Caulmert Limited

Engineering, Environmental & Planning Consultancy Services

Wasperton Farm Quarry Recovery Permit

Smiths Concrete Limited

Environmental Permit Application

Dust & Emissions Management Plan

Prepared by:

Caulmert Limited
Office: Strelley Hall, Main Street, Strelley, Nottingham, NG8 6PE
Tel: 01773 749132
Email: andystocks@caulmert.com
Web: www.caulmert.com

Document Reference: 5526-CAU-XX-XX-RP-V-0304.A0.C1

August 2024

Caulmert
engineering environmental planning

APPROVAL RECORD

Site:	Wasperton Farm Quarry Recovery Permit
Client:	Smiths Concrete Limited
Project Title:	Environmental Permit Application
Document Title:	Dust & Emissions Management Plan
Document Ref:	5526-CAU-XX-XX-RP-V-0304.A0.C1
Report Status:	**Final**
Project Manager:	Andy Stocks
Caulmert Limited:	Strelley Hall, Main Street, Strelley, Nottingham, NG8 6PE

Author	Samantha Hayden/Enlli Roberts Environmental Consultant	**Date**	25/07/2024
Reviewer	Andy Stocks Director of Environment	**Date**	30/07/2024
Approved	Andy Stocks Director of Environment	**Date**	30/07/2024

Revision Log			
Revision	**Description of Change**	**Approved**	**Effective Date**
C1	Initial Release	AS	06/08/2024

DISCLAIMER

This report has been prepared by Caulmert Limited with all reasonable skill, care and diligence in accordance with the instruction of the above-named client and within the terms and conditions of the Contract with the Client.

The report is for the sole use of the above-named Client and Caulmert Limited shall not be held responsible for any use of the report or its content for any purpose other than that for which it was prepared and provided to the Client.

Caulmert Limited accepts no responsibility of whatever nature to any third parties who may have been made aware of or have acted in the knowledge of the report or its contents.

Dust & Emissions Management Plan

TABLE OF CONTENTS

DRAWINGS

5526-CAU-XX-XX-DR-V-1801 Sensitive Receptors Plan

APPENDICES

Appendix 1 Daily Installation Checks Form
Appendix 2 Complaints Recording Form
Appendix 3 Dust Assessment

1.0 INTRODUCTION

1.1 Overview

1.1.1 Caulmert Limited have been appointed by Smiths Concrete Limited ('the Operator') to prepare a new bespoke environmental permit application for a waste recovery operation at Wasperton Farm Quarry ('the Site'), located within an agricultural area in the vicinity of Holloway Farm and Wasperton Farm, close to the town of Barford, Warwickshire.

1.1.2 The Operator proposes to import inert wastes to the Site in order to achieve the required restoration levels.

1.1.3 It is proposed to accept up to 1.2 million tonnes of inert wastes in order to complete the site. The quarry will be worked in a phased manner (a total of 12 phases) and reinstated using imported inert materials to recreate agricultural land, together with a new area of ecological habitat on a proposed silt lagoon.

1.2 Objectives

1.2.1 This Dust & Emissions Management Plan (DEMP) will provide thorough detail of appropriate measures that are required for effective dust and other particulate emissions management at the site and will outline control measures for any increase in visual dust or other particulate emissions.

1.2.2 This DEMP has the aim of ensuring that potential dust and other particulate emission sources are identified and controlled at source where possible. The DEMP aims to minimise the risk of dust and other particulate emissions impact on receptors outside of the site boundary. As a minimum this DEMP will consider the following elements:

- An assessment of the risks of dust and other particulate emissions at the site;
- Identify the appropriate controls to manage the identified risks;
- Visual monitoring to confirm effectiveness of control measures;
- Complaints handling;
- Identify actions, contingencies, and responsibilities when dust or other particulate emissions arise; and,
- Regular review of the effectiveness of the dust and other particulate emissions control measures.

1.2.3 A copy of this DEMP should be kept in the Site Office at all times and is intended for use by site operatives and managers for the control of dust and particulate emissions at the site. This is a live document and should be reviewed regularly and updated if changes are made to site activities. Electronic copies will also be held on the company's database system.

1.2.4 In addition to this DEMP, an 'Environmental Risk Assessment' has been produced as part of this permit application, which considers any potential risks (including dust) associated with the proposed operations, under document ref. 5526-CAU-XX-XX-RP-V-0302.

1.3 Site Location

1.3.1 The Site sits at Wasperton and Holloway Farms, to the south of the village of Barford. The centre of the Site can be found at OS Grid Reference SP27479 59454. The Site location and boundary is shown in Figure 1 below.

1.3.2 The Site is currently used for arable farming with a mix of crops being grown. Also within the Site are a number of small tree blocks, which are a mix of natural and planted areas.

1.3.3 Current access is from the A429 Warwick to Wellesbourne Road via 3 existing entrance points, at Wasperton Farm, Holloway Farm and an access/bridleway that links Marl Pit Cottages opposite Wasperton village.

1.3.4 To the north of the Site is Wasperton Lane, with Barford village centre being further north of Wasperton Lane. To the east, the land rises to Wasperton Hill. To the south the land is generally flat farmland falling very gently to the Thelsford Brook. The western boundary is formed by the A429 Wellesbourne Road, with Wasperton village sitting to the west of the road between the A429 and the River Avon.

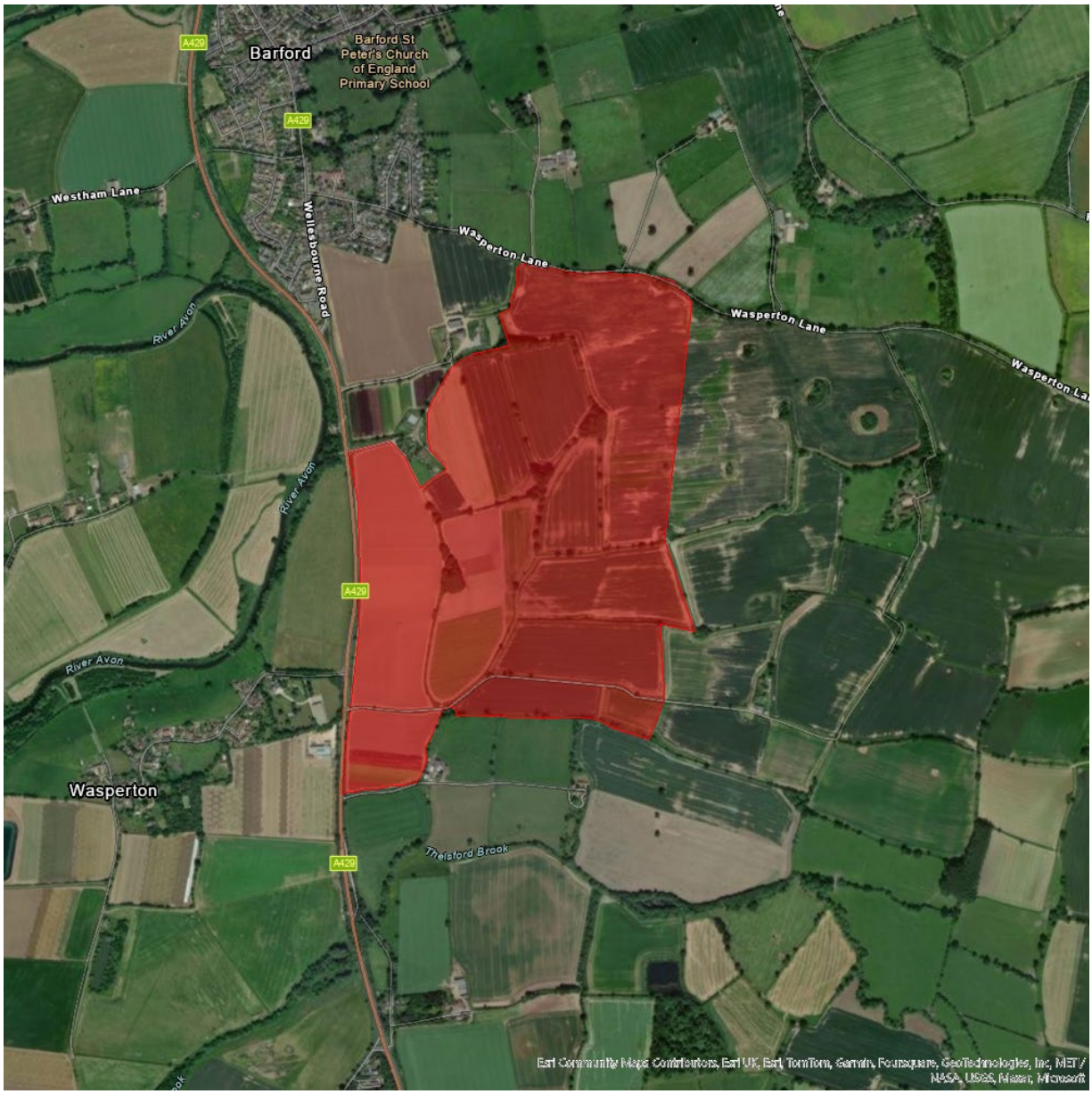


Figure 1 - Site Location (permit boundary outlined in red)

2.0 RECEPTORS & PATHWAYS

2.1 Overview

2.1.1 A sensitive receptor search has been conducted of the surrounding area within 1km radius of the of the site boundary (see Figure 2) using Defra's Magic Maps website[1] and other publicly available sources. The sensitive receptors identified are listed below in Table 1 and shown on the attached 'Sensitive Receptor Plan' drawing ref. 5526-CAU-XX-XX-DR-V-1801. The distance to each receptor is measured from the site boundary, as shown in Figure 1.

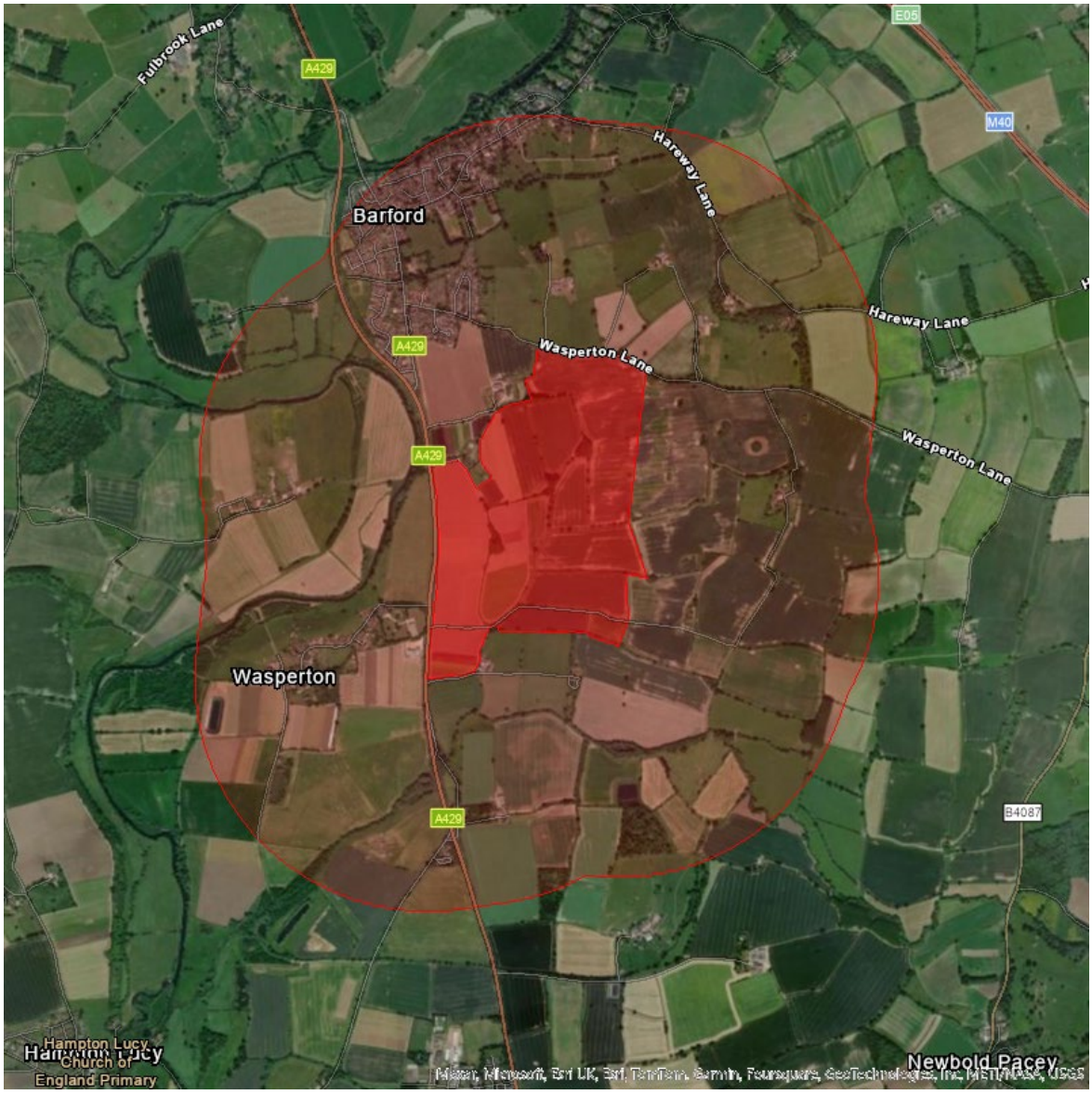


Figure 2 – 1km radius from the site boundary.

[1] DEFRA Magic Maps 2023: https://magic.defra.gov.uk/MagicMap.aspx

2.2 Sensitive Receptors

2.2.1 Sensitive receptors include human receptors, ecological receptors, agricultural land and surface waters, which could be affected by dust and particulate matter from the proposed activities. Human receptors can be further broken down into residential, recreational, commercial and industrial. Ecological receptors including flora and fauna can be sensitive to smothering by dust and surface waters can be sensitive to pollution by contaminated dust entering water.

2.2.2 The site is located adjacent to Holloway and Wasperton Farms (both situated along the northern perimeter), and Glebe Farm is located on the southern boundary. The closest human receptors are workers, visitors, and residents on the aforementioned tenanted working farms and also in The Forge Cottage and Bradshaw Farm to the northwest and west. The largest potential group of sensitive receptors are the residential and commercial properties in Barford Village, the closest approximately 325m north and 480m west, particularly those residing along Wellesbourne Road, Wasperton Lane, Sandy Lane, and Dugard Place. Additional potential receptors include users of the A429 Wellesbourne Road as it forms the western boundary of the site and is the primary access road to the site. There are no hospitals within 1km of the site. The closest school is 670m north of the site boundary.

2.2.3 There are no statutory ecological designations within 1 km of the site boundary. The primary site of ecological importance abutting the site is the River Avon, located approximately 90 m from the western boundary, as well as tributaries located within the northern areas of the site itself. The river is designated as a Local Wildlife Site (LWS) and serves an important function as a habitat corridor. Local Wildlife Sites typically have a low sensitivity to dust soiling, except for where smothering of vegetation could occur.

2.2.4 Firtree Hill is a deciduous woodland located approximately 800m south-east of the site, and there is an area of improved grassland approximately 900 m south-west of the site boundary. The remaining ecological designations within the 1 Km radius include Wasperton Farm (arable land favoured by lapwing), St John the Baptist Churchyard (moderately species rich churchyard), Watchbury Hill (ungraded nature conservation site), and Rushy Close (broadleaved plantation of poplar), all designated as non-statutory Ecosites.

2.2.5 Within 2km of the site boundary, there are no Sites of Scientific Interest (SSSI), Special Areas of Conservation (SACs), Special Protection Areas (SPAs), National Nature Reserves (NNRs), Ramsar sites or Areas of Outstanding Natural Beauty (AONBs). The Site is not within a Source Protection Zone (SPZ), with the closest (Zone II subsurface activity SPZ) 570m to the south. The closest Ancient Woodland designation is Hampton Wood, located 1.4km to the west

Table 1 – Summary of Sensitive Receptors within 1km of the Site Boundary

Receptor	Receptor Type	Distance/Direction
River Avon	Local Wildlife Site (LWS) / Surface Water	On-site and 90m W
Users of footpaths/bridleways	Public Footpaths	Crossing Site on E and S, 5m S
Users of Wasperton Lane	Public Road	5m N
Holloway Farm	Residential / Agricultural	5 m N
Glebe Farm	Agricultural / Residential	10 m E & S
Thelsford Brook	Surface Water	20m SE
Wasperton Farm	Residential / Agricultural	40m N
The Forge Cottage	Residential	55 m NW
Bradshaw Farm	Residential	60m W
Houses off Dugard Place / Wasperton Lane, Barford	Residential	160m NW, 290 m NW
Seven Elms Barn (Office)	Commercial	180m S
Wasperton House	Residential	190 m SW
Middle Watchbury Farm	Recreational	225m N
Marl Pit Cottages	Residential	250m E
Houses in Wasperton Village	Residential	270m W
Houses off Sandy Way, Barford	Residential	325 m N
Allotments	Recreational	360m NW, 445m W
St. John the Baptist Church	Recreational	400m W
Houses off Wellesbourne Road / Brembridge Close, Barford	Commercial / Residential	480m W
Watchbury Hill	Residential	500 m NE
Barford House	Residential	515m NW
Lower Watchbury Farm	Recreational	520m NE
The Green Barn House	Commercial	560m NE
Thelsford Farm	Residential	570m S
Barford School (Playing Field)	Residential	575 m N
Firtree Hill Spinney	Woodland Habitat	600 m S
St.Peters Church	Recreational	615m N
Barford School (main building)	Residential	670m N
Wasperton Hill	Commercial	670 m E
Grovefields House	Residential	730m W
Thelsford Cottages	Residential	730m S
Barford Village Centre	Residential	770 m NW
Rushy Close Spinney	Woodland Habitat	800 m SE
Woodlands House	Commercial	920m NE

2.3 Meteorological Setting

2.3.1 Fugitive emissions of dust from the site are likely to be affected by local weather conditions, in particular by wind direction and strength.

2.3.2 The closest meteorological station to the site actively recording wind statistics is Lawford Heath/Rugby, located over 22 km northeast of the Site. Wind statistics from this weather station are considered to be representative of the typical conditions at the site (see Figure 2 below).

2.3.3 A review of the data recorded daily between November 2008 and June 2023 on the Windfinder.com website[2] indicates that the prevailing wind direction is from the southwest towards the northeast. Therefore, there is limited potential fugitive emission propagation towards the majority of sensitive receptors which are located northwest of the site, including the nearby village of Barford. To the northeast, there are only a few farms and homesteads downwind of the proposed operation, which are at some distance (over 500m) from the site.

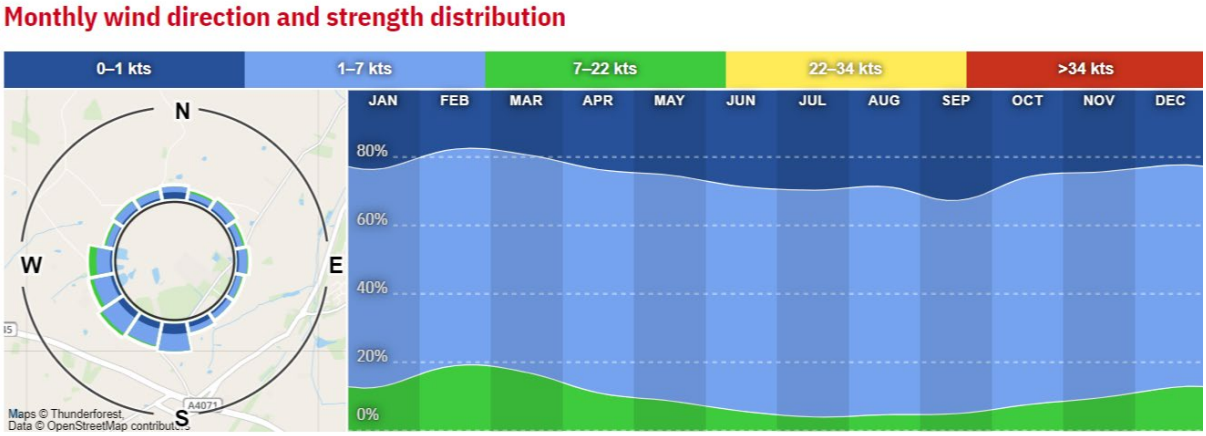


Figure 2 – Lawford Heath / Rugby wind statistics – average wind direction & strength 2008 to 2023

2.4 Airborne Pathways

2.4.1 It is considered the potential pathways for dust and particulate emissions to impact on receptors is via airborne transmission. Factors affecting dust and particulate emissions include:

- Quantity of wastes or stockpile heights
- Types of wastes
- Dry weather
- Wind direction, exposure and speed
- Exposure/distance of sensitive receptors to site operations/dust source

[2] Windfinder website 2023, found here: https://www.windfinder.com/windstatistics/lawford-heath_rugby

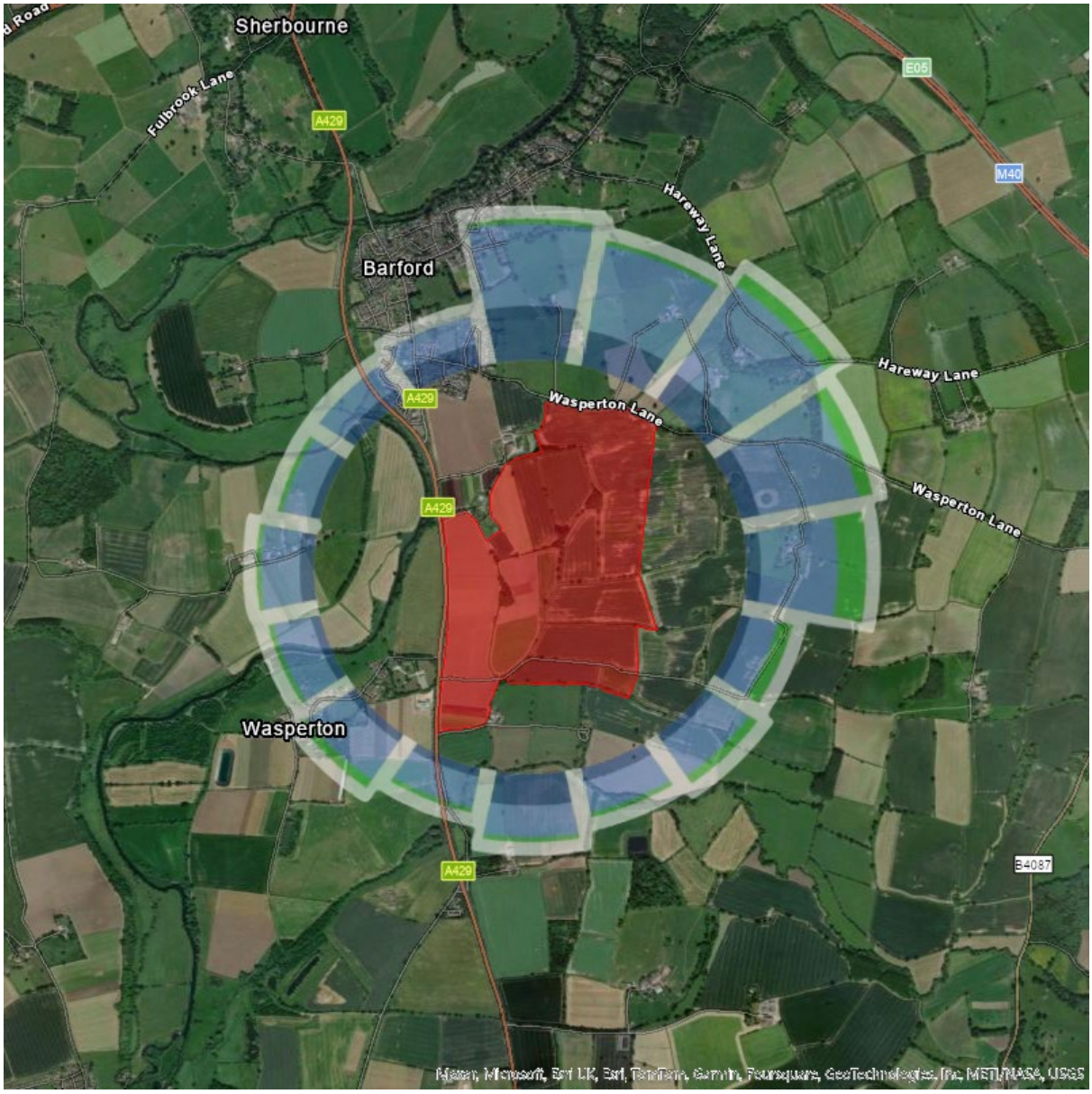


Figure 3 – The direction towards which the prevailing wind is blowing (NE) in relation to the site.

3.0 DUST SOURCES

3.1 Site Operations

3.1.1 The Site is being developed as a sand and gravel quarry by Smiths Concrete Limited in an area between Wasperton Farm and Holloway Farm.

3.1.2 As part of this, the Operator proposes to import 1.2 million tonnes of inert waste materials to return a larger part of the site to agricultural land after quarrying, in 12 phases and restoring the site to the required restoration levels.

3.1.3 Imported inert materials will undergo strict waste acceptance procedures prior to being accepted into the recovery operation.

3.1.4 The proposed recovery operation will use the following mobile plant:

- Front-end loading shovels
- Dumper trucks
- Bulldozer
- Tractor bowser

3.1.5 Site operatives will be trained in keeping dust emissions to a minimum during handling and transit around site and between the stockpile areas and recovery areas.

3.1.6 The handling and processing of materials on site will be well controlled to prevent excessive agitation, double handling and creating dust emissions. Drop heights of materials will be minimised. Good housekeeping of site surfaces, and processing areas will ensure the site is maintained in a clean and tidy condition.

3.1.7 The anticipated working hours shall be:

Monday to Friday: 07.00 to 19.00

Saturday: 07.00 to 13.00

Sunday: Closed

3.2 On-Site Dust Sources

3.2.1 Fugitive dust could result in visible dust being observed crossing the site boundary and nuisance can be caused by dust deposition on surfaces at sensitive receptors. Temporary storage and recovery activities will be undertaken on-site. Site operations will be designed in such a way that any emissions released will have the minimum impact on the environment and local receptors.

3.2.2 Dust and particulates can be generated from dry materials, site surfaces, vehicles, dried mud and other dry materials. Dry wastes and other materials may give rise to dust when processed or handled (unloaded or loaded, , moved etc.), particularly in dry or windy conditions outside.

3.2.3 The potential dust sources as a result of site operations have been identified at the site and these are detailed below:

- Delivery of wastes to site
- Loading and unloading of waste materials and stockpiles
- Vehicle movements
- General handling of wastes
- Windblown action across site surfaces and stockpiles of waste
- Deposition and compaction of wastes.

3.2.4 The surrounding operations at the Quarry Site i.e. vehicle movements around haul roads, sand and gravel extraction, could give rise to dust, however this will be controlled by operational procedures for the quarry, are generally short-term, transient operations and geographically restricted (only taking place in one phase at a time).

3.3 Off-Site Dust Sources

3.3.1 The site is predominantly surrounded by arable agricultural land, and so the associated farming activities (ploughing, harrowing, agitation of the soil by farm vehicles) could give rise to dust emissions, particularly in dry, windy conditions.

4.0 DUST CONTROL MEASURES

4.1 Overview

4.1.1 This section details the control measures that will be undertaken on site to mitigate dust and particulate emissions from site activities. The abatement of dust and particulate emissions will be based on best management practices.

4.2 Waste Acceptance

4.2.1 Waste carriers will report to the weighbridge and waste transfer notes inspected for their load, and if in order, the waste carrier will then be sent to the appropriate unloading area within the site and site operatives will visually inspect the waste load, including for dust emissions or excessive debris. Any non-conforming wastes will be rejected from site.

4.2.2 Drop heights will be minimised during the loading and unloading of materials to reduce the likelihood of dispersion of dust as a consequence of agitation. The weighbridge will conduct assessments of waste inputs and impose controls and restrictions on potentially dusty wastes. If required, the surface of the material will be dampened down prior to entering site.

4.3 Site Traffic and Movement of Vehicles

4.3.1 All site traffic will be kept to designated haul routes within the local area. The surface of internal haul routes will be inspected daily and swept at regular intervals with any defects made-good. Unmade access roads should be kept in good repair and wetted as required with a water bowser or sprinkler system.

4.3.2 All new drivers to site, contractors and visitors will be fully inducted on traffic movements and their responsibility to minimise dust emissions from vehicle movements. In the event of materials being entrained on the underside of vehicles and site plant, wash-down and cleaning facilities are made available to reduce the build-up of materials which could be further tracked and released as airborne dust.

4.3.3 During extended dry periods of weather, the movement of any vehicle can generate a substantial amount of dust and particulates which can cause nuisance to nearby receptors. In order to minimise the generation and entrainment of dust onto public highways, it is a site requirement that all vehicles entering and carrying potentially dusty loads are covered or sheeted.

4.3.4 Further standard good practices for site traffic on site will include:

- Setting appropriate site speed limits;
- Supervised loading of vehicles to avoid waste spillages;
- Ensuring even road surfacing and potholes filled;
- Regular removal of spilled material from site haul routes; and,

- Dust suppression by regular spraying in dry conditions.

4.3.5 A road sweeper, or other suitable equipment, will be deployed promptly to remove any debris or other deposits on internal roads to prevent drag out onto the public highway.

4.3.6 Good general housekeeping on site will be maintained by site operatives and checked by the Site Manager daily, with any spillages of potentially dusty wastes on site roads cleared as soon as possible and vehicles leaving site checked for any tracked mud or debris that could be stuck to wheels and removed prior to exiting the site.

4.3.7 On-site vehicle speed limits enforced to ensure vehicle movements do not generate excessive dust. An Anti-idling policy will be in place for vehicles to reduce emissions including noxious gases, particulates and dust.

4.3.8 In line with manufacture's specifications, all mobile plant and machinery shall be maintained as per the minimum requirements specified by the manufacturer, to ensure they are running smoothly and cleanly.

4.3.9 Any malfunction or breakdown leading to abnormal emissions will be dealt with promptly and operations will be modified or suspended until normal working conditions can be restored.

4.4 Loading and Tipping Operations

4.4.1 All wastes handled on site shall be done so in a controlled manner, with consideration given to the potential for dust generation at all times. Loading and tipping heights will be minimised to avoid uncontrolled dust emissions.

4.4.2 Dust suppression equipment will be available (e.g. hoses and bowser) to dampen down dusty loads and roads. Where necessary, delivery and collection vehicles will be sheeted when entering and leaving the site.

4.5 Materials Storage

4.5.1 Good housekeeping on site will include regular checks by site staff in all processing, waste handling and storage areas for any build-up of loose debris from the processing plant on site and movement of wastes across site. Movement of wastes will be undertaken for the shortest distances possible across site to their destination to reduce potential entrainment of dusts into the air. Site management will be notified if excessive loose debris or dust is present and appropriate sweeping and collection of debris and dampening of dust will be undertaken.

4.5.2 The movement of waste materials across site, by site vehicles and plant, will be limited where possible to suitable weather conditions, avoiding excessively windy, or dry conditions that could release dust and debris.

4.5.3 Site management will monitor stockpile heights to ensure they are not exceeding capacity and to prevent potential for wind blow action across tops of piles. Soil storage bunds should be stabilised by seeding and maintained appropriately.

4.5.4 Dust controls will include dampening down of the waste in stockpiles or limiting the quantity of wastes stored on-site during dusty conditions.

4.5.5 All movement of materials will be conducted during the normal site operational hours.

4.5.6 Daily and weekly inspection of the site will be undertaken and recorded in accordance with standard operating procedures. Any issues identified during inspection shall be reported to the Site Manager and remedial actions instigated. The daily inspections will include visual inspections for dust, as well as housekeeping of site surfacing and machinery.

4.5.7 As an overriding requirement, if winds which carry visible dust off-site towards any sensitive site receptor are observed by site operatives, then the site operations giving rise to the dust in that part of the site will be modified, or suspended where necessary, until more suitable conditions pertain, or until effective dust control measures are implemented.

4.6 Dust Suppression and Equipment

4.6.1 The main dust suppression at the site will be provided by hoses and tractor and bowser.

4.6.2 The equipment used for dust suppression will be inspected weekly and any maintenance requirements implemented and recorded by site operatives. Where necessary the equipment used for the processing and movement of materials around site shall be regularly inspected and cleaned to remove excess debris which could generate dust around site. Site operatives will be adequately trained in the safe and appropriate use and maintenance of dust suppression equipment.

4.6.3 An adequate water supply for dust suppression will be maintained at the site using mains water and clean water from lagoons on site. It is anticipated only small amounts of water will be used, but higher in summer if prolonged hot dry conditions. The use of water for dust suppression will be managed to ensure excessive water is not used. Water from the site surface will be directed via ditches/drains to the on-site lagoons/surface water management system.

4.6.4 Suitable road cleaning equipment will be kept available to ensure that areas are kept clear and tidy and trafficked areas kept routinely dampened in dry, windy conditions to reduce the risk of airborne dust emissions.

4.6.5 A road sweeper will be deployed promptly to remove any debris or other deposits from adjacent highways if debris is tracked off-site by vehicles.

4.7 Site Management

4.7.1 Site management shall be responsible for the satisfactory working of the whole site and operations ensuring full compliance with the dust emissions management plan. Site management will be responsible for checking the meteorological conditions for that day and for ensuring the appropriate dust control measures are in place. Site management may

impose restrictions, where deemed necessary, on operations that may give rise to dust to reduce the impact of dust and particulate emissions.

4.7.2 In line with waste acceptance procedures, wastes consisting solely or mainly of dusts will be excluded from site.

4.7.3 As part of the company management system, staff will receive the necessary training and instruction in their duties relating to all operations and the potential sources of dust emissions. Emphasis will be given to plant and equipment malfunctions and abnormal conditions.

4.7.4 Site management shall ensure that all personnel working at the site or visiting are aware of the need to comply with this Dust & Emissions Management Plan.

4.7.5 Any persons on site failing to comply with the requirements of the Dust and Emissions Management Plan and site procedures will be re-trained as necessary. External hauliers failing to abide by site rules in respect of vehicle operations will be reported and if required, asked to leave site.

5.0 EMISSIONS ACTION PLAN

5.1 Overview

5.1.1 In the event that site monitoring identifies that there are visible airborne dust and/or particulate emissions that have, or are likely to be, transported beyond the site boundary and cause an unacceptable dust impact at a nearby sensitive receptor, immediate action shall be taken to stop the material handling/treatment/landfilling operations giving rise to the emissions.

5.2 Dust Emissions Event Procedures

5.2.1 The following actions will be undertaken as part of the Action Plan should dust and/or particulate emissions be detected:

- Additional visual monitoring to identify the extent of the impact and potential cause and source;
- Examination of the operational activities at site at the time of the complaint or identification of an impact;
- Examination of the meteorological conditions at the time of the complaint or identification of an impact;
- Carry out a review of the operational procedure and controls and instigate any control measures immediately following identification of the problem;
- Further monitoring will be carried out to ensure the issue has been addressed and to monitor the effectiveness of any control measures undertaken.

5.2.2 In the event that dust emissions are observed to be crossing the site boundary or surfaces (such as trees/vegetation and cars) are becoming soiled, the site management will be informed immediately and the approximate location and extent of the dust, or deposition, assessed and site operations reviewed and remediated.

5.2.3 The rate of dust suppression will be adjusted to suit the conditions observed, ensuring water coverage is sufficient to prevent fugitive emissions to air. In extreme circumstances, if there is evidence of significant amounts of dust, all site activities will be suspended until the affected area has been dampened with sufficient water preventing emissions to air.

5.2.4 If airborne emissions are the result of equipment failure, faulty items of plant will be repaired/replaced as required. As part of plant maintenance, records will be made of repairs or replacement parts.

5.2.5 Operations that were halted due to adverse wind conditions will only resume when the wind conditions are deemed suitable. Suitable conditions will be determined by the Site Management and will comprise conditions where dust emissions and particulates are not

carried by the wind from the source to cause significant visible dust emissions that have the potential to leave the site boundary into the surrounding area.

5.2.6 If unacceptable airborne emissions have been observed, appropriate remediation measures will be put in place with immediate effect. The frequency of inspections will only be reduced once the issue has been fully resolved.

5.2.7 A record must be made of any dust emission incidents and actions taken. A review of the operational procedure and process controls will be initiated.

5.2.8 Waste storage and processing procedures should be reviewed, and additional controls imposed as deemed necessary by the Site Manager.

5.3 Responsibilities

5.3.1 It is the responsibility of all site personnel to maintain a visual awareness of dust emissions during the working day as part of continual proactive environmental monitoring. Any significant dust emissions occurring with the potential to travel beyond the site boundary will be reported to the Site Manager/designated person who will be responsible for investigating the cause and taking immediate action to minimise further emissions.

5.3.2 Site management (or designated persons) will also be responsible for daily visual checks which will be carried out as part of their normal operational procedures monitoring of dust levels and conditions associated with the potential for fugitive emissions of dust. In particular, this is in relation to:

- Dry surfaces where dust or debris is present;
- Any part of the site where movement of vehicles may generate dust;
- Any part of the site where dust may be generated by wind;
- Storage areas of material; and,
- Transport and handling of material on-site.

5.3.3 The site boundary will be checked weekly to ensure that there are no waste materials or debris being blown off site which has the potential to cause nuisance. If a complaint regarding such an emission is received, the company Complaints Record Form will be completed. Any corrective and preventative actions will be recorded.

6.0 MONITORING

6.1 Overview

6.1.1 Dust monitoring will be undertaken in order to assess operational management and mitigating control measures at site and to identify if necessary, whether dust is causing a potential nuisance. Monitoring will also ensure that appropriate remediation measures are adopted early. In addition, a visual awareness of dust is made and recorded daily logged in the 'Daily Site Checks Form' (Appendix 1).

6.1.2 Monitoring will be undertaken by designated staff who will be fully trained by site management. All site personnel will be responsible for reporting any problem dust emissions identified during their day to day operations. Monitoring at the site will consist of the following as shown in Table 2 below:

Table 2 – Monitoring Overview

Parameter	Monitoring Technique	Frequency
Meteorological Monitoring	Using weather station app or website.	Manually checked at start of each working day.
Dust Monitoring	Dust monitoring as part of daily site inspections. On-site checks and off-site checks in response to an issue being identified.	Daily on site checks (or more frequently following dust complaints, or during prolonged dry or windy conditions).
Complaints Monitoring	Logged in site diary in accordance with complaint procedure. In addition to intranet complaints log.	Ad-Hoc.

6.2 Meteorological Monitoring

6.2.1 In the event of dust complaints, the weather data enables complaints to be assessed against the meteorological conditions for the relevant period. Meteorological information will also be recorded in the 'Complaints Record Form' (Appendix 2).

6.3 Dust and Particulate Emissions Monitoring

6.3.1 Site staff will visually monitor the operations likely to cause airborne emissions. The frequency of these inspections will be risk-based but will occur daily as a minimum. Inspections will be increased in response to adverse weather conditions, and the activities undertaken on site. Inspections will be increased when the following situations are encountered (this list is for guidance only and is not exhaustive):

- Increases in wind speed;

- Intensity of wind;
- Changes in wind direction towards sensitive receptors;
- Periods of hot, dry weather; and,
- Any unscheduled activity (e.g. dealing with an emergency).

6.3.2 As part of the daily inspections, appropriately trained and experienced site personnel will carry out an on-site inspection to monitor dust and particulate emissions, which will be recorded on the 'Daily Site Checks Form' (Appendix 1). The records of the site daily inspections will be made available to the Environment Agency on request.

6.3.3 In the case of an emission, the below information will be recorded in the Site Diary:

- Date and time of dust/particulate emission;
- Meteorological conditions;
- Potential source of dust emissions/operations during the observation;
- Any complaints received and remedial actions to be taken to minimise or eliminate dust emissions.

6.3.4 It is the responsibility of all site personnel to maintain a visual awareness of dust emissions during the working day. Any significant dust emission occurring during the working day with the potential to travel beyond the site boundary will be reported to site management and a record made in the Site Diary. Site Management will be responsible for investigating the cause and taking immediate action to minimise further emissions. If necessary, site operations will be halted until appropriate remedial action(s) is completed.

6.3.5 Dust and particulate matter monitoring will include observing the movement of vehicles, stockpiling and movement of materials, to establish if such operations are giving rise to dust emissions and the size and frequency of these releases. Daily monitoring will also check for evidence of dust escaping beyond the site boundary or surfaces are becoming soiled (e.g. trees/vegetation and cars).

6.3.6 In the event that dust emissions are observed to be crossing the site boundary or surfaces are becoming soiled, the site management will be informed immediately and the approximate location and extent of the dust, or deposition, assessed and site operations reviewed and remediated.

7.0 ENGAGEMENT WITH NEIGHBOURS

7.1 Complaints Procedure

7.1.1 As part of this Dust & Emissions Management Plan, engagement with the neighbours will be undertaken.

7.1.2 Typically, any complaints received at the site are likely to be through the Environment Agency or Local Authority although the operator is willing to deal directly with the complainants and where necessary the following can be implemented:

- Information can be provided to the local neighbours (via the Local Authority) regarding the point and method of contact for the site in the event that fugitive dust has been detected or they want to discuss any activities at the site;
- Complainants can be advised that any complaints/concerns will be addressed immediately following identification/notification and contingency action measures implemented;
- Complainants can be advised of any corrective action and a follow up call carried out by the Site Manager if required.

7.1.3 The primary point of contact at the site for complaints and liaison with the neighbours is the Site Manager, who will ensure that the recording, investigation and close-out of any complaints is undertaken as described as below and in accordance with company management procedures.

7.1.4 In the event of a dust complaint being received by the Local Authority the complaint is passed to the Operator for investigation. Every complaint will be recorded as per the company's Complaint Reporting Procedure, a Complaints Record Form (Appendix 2) will be completed and an entry made in the Site Diary to include the following information:

- Date and time of complaint;
- Extent of complaint;
- Meteorological conditions at time of complaint;
- The complainant's contact details including name and contact telephone;
- Name of person filling out Complaint Record Form/Site Diary;
- Action taken to resolve complaint or investigate complaint further;
- Depending on the severity, the complaint can be escalated to senior management for even further investigation if necessary.

7.2 Complaints Monitoring

7.2.1 Any complaints received directly by the site or via the regulatory bodies, will be recorded on the Complaints Record Form (Appendix 2) and will instigate dust monitoring at the location of the complaint and on site to determine the extent and location of the plume and the source of the dust will be identified. If necessary, monitoring will also be carried out at the nearest sensitive receptors to the site and the monitoring results recorded.

8.0 GENERAL SITE PROCEDURES

8.1 Record Keeping

8.1.1 The Complaints Record Form (Appendix 2) will be completed, and notes made in the Site Diary of records made. Daily site inspections will be recorded on the 'Daily Site Checks Form' (Appendix 1). The forms will be maintained free from damage and kept within the Site office and will be made available to the regulating authorities on request. The record keeping will form part of the site's Management System.

8.2 Staff Training

8.2.1 The designated person or Site Manager will be responsible for ensuring staff receive proper and adequate training in respect of dust and emissions management.

8.2.2 Site staff will undergo training to ensure that they understand how their actions and the site operations can affect airborne emissions. Staff will be instructed to not operate unless the site controls are operational and to alert site management at times when the site could potentially cause a dust/emissions nuisance. Staff will be trained to apply dust suppression on operations when conditions require and trained to visually inspect for airborne dust emissions. Staff will be instructed to report fugitive dust emissions to the designated person or the Site Manager with immediate effect.

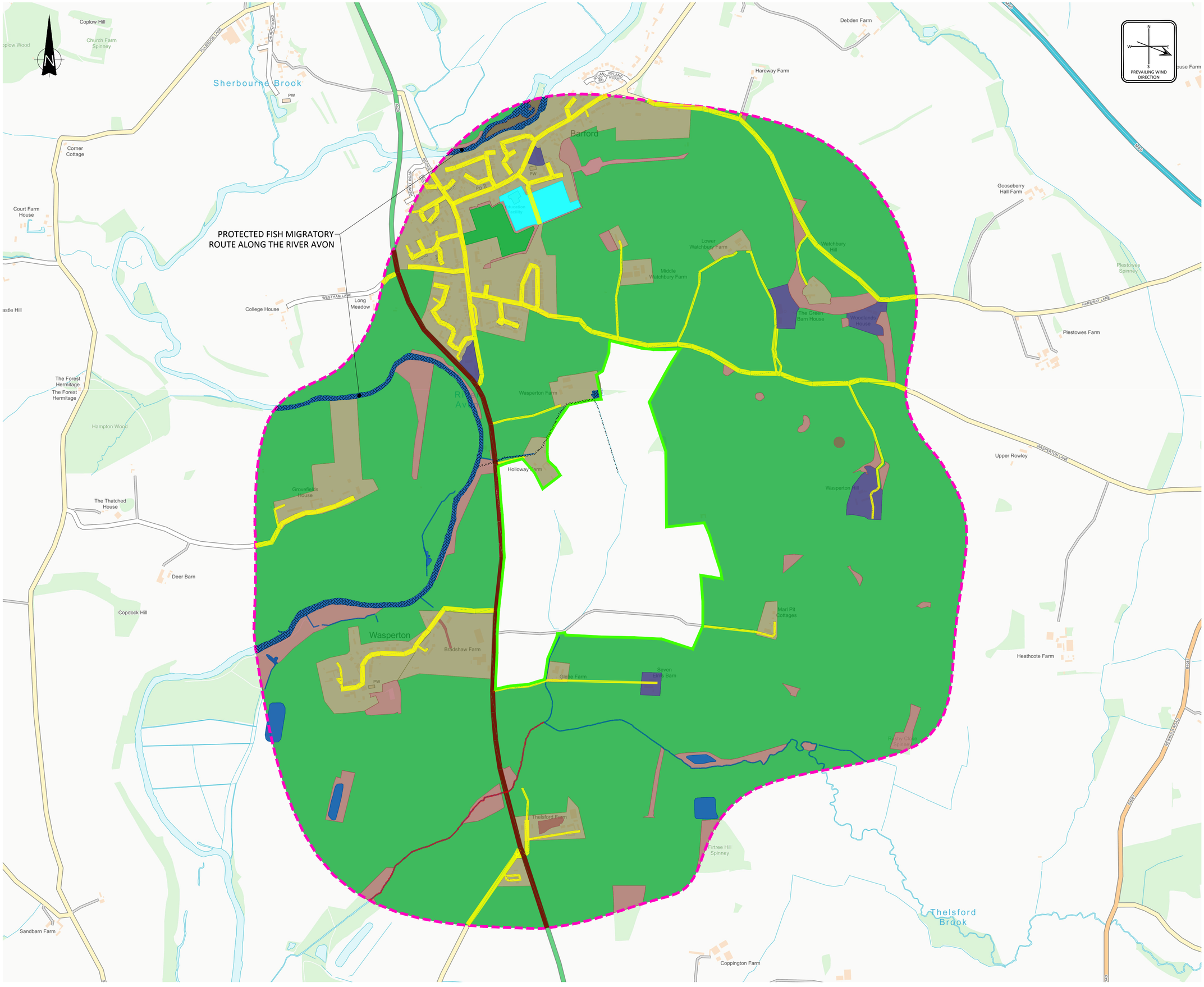
8.2.3 Staff training records will also be updated and stored within the Site Office.

8.3 Dust & Emissions Management Plan Review

8.3.1 This Dust & Emissions Management Plan (DEMP) will be reviewed by Site Management on a regular basis to ensure that the controls described are effective and reflect best available techniques. The management plan will also be reviewed following a number of complaints at the site or if there are relevant changes in the site operations or procedures.

DRAWINGS

5526-CAU-XX-XX-DR-V-1801 Sensitive Receptor Plan



LEGEND

- PERMIT BOUNDARY
- 1000m OFFSET
- SURFACE WATER
- WOODLAND / SCRUBLAND
- COMMERCIAL
- EDUCATIONAL FACILITY
- INDUSTRIAL
- RESIDENTIAL
- MAJOR ROAD
- MINOR ROAD
- RAIL
- LOCAL WILDLIFE SITES

REV	MODIFICATIONS	BY	RE	AP	DATE
P01	ISSUED FOR INFORMATION	EJD	SH	SH	26.07.23

PURPOSE OF ISSUE: FOR INFORMATION — STATUS: S2

CLIENT: Smiths CONCRETE

PROJECT: WASPERTON FARM QUARRY

TITLE: SENSITIVE RECEPTORS PLAN

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
EJD	EJD	SH	SH

DATE	SCALE @ A2	JOB REF:	REVISION
25.07.2023	1:10000	5526	P01

DRAWING NUMBER: 5526-CAU-XX-XX-DR-V-1801

Caulmert engineering environmental planning

WWW.CAULMERT.COM

Registered Office: inTec, Parc Menai, Bangor, Gwynedd, LL57 4FG Company Registered No: 06716319

APPENDIX 1

Daily Site Checks Form

DAILY SITE CHECKS FORM	WEEK STARTING:	Smiths Concrete Limited

DAILY SITE INSPECTION		DAY							NOTES / REFERENCE
		M	Tu	W	Th	F	Sa	Su	
SITE ENTRANCE / NOTICE BOARD									
SECURITY - PERIMETER FENCING & GATES									
SECURITY - PORTACABINS & STORES									
WEIGHBRIDGE									
OFFICE									
WELFARE FACILITIES									
PROCESSING PLANT (if present)									
MOBILE PLANT (DUMPERS, LOADING SHOVELS)									
GENERAL HOUSEKEEPING									
FUEL TANK / BUND (if present)									
SITE ROADS / SURFACES									
DRAINAGE & SUMP (if present)									
WASTE STORAGE AREAS									
WASTE TYPES: - QUANTITY - QUALITY	Recovery Materials								
	General Waste								
	Quarantine Area								
AMENITY CHECKS:	Mud / Debris								
	Litter								
	Dust								
	Noise / Vibration								
	Odour								
	Pests / Vermin								
SPILL KITS									
FIRE EXTINGUISHERS									
FIRST AID KITS									(All radios working)
DUST SUPPRESSION SYSTEM									
OTHER									
INSPECTION CARRIED OUT BY:									
FIREWATCH (if required) COMPLETED BY:									

NOTES / ACTIONS (CONTINUE ON A SEPARATE SHEET IF NECESSARY):

CHECKED BY:		SIGNATURE:	
POSITION:		DATE:	
Sheet		*of*	

DAILY INSTALLATION CHECKS FORM	WEEK STARTING:	**Smiths Concrete Limited**

NOTES/ACTIONS (CONTINUATION SHEET):

CHECKED BY:		SIGNATURE:	
POSITION:		DATE:	
Sheet		*of*	

APPENDIX 2

Complaints Record Form

COMPLAINTS RECORDING FORM	REFERENCE NUMBER:	**Smiths Concrete Ltd.**

DATE & TIME REPORTED TO SITE:		
PERSON REPORTING	NAME	
	ADDRESS	
	TELEPHONE	
	EMAIL	
DATE & TIME COMPLAINT RECEIVED:		(If different to above)
PERSON MAKING COMPLAINT	NAME	(If different to above)
	ADDRESS	(If different to above)
	TELEPHONE	(If different to above)
	EMAIL	(If different to above)
NATURE OF COMPLAINT:		(eg. debris, dust, litter, noise, odour, pests, vibration)
DATE & TIME OF INCIDENT:		
WEATHER DURING INCIDENT	GENERAL CONDITIONS	
	WIND SPEED & DIRECTION	
ROOT CAUSE IDENTIFIED?		Y / N | Reference (if applicable)
REMEDIAL ACTIONS / CHANGES TO SITE PROCEDURES:		

NOTES / CONTINUATION:

COMPLAINT RECEIVED BY:	
COMPLAINT ACTIONED BY:	
COMPLAINT ESCALATED TO:	(If applicable)

APPENDIX 3

Dust Assessment

Dust Assessment

Proposed Quarry near Wasperton, Warwickshire

August, 2022

Smiths Concrete

This page is intentionally left blank

Document Control Sheet

Project Information

Title	Dust Assessment for a proposed quarry near Wasperton, Warwickshire
Job Code	ZSCWASP
Report Ref	ZSCWASP_DA_B_Final
Report Type	Minerals Dust Assessment
Client	Smiths Concrete Ltd
Client Contact	Ian Briggs (Landesign Planning and Design)
Revision	B
Status	Final
Date of Issue	12/08/2022

Revision History

Revision	Date	Authors	Reviewers	Approvers	Status
A	25/02/2022	Daniel Quinn	John Bruce	John Bruce	Draft
A	04/03/2022	Daniel Quinn	John Bruce	John Bruce	Final
B	12/08/2022	Daniel Quinn	John Bruce	John Bruce	Final

Distribution

Organisation	Contact	Date of Issue	Copies
Landesign Planning and Design	Ian Briggs	12/08/2022	01

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.

Report Prepared By

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

Table of Contents

List of Figures

List of Tables

1 Introduction

1.1 Overview

Smiths Concrete Ltd (Smiths) are preparing a planning application for a proposed sand and gravel quarry on land near Wasperton, Warwickshire; this is hereafter referred to as the proposed development.

The proposed development is located within the jurisdiction of Warwick District Council (WDC) and Warwickshire County Council (WCC) and lies well outside any declared Air Quality Management Area (AQMA).

It is proposed to extract and process up to approximately 1.8 million tonnes of sand and gravel over the course of 10 to 15 years, at a rate of up to 200,000 tonnes per annum. Extracted and processed minerals will be transported via Heavy Duty Vehicles (HDV) for use at the client's concrete batching sites, primarily Bubbenhall Quarry south of Coventry. The site will be restored to agriculture and wetlands using imported inert fill.

DustScanAQ (herein DS) have been instructed by Landesign Planning and Design, on behalf of Smiths, to undertake both dust and air quality assessments for submission with the application; an air quality assessment is provided separately. This assessment focuses on disamenity (nuisance) and human health impacts as a result of the development and operation of the proposed quarry.

There is no standard method for carrying out dust assessments for minerals sites although this report has been prepared with reference to relevant documents and best practice guidance, including the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG) relating to Air Quality[1] and guidance on dust and air quality assessments for minerals sites produced by the Institute of Air Quality Management (IAQM)[2], together with guidance developed by Environmental Protection UK (EPUK) in conjunction with the IAQM[3].

1.2 Objective

The objective of the assessment is to consider potential impacts to air in relation to the pollutants identified below, and potentially arising from the proposed development

1.3 Key pollutants

The assessment considers impacts from 'disamenity' (or 'nuisance') dust, associated with annoyance. Although there are no standards (such as AQO) for dust disamenity or annoyance, various 'custom and practice' criteria have become established.

[1] Ministry of Housing, Community & Local Government (2014). *Guidance: Air Quality.* Available at http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/
[2] Institute of Air Quality Management (2016). *Guidance on the Assessment of Mineral Dust Impacts for Planning (v1.1)*
[3] Environmental Protection UK and the Institute of Air Quality Management (2017). *Land-Use Planning & Development Control: Planning For Air Quality (v1.2)*

The assessment also considers impacts to air in relation to the national Air Quality Objectives (AQO) for PM_{10} (essentially particles less than 10 µm (micron) aerodynamic diameter), and $PM_{2.5}$ (essentially particles less than 2.5 µm aerodynamic diameter). These are also covered in more detail in the separate air quality assessment.

1.3.1 Disamenity dust

'Dust' is generally regarded as particulate matter up to 75 µm in diameter and in an environmental context can be considered in two size categories; coarser dust (particles greater than 10 µm) and fine particulate matter (PM_{10} and $PM_{2.5}$) as described above.

Coarser dust (particles greater than 10 µm) is generally regarded as 'disamenity dust' and can be associated with annoyance, although there are no official standards for dust annoyance[4]. Disamenity dust is more readily described than defined as it relates to the visual impact of short-lived dust clouds and the long-term soiling of surfaces.

Although it is a widespread environmental phenomenon, dust is also generated through many anthropogenic activities including materials handling, demolition, construction, vehicle use, arable farming and numerous industrial processes. 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.

1.3.2 Particulate matter

Particulate matter as a term refers to a mixture of solid particles and liquid droplets suspended in the air. These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some particles, such as dust, dirt, soot or smoke, are large or dark enough to be seen with the naked eye. Others can be so small that they can only be detected using an electron microscope. Fine dust, essentially particles up to 10 microns (µm), is commonly referred to as PM_{10}.

PM_{10} is known to arise from a number of sources such as construction sites, road traffic movement, industrial and agricultural activities. Very fine particles ($PM_{0.1}$ – $PM_{2.5}$) are known to be associated with pollutants such as NO_x and sulphur dioxide (SO_2) emitted from power plants, industrial installations and road transport sources.

$PM_{2.5}$ is generally associated with combustion and traffic rather than mineral sources.

[4] Note that the expression 'nuisance dust' refers here to '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.

1.4 Site setting

The proposed site covers an area of approximately 89 hectares and is located immediately to the east of the A429, as shown in Figure 1.1. The proposed site is currently in use as arable farmland.

The site is bounded to the west by the A429, to the north by Wasperton Lane, and to the east and south by open farmland. There are several farmhouses in close proximity to the site including Wasperton Farm and Holloway Farm, whilst the closest major settlements are Wasperton village, approximately 200 m to the west of site, and Barford approximately 330 m to the north.

There are no statutory designated ecological sites (such as SSSIs or SACs) within 3 km of the proposed site; the nearest, Sherbourne Meadows SSSI, being more than 3.8 km to the northwest. Consequently, it will not be impacted by dust impacts as a result of the proposed development. A small Local Wildlife Site runs along the northern boundary of the site and between Phases 2 and 3. It is being retained through the development, however a crossing point will be put in place while Phase 3 is being worked.

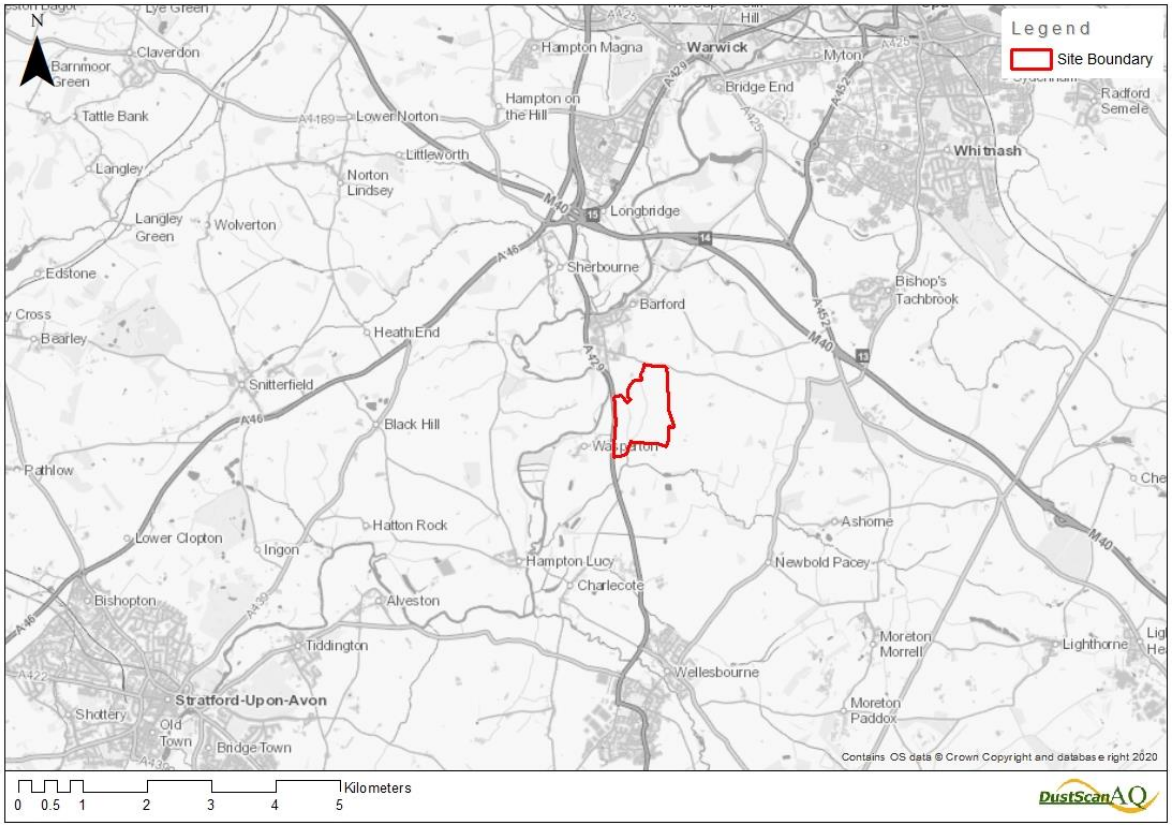


Figure 1.1: Site location

1.5 Proposed development

Full details of the proposed development are set out elsewhere, but in summary it is proposed to extract approximately 1.8 million tonnes tonnes of sand and gravel from within an approximately 78 hectare extraction and processing area, at a maximum anticipated rate of 200,000 tonnes per annum over a 10 to 15 year period.

As shown in Appendix D, the site will be worked over a series of 12 phases in a roughly anti-clockwise manner, with progressive restoration of the land using imported inert materials. Topsoil and sub-soil shall be initially stripped and used for construction of screening and storage bunds around the perimeter of the site. This material shall be used in the restoration of earlier phases.

Minerals will be extracted using a 360° excavator and front-end loading shovel, and will be transported to the plant site via dump trucks. A bulldozer will be used to shape the infill for returning the site to agricultural land. The mineral will be processed at the plant site which will be installed in the centre of the quarry in what will later become Phase 12.

The anticipated maximum hours of working shall be:

- Monday to Friday: 07.00 to 19.00;
- Saturday: 07.00 to 13.00; and
- Sunday: closed

It is proposed to restore the site to predominantly agricultural use with some small water bodies and marshland centred on Phase 1 near the middle of the site.

2 Legislation, policy and non-statutory guidance

2.1 Overview

This section of the report provides the relevant legislative, policy and guidance context for the assessment of the operation.

2.2 National (England)

The 2008 EU ambient air quality directive 2008/50/EC was transposed into English law through the introduction of the Air Quality (Standards) Regulations in 2010[5] which also incorporated the fourth EU Daughter Directive (2004/107/EC) that set target values for certain toxic heavy metals and polycyclic aromatic hydrocarbons, (PAH).

The UK government has a legal responsibility to meet the EU limit values. Part IV of the 1995 Environment Act[6] sets guidelines for protecting air quality in the UK and forms the basis of local air quality management. The Environment Act requires local authorities in the UK to review air quality in their area periodically and designate AQMAs where the objectives are not being achieved or are not likely to be achieved within the relevant period. Where an AQMA is designated, local authorities are also required to produce an 'Air Quality Action Plan' (AQAP) detailing the pollution reduction measures that need to be adopted to achieve the relevant air quality objectives within an AQMA.

As part of the Environment Act, the UK Government was required to publish a National Air Quality Strategy (NAQS) to establish the system of 'local air quality management' (LAQM) for the designation of AQMAs. This led to the introduction of the first Air Quality Strategy (AQS) in 1997[7] which has since progressed through several revisions until it was replaced by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007[8]. Each revision introduced strategies and regulations that considered measures for different pollutants by tightening existing objectives and also by introducing new ones to establish a common framework to protect human health and the environment by achieving ambient air quality improvements.

2.2.1 National Planning Policy Framework

The principal national planning policy guidance in respect of the proposed development is the National Planning Policy Framework (NPPF)[9]. The most recent update of the NPPF was published in July 2021 by the Department for Communities and Local Government (DCLG).

The NPPF 2021 contains five sections which are relevant to air quality.

[5] Statutory Instrument. (2010), 'The Air Quality Standards Regulations', No. 1001. Queen's Printer of Acts of Parliament.
[6] Parliament of the United Kingdom. (1990), 'Environmental Protection Act', Chapter 43. Queen's Printer of Acts of Parliament.
[7] Department for Environment Food and Rural Affairs. (1997), 'The United Kingdom National Air Quality Strategy', Cm 3587, Department for Environment Food and Rural Affairs.
[8] Department for Environment Food and Rural Affairs. (2007), 'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland', Cm 7169, Department for Environment Food and Rural Affairs.
[9] National Planning Policy Framework. Accessible at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

Section 105 states that:

> *"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."*

Section 174 (e) states that:

> *"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans…"*

Section 185 includes

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development…"*

Section 186 states that:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

Section 188 states that:

> *The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively.*

Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

2.2.2 National Planning Practice Guidance

The DCLG published a number of supporting web-based resources of Planning Practice Guidance (PPG)[10] to supplement the NPPF. With respect to minerals the PPG[11] provides guidance on the assessment of potential dust impacts from minerals sites:

"Where dust emissions are likely to arise, mineral operators are expected to prepare a dust assessment study, which should be undertaken by a competent person/organisation with acknowledged experience of undertaking this type of work.

There are 5 key stages to a dust assessment study:

- *Establish baseline conditions of the existing dust climate around the site of the proposed operations;*
- *Identify site activities that could lead to dust emission without mitigation;*
- *Identify site parameters which may increase potential impacts from dust;*
- *Recommend mitigation measures, including modification of site design; and*
- *Make proposals to monitor and report dust emissions to ensure compliance with appropriate environmental standards and to enable an effective response to complaints."*

This assessment has been carried out with reference to the above guidance.

2.2.3 National Air Quality Strategy (NAQS)

The Air Quality Standards Regulations (AQR) prescribe national Air Quality Objectives (AQO) to be achieved for a range of pollutants. These include nitrogen dioxide (NO_2), which is usually associated with exhaust emissions from traffic, and fine particulate matter (PM_{10}), which can arise from many sources including traffic but also from industrial activities such as quarrying. The AQOs for PM_{10} and $PM_{2.5}$ are set out in Table 2.1. The AQO listed in Table 2.1 are only applicable at locations where a member of the public could be reasonably expected to spend the relevant averaging period. Further examples of this are presented in Table 2.2.

[10] National Planning Practice Guidance web-based resource. Accessible at: http://planningguidance.planningportal.gov.uk/
[11] Paragraph: 023 Reference ID: 27-023-20140306, revision date 06/03/2014

Table 2.1: AQOs relevant to the existing site

Pollutant	Averaging Period	AQO (µg/m^3)	Exceedance Allowance	Percentile Equivalent
Particulate Matter (as PM_{10})	Annual	40	-	-
	24-hour	50	35 per annum	90.4th
Particulate Matter (as $PM_{2.5}$)[(a)]	Annual	20[(b)]	-	-

Notes: [(a)] This is a target value set for a 15% reduction in concentrations at urban background aimed to achieve between 2010 and 2020

[(b)] The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amended the annual average Air Quality Objective (AQO) for PM2.5 from 25 µg/m3 to 20 µg/m3 outlined within the Air Quality Standards Regulations (2010 & 2016 Amendments).

Source: Department for Environment Food and Rural Affairs (2016): 'Local Air Quality Management Technical Guidance' (TG.16).

Table 2.2: Examples of where the AQO should apply

Averaging period	Objectives should apply at	Objectives should not apply at
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24 Hour	All locations where the annual mean objective would apply, together with hotels and gardens of residential properties[(a)].	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1 Hour	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more.	Kerbside sites where the public would not be expected to have regular access.

Averaging period	Objectives should apply at	Objectives should not apply at
	Any outdoor locations where members of the public might reasonably have expected to spend one hour or longer.	

Note:

(a) "*Such locations should represent parts of the garden where relevant public exposure to pollutants is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.*"

Source:

Department for Environment Food and Rural Affairs (2016): 'Local Air Quality Management Technical Guidance' (TG.16).

As an overall perspective, the NPPF PPG sets out a Site Assessment Flow Chart (reproduced at Figure 2.1) to determine the potential impact of a site in relation to the AQO.

Consequently, where residential properties or other sensitive land uses are within 1 km of the actual source of emission (e.g. mineral processing) the potential for PM_{10} and $PM_{2.5}$ emissions to cause a breach of AQO should be assessed.

Where PM_{10} emissions from site activities are unlikely to cause a breach of AQO, the site should apply good practice measures in dust management to avoid causing dust annoyance, such as set out in PGN 3/08(12)[12].

Under the AQR, and through Local Air Quality Management (LAQM), local authorities are required to review the existing and projected airborne concentrations of relevant pollutants and compare them with the AQO. If an exceedance of any AQO appears likely, an Air Quality Management Area (AQMA) is to be designated with the aim of achieving the objective by the due date.

The local authority responsible for assessing air quality in the area is WDC.

In their 2021 Air Quality Annual Status Report (ASR)[13], WDC state that PM_{10} and $PM_{2.5}$ are monitored at two locations within their district; Hamilton Terrace, and Rugby Road, both in Leamington Spa. These locations have been designated as 'urban background' and 'roadside' respectively.

WDC state that they currently have five AQMAs within the district:

- Warwick Coventry Road, declared for exceedances of the NO_2 annual mean;
- Warwick Road (Kenilworth), declared for exceedances of the NO_2 annual mean;
- New Street Kenilworth, declared for exceedances of the NO_2 annual mean;

[12] Department for Environment, Food & Rural Affairs (2012). *Process Guidance Note 3/08(12): Statutory guidance for quarry processes*
[13] Bureau Veritas (2021): Warwick District Council Annual Status Report 2021

- Leamington Spa, declared for exceedances of the NO_2 annual mean; and
- Warwick, declared for exceedances of the NO_2 annual and 1-hour mean.

The nearest of these (Warwick AQMA) is over 5 km from the site so will not be affected by the proposed development.

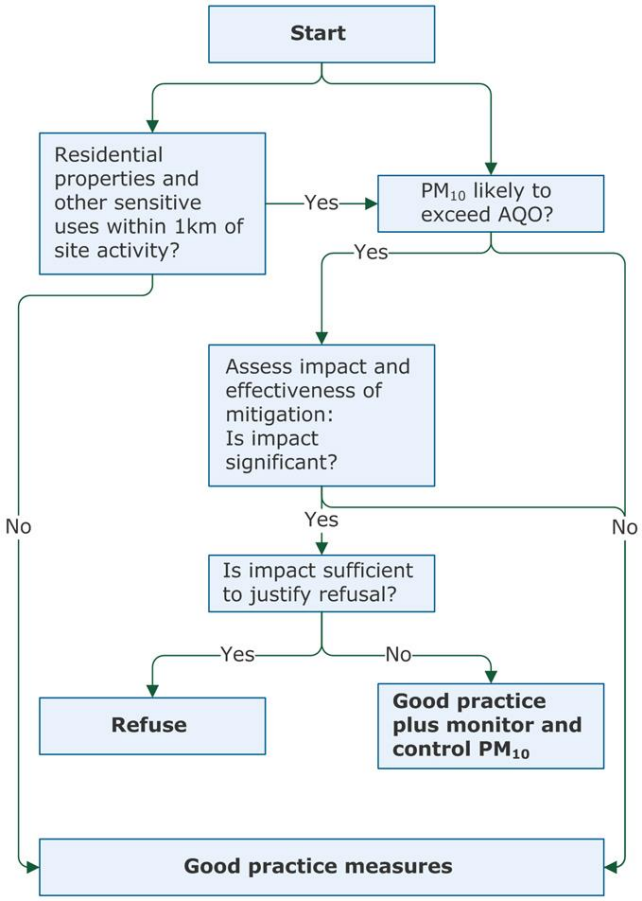


Figure 2.1: Site assessment flow chart (from Planning Practice Guidance)

2.3 Non-statutory guidance

There is no standard method for carrying out a dust assessment for minerals sites although the IAQM (2016) and others provide guidance, as noted above.

This assessment has been carried out with reference to the minerals guidance from IAQM, which states:

> *"The assessment approach described here requires a degree of professional judgement from a competent and suitably experienced air quality professional in order to reach a conclusion on the overall significance of the effect… This guidance is based on the judgement of the IAQM Minerals Guidance Working Group. The IAQM does not expect practitioners to follow the suggested approach in all circumstances."*

2.3.1 Local

2.3.2 Warwickshire County Council Minerals Local Plan 2018 – 2032

The Warwickshire County Council Minerals Local Plan was adopted in July 2022[14], and replaces the 1995 Minerals Local Plan[15].

Policy DM4, Health, Economy and Amenity – Minimising the Impact of Mineral Development states:

> *Planning permission will not be granted for mineral development proposals which will have unacceptable adverse impacts on local communities (including adjacent land uses or occupiers) or their environment (including open spaces, sports and other recreational assets) or on the economy (including tourism), either individually or cumulatively with other existing or proposed developments through any of the following: …*
>
> *f) dust;*
> *g) emission to air and odours…"*

2.3.3 Warwick District Local Plan

The Warwick District Local Plan[17], adopted in September 2017, is the principal planning policy document for the District, setting out the policies and proposals to support the development of the district through to 2029. It sets out a long-term spatial vision and strategy for the District with economic, social and environmental objectives. The Local Plan contains one main policy that relates to air quality. Policy TR2, Traffic Generation states that:

> *"Any development that results in significant negative impacts on air quality within identified Air Quality Management Areas or on the health and wellbeing of people in the area as a result of pollution should be supported by an air quality assessment and, where necessary, a mitigation plan to demonstrate practical and effective measures to be taken to avoid the adverse impacts*
>
> *…*
>
> *All measures required in the policy should take full account of the cumulative impact of all development proposed in this Plan (and any other known developments) on traffic generation and air quality".*

Policy NE2, Protection of Natural Resources states that:

> *"Development proposals will be permitted provided that they ensure that the district's natural resources remain safe, protected, and prudently used. Development proposals will be expected to demonstrate that they:*
>
> *a) Do not give rise to soil contamination or air, noise, radiation, light or water pollution where the level of discharge, emissions or contamination could cause harm to sensitive receptors;*

[14] Warwickshire County Council (2022) 'Warwickshire Minerals Local Plan 2018 – 2032', available at https://warwickshire-consult.objective.co.uk/portal/warwickshire_minerals_plan_examination_website
[15] Warwickshire County Council (1995) 'Minerals Local Plan for Warwickshire: Written Statement'
[17] Warwick District Council (2017) 'Warwick District Local Plan 2011 - 2029'

b) ensure that, where evidence of contamination exists, the land is made fit for its intended purpose and does not pose an unacceptable risk to sensitive receptors…"

2.3.2 Air Quality Action Plan

The WDC Air Quality Action Plan (AQAP) was published in 2015. It contains seven broad actions to improve air quality. For further details, refer to the AQAP.

3 Methodology

This section of the report sets out the methodology followed for the dust and air quality assessments, which consider potential impacts arising from the key pollutants and 'residual source emissions' (i.e. dust emissions after mitigation) in relation to the operational and restoration stages of the development.

3.1 Scope of the assessment

The dust assessment considers impacts to air from the following key pollutants, and whether they are scoped into or out of the assessment:

- NO_2 and NO_x, (associated with road traffic);
- PM_{10} and $PM_{2.5}$ (associated both with road traffic and with quarry operations); and
- Disamenity dust (associated with quarry operations).

3.2 Nitrogen dioxide (NO_2)

NO_2 and NO_x are largely associated with exhaust emissions, especially Heavy Duty Vehicle (HDV) traffic, and current guidance suggests that a detailed air quality assessment is required if any indicative criteria are met (presented in Table 3.1, from guidance produced by EPUK and IAQM[18]). Any change in traffic movements of 100 HDV movements per day (or 25 within or adjacent to an AQMA) as an AADT (Annual Average of Daily Traffic) can therefore be an indicative trigger level for when the operational traffic of a development could have a significant effect on air quality. In effect, NO_2 could be scoped out of the EIA if vehicle movements were below the indicative threshold.

It is anticipated that the proposed development will generate up to 216 HDV movements per weekday (as a worst-case scenario). Consequently, the number of daily vehicular movements associated with the operational phase of the proposed scheme triggers the indicative criteria listed in Table 3.1, therefore necessitating modelling of transport emissions. Detailed dispersion modelling has therefore been undertaken to make a quantified assessment of the proposed development's contribution to local air quality; the results of the modelling are presented in a separate Air Quality Assessment.

[18] Institute of Air Quality Management and Environmental Protection UK (2017). Land-Use Planning & Development Control: Planning for Air Quality

Table 3.1: Indicative criteria for requiring an Air Quality Assessment (from EPUK/IAQM, 2017)

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment [a]
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight).	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere.
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA.
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/sec[a] is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

[a] As a guide, the 5 mg/s criterion equates to a 450 kW ultra low NO_x gas boiler **or** a 30kW CHP unit operating at <95mg/Nm^3. Users of this guidance should quantify the NO_x mass emission rate from the proposed plant, based on manufacturers' specifications and operational conditions.

3.3 Fine particulate matter (PM_{10} and $PM_{2.5}$)

WDC are responsible for air quality within the jurisdiction in which the proposed development is located. WDC state in their 2021 Air Quality Annual Status Report (ASR)[19] that PM_{10} and $PM_{2.5}$ are monitored at two locations within their district; Hamilton Terrace, and Rugby Road, both in Leamington Spa. As mentioned previously, these sites have been designated as 'urban background' and 'roadside' respectively.

Particulate matter emissions as a result of the traffic generated are assessed in more detail in the separate Air Quality Assessment.

[19] Bureau Veritas (2021): Warwick District Council Annual Status Report 2021

Particulate matter can also arise from a wide range of sources other than traffic at minerals sites thus the potential impacts of PM_{10} and $PM_{2.5}$ arising from the proposed development require further consideration.

With regard to PM_{10} and $PM_{2.5}$ impacts associated with the proposed development, one approach is that the potential impacts on AQO can be determined by comparing the total predicted environmental concentration (PEC) of particulate matter estimated to arise from them with the annual mean objective. The PEC can be determined by combining the existing background ambient concentration (AC) and the expected process contribution (PC).

The AC for PM_{10} and $PM_{2.5}$ can be determined from publicly available monitoring data or, where this is not representative, site-specific monitoring data. For this assessment, baseline PM_{10} and $PM_{2.5}$ monitoring was undertaken for a number of months during 2021; the data from this monitoring programme are considered representative.

Furthermore, the Defra national annual estimated average background concentrations, which are determined for every local authority in the UK at 1 × 1 km grid square resolution[20], have also been investigated.

The IAQM minerals guidance (2016) 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."*

The PC for the operation, the consequent PEC and resultant impacts on the AQO for PM_{10} and $PM_{2.5}$ arising from the operation are considered further below.

3.4 Disamenity dust

3.4.1 Dust definitions, generation and propagation

'Dust' is generally regarded as particulate matter up to 75 µm (microns) diameter and can be considered in two categories. Fine dust, essentially particles up to 10 µm, is commonly referred to as PM_{10} and, as set out above, PM_{10} is measured to agreed standards and forms part of the AQO.

Coarser dust (essentially particles greater than 10 µm) is generally regarded as 'disamenity dust' and can be associated with annoyance, although there are no official standards (such as AQO) for dust annoyance[21].

Although it is a widespread environmental phenomenon, dust is also generated through many human activities. These include processes on minerals sites and surface mines, as

[20] Department for Environment, Food & Rural Affairs (2018). *Background Mapping data for local authorities – 2018*. Available at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

[21] 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

well as those associated with 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.

PGN 3/08 (12) states that dust emissions can arise from a range of processes at minerals sites. The AEA Good Practice Guide [22] sets out a table of dust source types and characteristics for minerals sites (reproduced at Appendix A).

In addition, the IAQM minerals guidance (2016) sets out suggested site processes that may be considered distinctly as having the potential to generate dust at a minerals site. This is outlined at Appendices 3 and 4 of the guidance (reproduced in part within the text below). From this, the residual source emissions for different activities may be determined. A guide to the estimation of residual source emissions, reliant on the professional judgement of the assessor, is provided at Appendix 4 of the IAQM minerals guidance (2016).

Consequently, however it is recognised that there is a potential for dust emissions to occur at various stages of the operation, but it is also known that these can generally be controlled by recognised practices, as set out below.

The most 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 m of sources, those between 10 – 30 µm will travel up to 250 – 500 m and particles less than 10 µm will travel up to 1 km from sources, however there is a notable reduction in concentration with distance.

For a sand and gravel quarry, experience indicates that nuisance effects of dust arising from such quarries may extend up to 250 m from the source although, as noted in various guidance documents, residents' concerns are most likely to be experienced within 100 m of the dust source, or sources. The IAQM minerals guidance (2016) states that dust impacts will mainly occur within 250 m of the operation for sand and gravel quarries, and within 400 m of the operation for hard rock (e.g. granite) quarries.

However, it is understood that numerous local residents within the community have expressed concern about the proposed development. There are relatively few receptors within 250 m of the proposed development, consequently, to ensure that the potential

[22] AEA (2010). *Good Practice Guide: Control and Measurement of Nuisance Dust and PM_{10} from the Extractive Industries*

impact of the development is fully determined, all receptors within 400 m of the proposed development have been scoped into the assessment.

3.5 Dust sources, potential for emissions and Residual Source Emissions (with mitigation in place)

Residual Source Emissions (RSE) are defined in the 2016 IAQM guidance as the potential dust emissions from a site activity after designed-in mitigation measures have been taken into account.

The scale and nature of proposed works determines the level of RSE. Judgement of the categorisation of RSE (generally Small, Medium and Large) takes into account the emission potential for each on-site source (including source strength, frequency and duration) and how effectively they are likely to be controlled by designed-in mitigation measures.

Specific factors include:

- The activities being undertaken;
- The types and properties of materials involved;
- The size of the site;
- The duration and frequency of activities;
- The likely effectiveness of the designed-in mitigation measures;
- Other mitigation measures applied to reduce or eliminate dust; and
- The meteorological conditions that can promote or inhibit dust generation.

Potential sources or site activities that may give rise to dust as a result of onsite operations are:

- Site preparation and restoration
- Mineral extraction;
- Materials handling and on-site transportation;
- Mineral processing;
- Wind scouring of exposed surfaces and stockpiles; and
- Off-site transportation

The potential dust sources are considered below, setting out both the potential for emissions and suggested mitigation methods in Section 7.

From these, the determined Residual Source Emissions (i.e. the potential dust emissions after designed-in mitigation measures have been taken into account) are stated per activity.

Note that for certain processes (e.g. soil and overburden handling) consideration is by necessity generic, in that they apply to that process wherever it takes place within the quarry but at different locations according to phasing.

The Residual Source Emissions outlined below take into account the recommended mitigation measures provided in Section 7 further below.

3.5.1 Site preparation and restoration

There is potential for high levels of airborne and wind-blown dust propagation from the preparation and restoration of a minerals site, however these are generally short-term, transient operations that are geographically restricted (i.e. only taking place on one phase at a time). There is also potential for moderate levels of dust emission during overburden, storage and replacement, although it can usually be worked at higher moisture contents than soils, thus reducing the risk of unacceptable dust emissions from this aspect of site operations.

Soils and overburden shall be stored in seeded screening bunds around the outside of the phased extraction areas, before progressively restoring using imported inert fill and the stored materials. This will take place on a phase-by-phase basis.

Given the overall extraction area (78 hectares split over 12 phases), and taking into account the methods applied, with reference to the guidance reproduced in Appendix C, the Residual Source Emissions from site preparation and restoration after mitigation is applied are considered to be Medium.

3.5.2 Mineral extraction

The majority of mineral reserves lie below the water table, hence will require dewatering before extraction can take place. The minerals will still be very damp during extraction, which will effectively reduce the potential for dust emissions.

Minerals will be extracted on a phase-by-phase basis using a 360° excavator. Given the unconsolidated nature of the minerals no drilling or blasting is necessary.

Prior to extraction, soil and overburden screening bunds will be constructed along external phase boundaries, thereby reducing the potential for dust propagation during mineral extraction.

Consequently, there is a low risk of airborne dust propagation emissions from mineral extraction due to the method and rate of extraction, and the nature of materials being extracted. With reference to the guidance reproduced in Appendix C, the Residual Source Emissions from mineral extraction and handling after mitigation are therefore conservatively considered to be Medium.

3.5.3 Materials handling and on-site transportation

There is a high risk of dust propagation from transport on unpaved roads unless appropriate mitigation measures are applied. Dust may be generated from downward-blowing exhausts and cooling fans as well as air turbulence caused by the movement of vehicles so these should be avoided where possible.

Extracted minerals will be transported from extraction areas to the plant site via articulated dump trucks, with the internal haul route layout being designed to reduce distances where possible, ensuring that the majority of on-site vehicle movements take place away from the

site boundaries. The surface of the internal haul routes will be compacted sand and gravel, and they will be inspected regularly to ensure they are kept in good condition.

A speed limit of 15 mph will be set for internal site haul routes, minimising the potential for dust propagation as a result of vehicle movements.

Internal haul routes will be wetted down with a tractor and bowser where necessary.

Given that all materials will be transported by dump trucks and not by conveyors, with reference to the guidance reproduced in Appendix C, the Residual Source Emissions from on-site transportation after mitigation is applied are considered to be Medium.

3.5.4 Mineral processing

Mineral processing will primarily involve the use of a single wash plant fed by loading shovels on the plant site. The plant site will be located in a central area away from any sensitive site boundaries to minimise the potential for dust propagation. Due to the nature of mineral reserves, no crushing will take place during mineral processing.

Mineral processing at a sand and gravel is an inherently wet process, consequently the potential for dust emissions as a result of this activity is relatively low.

Therefore, with reference to the guidance reproduced in Appendix C, the Residual Source Emissions the residual source emissions from mineral processing is considered to be Small.

3.5.5 Wind scouring of exposed surfaces and stockpiles

As a general rule, there is a moderate risk of wind-blown dust propagation from dry surface layers of stripped surfaces, freshly constructed bunds prior to seeding and from bare ground. However, storage bunds will be seeded with grass in order to stabilise and prevent wind scouring to these exposed surfaces.

Stockpiles of extracted and processed materials will be kept within the plant site and away from receptors. These will be regularly wetted down with water sprays to prevent them drying out.

During dry windy conditions, visible wind-blown dust may be raised from large areas of open or bare ground, including stockpiles and other unsurfaced areas particularly where the materials are loose or have been disturbed by traffic or other operations.

With these points in mind, and with reference to the guidance reproduced in Appendix C, the Residual Source Emissions from wind-whip from bare ground and exposed surfaces after mitigation is applied are considered to be Medium.

3.5.6 Off-site transportation

As outlined earlier, the proposed development will generate up to 216 HDV movements per weekday (as a worst-case scenario). HDVs will enter and exit the site via a tarmacked access road off the A429. The access road will be wetted down with a tractor and bowser during dry and windy weather, and vehicles exiting the site will pass through a wheel wash to remove any material accumulated on their undersides.

With these points in mind, and with reference to the guidance reproduced in Appendix C, the Residual Source Emissions from off-site transportation after mitigation is applied are considered to be Small.

3.5.7 Summary of Residual Source Emissions (with mitigation)

The estimated Residual Source Emissions for the primary aspects of the proposed development are summarised in Table 3.2.

Table 3.2: Summary of Residual Source Emissions, proposed development

Activity	Residual Source Emission
Site preparation and restoration	Medium
Mineral extraction	Medium
Materials handling and on-site transportation	Medium
Mineral processing	Small
Wind scouring of exposed surfaces and stockpiles	Medium
Off-site transportation	Small

3.6 Meteorological data

Meteorological 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, other businesses and designated ecological sites) 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 wind rose showing the 'dry' hours[23] in 2017 - 2021 for Church Lawford, the nearest appropriate Met Office land surface observation station, approximately 23 km to the northeast of the site, is presented at Figure 3.1. This demonstrates that south-southwesterly winds are prevailing in this area, although winds from the west, south and northeast are also relatively frequent.

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

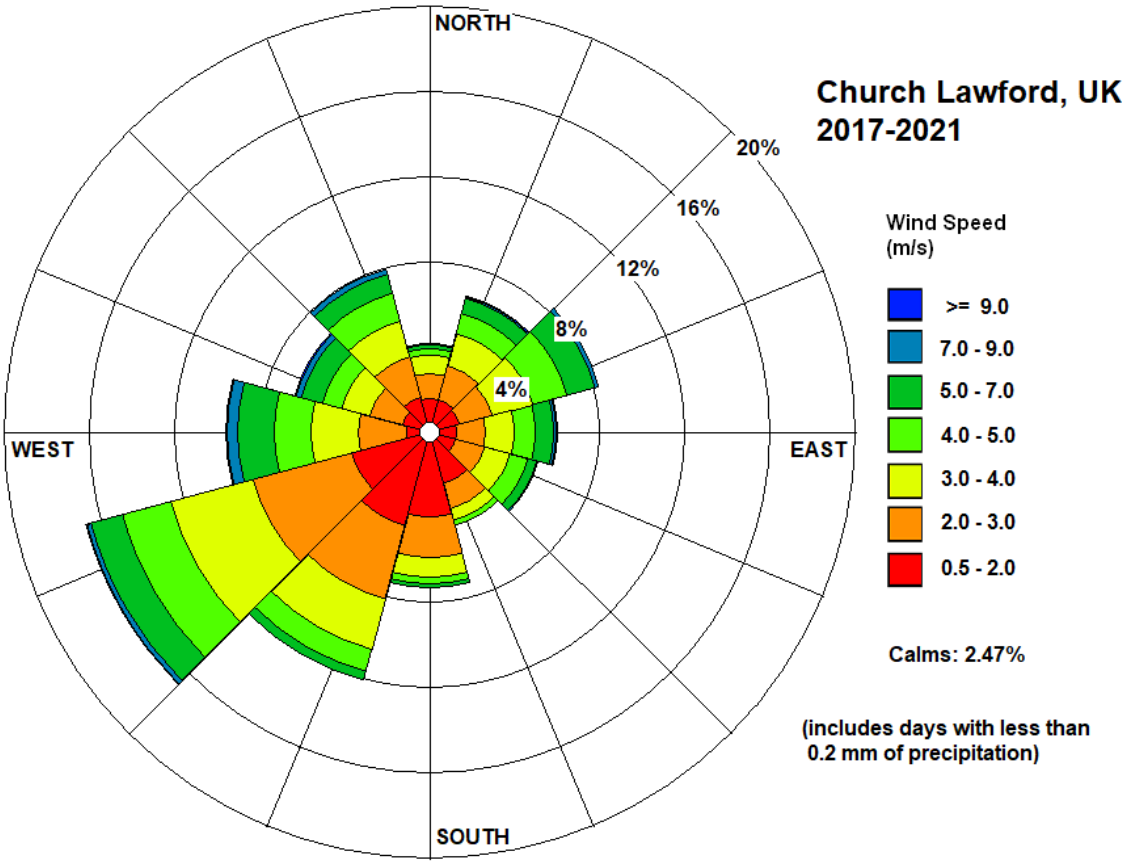


Figure 3.1: Wind rose, dry hours (five year average), Church Lawford, 2017-2021

3.7 Receptors

Dust receptors can be within or beyond the quarry 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).

Table 3.3 provides a summary of receptors situated within 400 m of the proposed development boundary, along with the closest distance to dust-generating activities, and their deemed sensitivity to dust soiling (as set out below). As outlined in Section 3.4.1, the IAQM minerals guidance (2016) states that dust impacts will mainly occur within 250 m of the operation for sand and gravel quarries, and within 400 m of the operation for hard rock (e.g. granite) quarries. In order to comprehensively assess the potential for dust impacts as a result of the proposed development, all receptors within 400 m have been scoped into the assessment.

The locations of the receptors are shown in Figure 3.2, along with distance buffers from the proposed development. Note that due to the large number of receptors within Wasperton and Barford, indicative receptor locations have been chosen, as opposed to each individual residential property.

The IAQM minerals guidance (2016) sets out guidance regarding the sensitivity of human receptors to dust; for this assessment all residential properties are considered to have a High sensitivity and commercial receptors (such as the businesses of Wellesbourne Road, R9) are considered to have a Medium sensitivity.

With regard to ecological receptors the IAQM minerals guidance (2016) stresses that professional judgement is required to identify the specific sensitivity of a given ecological receptor, but notes that sensitivity to dust for ecological receptors may relate to international, national or local designations. There are no statutory designated ecological receptors within 400 m of the proposed development.

Local Wildlife Sites typically have a low sensitivity to dust soiling. Therefore, with reference to the Site running along the northern edge of the site boundary and between Phases 2 and 3, it can be considered that where dust deposition levels are below those associated with annoyance, they can be expected to be below those at which any this receptors would be affected.

The IAQM minerals guidance (2016) suggests that potential dust impacts arising from a minerals site may be considered in relation to the identified dust source activities and locations. From above, consideration is made of potential impacts to the receptors identified in Table 3.3 with regard to principal dust sources.

The distances shown are the minimum between any potential receptor and any given stage of site operations and thus can be considered to represent a 'worst-case' evaluation. For the majority of receptors, the activity in closest proximity will be the formation of soil bunds. Similarly, the directions to dust sources consider the maximum potential arc of direction (taking into account activities on all phases within 400 m), so are also considered to represent a 'worst-case' evaluation.

Table 3.3: Receptors considered in the assessment

No.	Receptor	Sensitivity	Primary direction/s to dust sources (°)	Minimum distance to dust source (m)
R1	The Oed Seores	High	045-135	265
R2	1 Farriers	High	045-105	320
R3	5 Farriers	High	045-135	255
R4	8 Farriers	High	045-135	290
R5	College Farm House	High	045-105	325
R6	8, Wasperton	High	075-105	390
R7	Holloway Farm, Round Oak School	High	015-255	35

No.	Receptor	Sensitivity	Primary direction/s to dust sources (°)	Minimum distance to dust source (m)
R8	Wasperton Farm	High	045-225	45
R9	Bell House (commercial)	Medium	105-165	390
R10	18, Sandy Way	High	105-165	370
R11	14, Sandy Way	High	105-165	360
R12	10, Sandy Way	High	105-135	395
R13	28 Wasperton Ln	High	105-135	360
R14	20 Wasperton Ln	High	105-135	395
R15	26 Dugard Pl	High	105-135	340
R16	24 Dugard Pl	High	105-135	350
R17	18 Dugard Pl	High	105-135	385
R18	54 Wasperton Ln	High	105-135	300
R19	47 Dugard Pl	High	105-135	325
R20	41 Dugard Pl	High	135-165	344
R21	33 Dugard Pl	High	105-135	375
R22	29 Dugard Pl	High	135-165	395
R23	Middle Watchbury Farm	High	135-195	255
R24	Glebe Farm	High	255-075	10
R25	Seven Elms	High	315-045	185
R26	Marl Pit Cottages	High	255-345	270

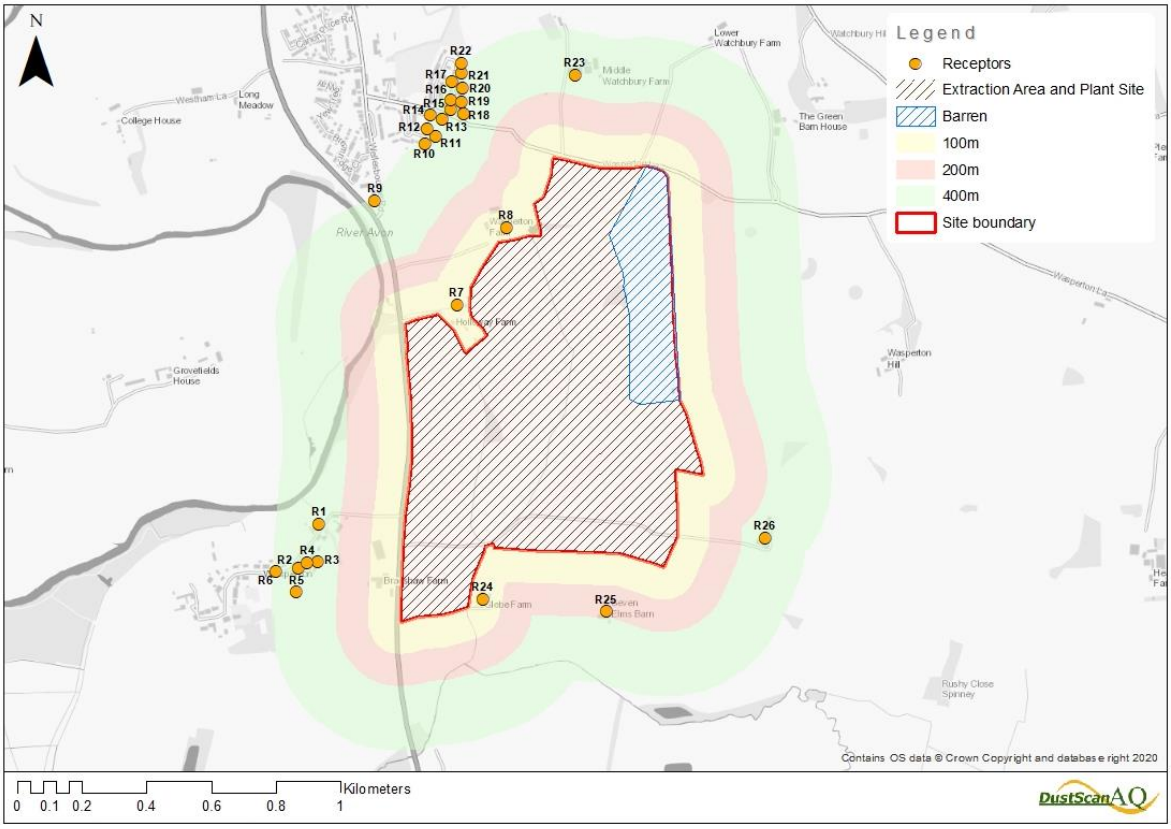


Figure 3.2: Locations of receptors with respect the proposed development

3.8 Assessment criteria

The assessment has been carried out with reference to relevant guidance, in particular the PPG minerals guidance (2014) and the IAQM minerals guidance (2016). Key tables and figures from that guidance are reproduced below.

From above, it is recognised that dust impacts reduce with distance. IAQM suggest that minerals dust assessments are carried out in relation to three distance criteria, as reproduced in Table 3.4. These criteria have been applied to this assessment.

Table 3.4: Categorisation of receptor distance from source (reproduced from IAQM, 2016)

Category	Criteria
Distant	Receptor is between 200 and 400 m from the dust source
Intermediate	Receptor is between 100 and 200 m from the dust source
Close	Receptor is less than 100 m from the dust source

In addition to the above, wind speed is recognised to affect dust propagation. The IAQM minerals guidance (2016) suggests a range of wind speed criteria, as reproduced in. These wind speed criteria have been applied to this assessment.

Table 3.5: Categorisation of frequency of potentially dusty winds (reproduced from IAQM, 2016)

Frequency Category	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are less than 5%
Moderately frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

From this, the IAQM (2016) suggest that the effectiveness of the pathway for dust propagation may be evaluated by combining the distance/s to receptors and the frequencies of potentially dusty winds (as set out in Table 3.6). This method has been applied to this assessment.

Table 3.6: Pathway effectiveness (reproduced from IAQM, 2016)

		Frequency of potentially dusty winds			
		Infrequent	**Moderately frequent**	**Frequent**	**Very frequent**
Receptor Distance Category	**Close**	Ineffective	Moderately Effective	Highly Effective	Highly Effective
	Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
	Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

The IAQM minerals guidance (2016) suggest that the 'risk of dust impact' may be assessed by considering the pathway effectiveness (from Table 3.6) with the Residual Source Emissions (from Table 3.2), using Table 3.7. This approach has been followed for this assessment.

Table 3.7: Estimation of dust impact risk (reproduced from IAQM, 2016)

		Residual Source Emissions		
		Small	**Medium**	**Large**
Pathway Effectiveness	**Highly effective pathway**	Low Risk	Medium Risk	High Risk
	Moderately effective pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective pathway	Negligible Risk	Negligible Risk	Low Risk

As stated by the IAQM minerals guidance (2016) estimation of residual source emissions is a matter of professional judgement based on knowledge of the site and its locality, the processes involved and how these might relate to corresponding activities at other minerals sites.

Consequently, it should be recognised that these are wide ranging and therefore not prescriptive criteria and, as with all other aspects of dust assessment for minerals sites, rely on professional judgement based on the experience of the assessor.

From this, the magnitude of dust impacts may be evaluated by combining the dust impact risk with the receptor sensitivity (noted above), as shown in Table 3.8. This approach has been followed for this assessment.

Table 3.8: Descriptors for magnitude of dust effects (reproduced from IAQM, 2016)

		Receptor Sensitivity		
		Low	**Medium**	**High**
Dust impact risk	**High Risk**	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
	Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
	Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
	Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

Consequently, from the IAQM minerals guidance (2016) an assessment of the potential severity of dust impacts associated with the operation may be determined.

3.9 Dust assessment uncertainties, limitations and assumptions

As set out above, there is no standard method for carrying out a minerals dust assessment and the most recent guidance (IAQM, 2016) recognises the need for professional judgement in carrying out such an assessment. Consequently, an uncertainty associated with any minerals dust assessment is that the assessor's judgement is appropriate. The lead author of this assessment was suitably experienced to carry out the assessment, and the assessment and calculations went through a rigorous internal review and approval protocol prior to issuing to the client.

A limitation of any assessment is that it is carried out without the development in place, i.e. as a future scenario. Consequently, it is not possible to make any quantification of the potential impacts although every effort has been made to accurately assess any potential impact of the proposed development.

A limitation of this assessment is that it has been carried out with reference to weather data from beyond the site boundary. This is in accordance with the IAQM minerals guidance (2016).

It is assumed that the site will be developed and operated as described for the purposes of this assessment.

It is assumed that there is no change in the relevant AQO, or that any AQO or similar national or local objective, threshold or limit value will be introduced for disamenity dust.

It is assumed that the mitigation set out in this report will be adopted once planning consent has been granted, and that the mitigation measures will be applied as recommended, and consequently that the residual source emission values determined in this assessment will be realistic estimates of dust emissions associated with the operations described.

4 Baseline particulate matter conditions

4.1 Local authority monitoring data

As mentioned previously, WDC undertake PM_{10} and $PM_{2.5}$ monitoring at two locations within the district, however these are classed as 'urban background' and 'roadside' site types, and are located in Leamington Spa, more than 6.5 km from the proposed development. Consequently, the monitored data are not suitable for determining likely baseline concentrations at the proposed development site.

4.2 Defra modelled background 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), 2022 and 2025 (the earliest anticipated opening year) for the grid squares encompassing the proposed development 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 operation is located

Grid reference		PM_{10} concentration (µg/m^3)		
Eastings	**Northings**	**2018**	**2022**	**2025**
427500	260500	13.5	12.7	12.3
427500	259500	14.6	13.8	13.4
428500	259500	14.1	13.3	12.9
427500	258500	14.4	13.6	13.1
428500	258500	13.7	12.9	12.4
Average		**14.0**	**13.3**	**12.8**

Table 4.1 shows that the 2022 predicted PM_{10} background concentration in the vicinity of the site is 13.3 µg/m^3, equivalent to 33.3 % of the PM_{10} annual mean objective (40 µg/m^3), whilst the 2025 predicted PM_{10} background concentration is 12.8 µg/m^3, equivalent to 32.0 % of the annual mean objective.

As such, based on the IAQM minerals guidance (2016), given that the predicted background concentration is less than 17 µg/m^3, there is little risk that on site operations would lead to an exceedance of the annual mean objective for PM_{10}.

Table 4.2: Defra estimated background ambient $PM_{2.5}$ concentrations for the grid squares in which the operation development is located

Grid reference		$PM_{2.5}$ concentration (µg/m^3)		
Eastings	**Northings**	**2018**	**2022**	**2025**
427500	260500	8.7	8.0	7.7
427500	259500	9.0	8.4	8.0
428500	259500	8.8	8.2	7.8
427500	258500	8.9	8.3	7.9
428500	258500	8.7	8.0	7.7
Average		**8.8**	**8.2**	**7.8**

Table 4.2 shows that the 2022 predicted $PM_{2.5}$ background concentration in the vicinity of the site is 8.2 µg/m^3, equivalent to 41 % of the annual mean AQO (20 µg/m^3), whilst the 2025 predicted PM_{10} background concentration is 7.8 µg/m^3, equivalent to 39 % of the annual mean AQO. Consequently, the impacts of current operations on the target value for $PM_{2.5}$ are not considered to be significant.

4.3 Site-specific and proxy monitoring

Real-time particulate matter monitoring was undertaken at one location in close proximity to Wasperton Farm (R8, Table 3.3) on the proposed development site between 06 July 2021 and 16 November 2021 to obtain site-specific baseline data.

Additional particulate matter monitoring was undertaken at Wolston Fields Quarry, a sand and gravel quarry also operated by the client, in order to obtain relevant proxy monitoring data from an active site. Wolston Fields Quarry is situated approximately 20 km to the northeast. It is a sand and gravel quarry and operates in a similar manner to the proposed development, hence it is a appropriate site for proxy monitoring.

Monitoring was carried out at both locations using a Turnkey Osiris real-time continuous particulate matter monitor at the locations shown in Figure 4.1 and Figure 4.2. The monitors were set to record PM_{10} and $PM_{2.5}$ concentrations at 15-minute averaging intervals. Although the Osiris is not a filter reference device, the instrument is certificated by MCERTS[24] for PM_{10} in the range 0 – 100 µg/m^3. As such, tentative comparisons against the AQO can be made in this report for the purposes of assessing baseline data.

There are currently no target values or AQOs for PM_1 in the UK, consequently this size fraction has not been included in the assessment.

A summary of the PM_{10} data recorded at both Wasperton and Wolston is presented in Table 4.3, whilst a similar summary of the $PM_{2.5}$ monitoring data is presented in Table 4.4. The data are also presented graphically in Figure 4.3 and Figure 4.4.

[24] http://turnkey-instruments.com/wp-content/uploads/2016/11/MC09015705.pdf

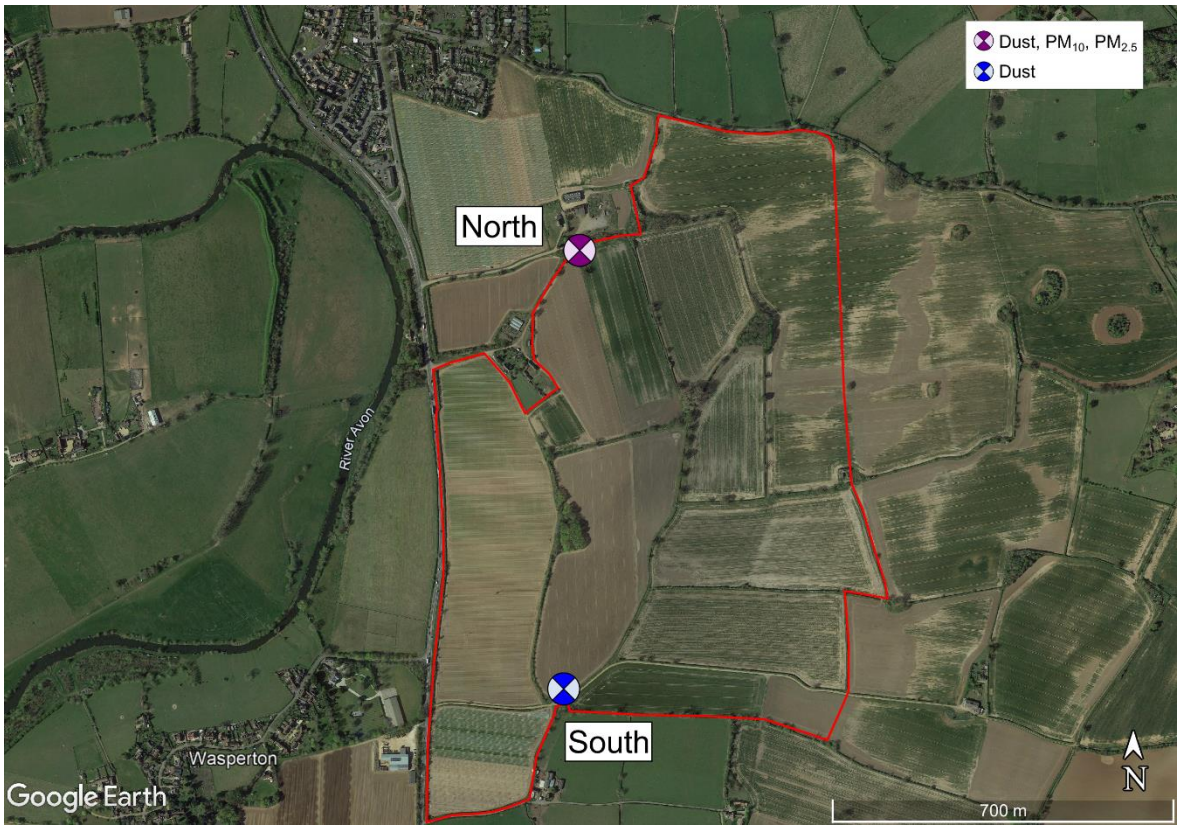


Figure 4.1: Dust and particulate matter monitoring locations, Wasperton.

Figure 4.2: Dust and particulate matter monitoring locations, Wolston Fields Quarry.

Table 4.3: Summary of PM_{10} monitoring results, Wasperton (baseline) and Wolston (proxy)

PM_{10}	Wasperton (baseline)	Wolston (proxy)
Days sampled	134	90
Average PM_{10} concentration	14.98 µg/m³	8.50 µg/m³
Minimum daily average PM_{10} concentration	5.67 ug/m³ (04/11/2021)	3.67 µg/m³ (10/07/2021)
Maximum daily average PM_{10} concentration	84.80 µg/m³ (17/08/2021)	24.56 µg/m³ (20/07/2021)
No. days >50µg/m³	2	0
Maximum 15-minute PM_{10} concentration recorded	932.7 µg/m³ (17/08/2021)	135.7 µg/m³ (21/07/2021)

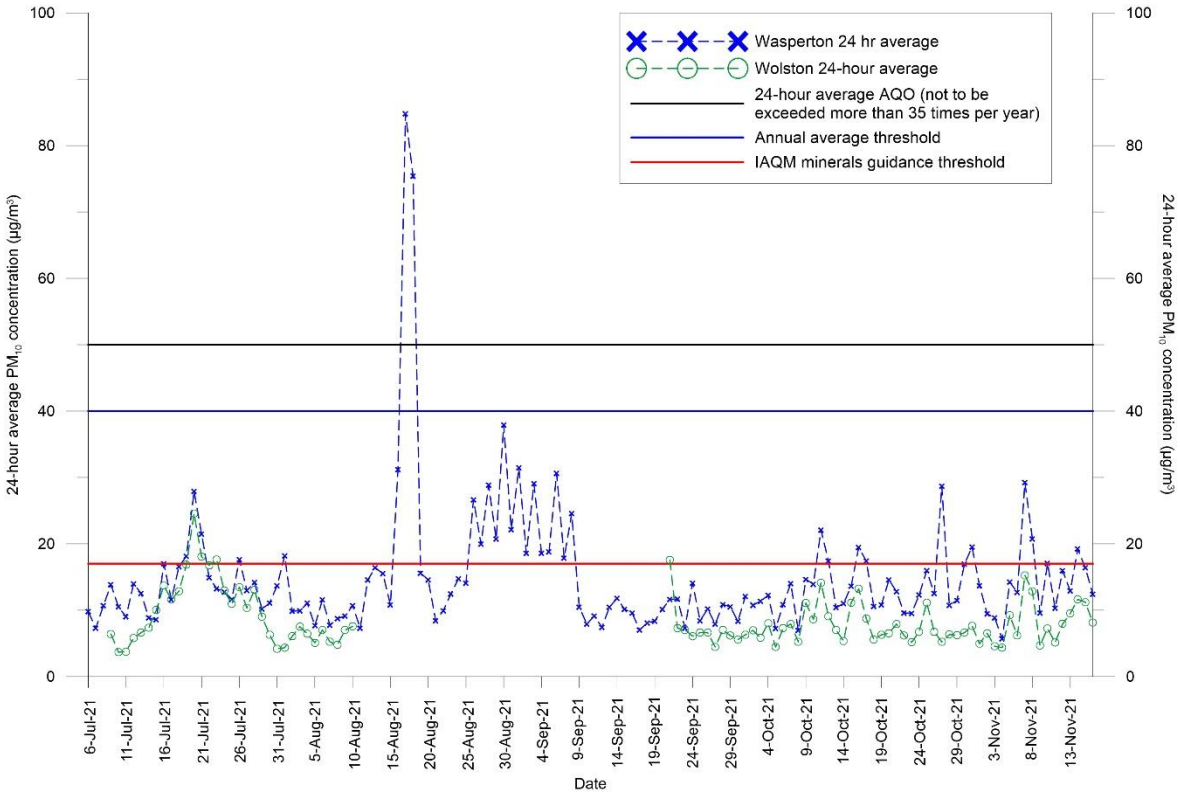


Figure 4.3: Daily average PM_{10} concentrations (µg/m³), Wasperton (baseline) and Wolston (proxy)

The average PM_{10} concentration measured from 06 July to 16 November 2021 at the proposed development site was just under 15 µg/m³. As seen from Figure 4.3, daily average concentrations were generally below the IAQM minerals guidance threshold (17 µg/m³), with the exception of a significant spike in levels during mid-August (during which the daily average AQO was exceeded on two consecutive days), and an extended period of slightly elevated levels from late August to mid-September. Based on our understanding of current site operations and from correspondence with the client it is likely that these elevated levels

are most likely related to arable agricultural activities, such as the harvesting of wheat in mid-August.

At Wolston Fields Quarry, the average PM_{10} concentration recorded over the same period was lower, at 8.5 µg/m^3, although the overall pattern of daily average concentration was similar to Wasperton, implying that a regional PM_{10} signal may have been recorded at both sites (for example, the spike in mid-July recorded at both sites). Due to a technical issue, no monitoring data were available from mid-August until mid-September.

Although this monitor was located very close to the site boundary, and active mineral extraction was taking place during monitoring, daily average PM_{10} concentrations were generally lower than at the proposed development site.

Table 4.4: Summary of $PM_{2.5}$ monitoring results, Wasperton (baseline) and Wolston (proxy)

$PM_{2.5}$	**Wasperton (baseline)**	**Wolston (proxy)**
Days sampled	134	90
Average $PM_{2.5}$ concentration	4.47 µg/m^3	4.75 µg/m^3
Minimum daily average $PM_{2.5}$ concentration	1.75 ug/m^3 (23/09/2021)	1.91 µg/m^3 (10/07/2021)
Maximum daily average $PM_{2.5}$ concentration	12.51 µg/m^3 (07/11/2021)	11.93 µg/m^3 (07/11/2021)
Maximum 15-minute $PM_{2.5}$ concentration recorded	28.93 µg/m^3 (16/08/2021)	21.58 µg/m^3 (22/07/2021)

As seen in Table 5.3 and Table 4.4, the average $PM_{2.5}$ concentration recorded at the proposed development site from 6 July to 15 November 2021 was 4.47 µg/m^3. This is well within the relevant annual AQO for $PM_{2.5}$.

$PM_{2.5}$ concentrations at Wolston Fields Quarry were generally very similar to at the proposed development site, with an overall average concentration of 4.75 µg/m^3, and daily averages not exceeding 15 µg/m^3.

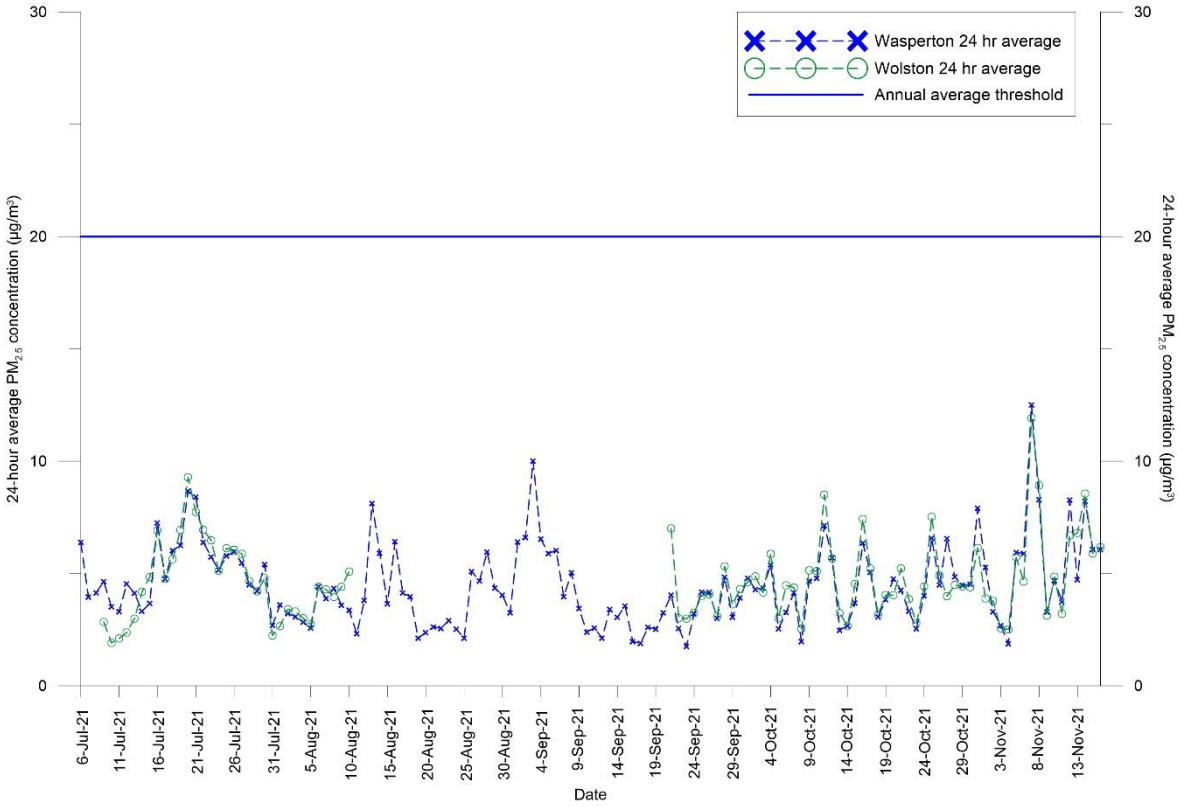


Figure 4.4: Daily average $PM_{2.5}$ concentrations, Wasperton (baseline) and Wolston (proxy)

4.4 Summary

Baseline PM_{10} and $PM_{2.5}$ monitoring at the proposed development site has shown that during the summer months (i.e. during 'worst-case' weather conditions') the average PM_{10} and $PM_{2.5}$ concentrations are well within the relevant AQOs.

Based on the IAQM minerals guidance (2016), given that the predicted and monitored background concentrations are less than 17 µg/m^3, there is little risk that on site operations would lead to an exceedance of the annual mean objective for PM_{10}.

5 Baseline disamenity dust conditions

5.1 Methodology

Directional and dust settlement monitoring was carried out at two locations on the proposed development site between 06 July and 16 November 2021, as shown in Figure 4.1.

Similar to the particulate matter monitoring, additional dust monitoring was undertaken at Wolston Fields Quarry, a sand and gravel quarry also operated by the client, in order to obtain relevant proxy monitoring data from an active site (Figure 4.2). The dust monitoring locations at Wolston were chosen to assess 'worst case' conditions, with Wolston West being located very close to the active working area. Wolston East was chosen to assess the reduction in dust with distance from the site.

Directional dust was monitored using DustScan sticky pad directional dust samplers. Being cylindrical, the samplers collect dust from 360° around the sampling head and are reported in discrete 15° intervals (i.e. 0 – 15°, 15 – 30° and so on).

Dust settlement was monitored using DustScan DustDisc samplers. This sticky pad deposited dust monitor collects dust falling out of the air and depositing onto a horizontal surface.

Both directional and deposited dust samples were analysed for dust coverage (AAC) and dust soiling (EAC) which are typically expressed as % AAC and % EAC, both per sampling interval and per day. The potential risk of annoyance through directional dust and dust settlement at each sampling location can be assessed in accordance with the 'risk' matrices in Table 5.1 and Table 5.2 respectively. To ensure that a reliable dust 'risk' was calculated, sample monitoring periods did not exceed two weeks.

Table 5.1: Directional dust annoyance 'risk' matrix for use with directional dust samplers

		AAC: Dust coverage				
		Level 0: <80%/interval	Level 1: 80 to <95%/interval	Level 2: 95 to <99%/interval	Level 3: 99 to 100%/interval	Level 4: 100% over 45°/interval
EAC: Dust soiling	Level 0: <0.5%/day	Very Low	Very Low	Very Low	Low	Medium
	Level 1: 0.5 to <0.7%/day	Low	Low	Low	Medium	High
	Level 2: 0.7 to <2.0%/day	Medium	Medium	Medium	High	High
	Level 3: 2.0 to <5.0%/day	High	High	High	High	Very High
	Level 4: ≥5%/day	Very High	Very High	Very High	Very High	Very High

Table 5.2: Deposited dust annoyance 'risk' matrix for use with DustDisc samplers

EAC: Dust soiling	AAC: Dust coverage					
		Level 0: <80%/interval	Level 1: 80 to <95%/interval	Level 2: 95 to <99%/interval	Level 3: 99 to <100%/interval	Level 4: 100%/interval
	Level 0: <0.5%/day	Very Low	Very Low	Very Low	Low	Medium
	Level 1: 0.5 to <0.7%/day	Low	Low	Low	Medium	High
	Level 2: 0.7 to <2.0%/day	Medium	Medium	Medium	High	High
	Level 3: 2.0 to <5.0%/day	High	High	High	High	Very High
	Level 4: ≥5%/day	Very High	Very High	Very High	Very High	Very High

Furthermore, the deposited dust samples were analysed using gravimetry to establish the dust deposition rate (expressed as mg/m^2/day).

A 'custom and practice' threshold of 200 mg/m^2/day can be used as a means of assessing performance in the absence of any recognised limit values for visible/nuisance dust and in accordance with the Environment Agency M17 Technical Guidance Note relating to monitoring particulate matter in ambient air around waste facilities. This limit was derived by multiplying typical UK background dust levels by a factor of 3.5 and is widely used for assessing dust nuisance in the vicinity of waste handling and other sites with the potential to generate dust.

5.2 Directional dust results

The baseline directional dust results for the monitoring undertaken at the proposed development site between 06 July and 16 November 2021 are shown in Figure 5.1, whilst the proxy directional dust results from Wolston Fields Quarry are shown in Figure 5.2.

The frequency of the dust 'risk' scores at each sampling location, by direction are indicated by the length of the colour-coded bar in each radial plot. It should be noted that the radial plots should be interpreted in the same manner as a wind rose, in that the magnitude of effect is shown travelling towards the sampling point. Full directional results are presented in Appendix C.

Figure 5.1 shows that up to High dust impact risks were occasionally recorded from the south to the west at Wasperton North, whilst up to High risks were recorded from the south clockwise to the northeast at Wasperton South. All High dust risk levels were recorded during the late summer, between 06 July and 31 August 2021. It is of note that this period of elevated dust levels also coincides with a period of elevated PM_{10} concentrations discussed in Section 4.3. This period of time corresponds with a drier, warmer period recorded at the beginning of the dust monitoring, whilst higher levels of precipitation were recorded in the second half of monitoring which would likely have suppressed dust

propagation. Generally, these results also follow the predominant southwesterly winds recorded in this area.

Given the location of the dust monitors, it is likely that the majority of elevated directional dust levels were caused by agricultural activities in the surrounding fields, or by passing farm vehicles, similar to the elevated PM_{10} concentrations discussed above.

Figure 5.1: Directional dust impact risk roses, Wasperton, 06 July – 16 November 2021

For the same period, the directional dust risk levels recorded at Wolston Fields Quarry were generally lower, with High risk levels recorded at Wolston West during just a single monitoring period in late July, and from the southeast to the southwest. Outside of this period, the majority of directions recorded Very Low dust risk levels, implying minimal amounts of dust propagation beyond the quarry boundary.

At Wolston East, Very Low dust risk levels were overwhelmingly recorded, with up to Medium levels recorded from the southwest during one period in August. Although it is possible that this may be related to on-site activities, it is of note that the fields immediately to the west of this location contained numerous horses and were generally dry. The impact on receptors beyond this point is thought to be minimal.

Figure 5.2: Directional dust impact risk roses, Wolston, 06 July – 16 November 2021

5.3 Dust settlement results

In additional to directional dust flux monitoring, dust settlement monitoring was undertaken at both sites; these results are presented in Table 5.3.

Table 5.3: Dust settlement results, Wasperton and Wolston, 06 July 2021 – 16 November 2021

Start Date	End Date	Wasperton (baseline)		Wolston (proxy)	
		North	South	West	East
06/07/2021	20/07/2021	Very Low	Very Low	Very Low	Very Low
20/07/2021	03/08/2021	Medium	Very Low	Medium	Very Low
03/08/2021	17/08/2021	Medium	Very Low	Very Low	Very Low
17/08/2021	31/08/2021	High	High	Very Low	Very Low
31/08/2021	14/09/2021	Very Low	Medium	High	Very Low
14/09/2021	28/09/2021	Very Low	Very Low	Very Low	Very Low
05/10/2021	19/10/2021	Very Low	Very Low	Very Low	Very Low
19/10/2021	02/11/2021	Very Low	Very Low	Very Low	Very Low
02/11/2021	16/11/2021	Very Low	Very Low	Very Low	Very Low

The depositional dust impact risks recorded at Wasperton were Very Low during the majority of monitoring periods. High dust impact risks were recorded at Wasperton North and South during late August, with up to Medium risks also recorded at both locations during late summer and early autumn. This is generally consistent with the directional dust monitoring results, suggesting that these elevated levels were related to ongoing agricultural activities in the surrounding fields.

At Wolston, the depositional dust impact risks were consistently Very Low at Wolston East, whilst at Wolston West a Medium risk level was recorded in late July, and a High risk level was recorded in early September.

The gravimetric results for Wasperton and Wolston are presented below in Table 5.4.

Table 5.4: Dust gravimetry results, expressed as mg/m^2/day, Wasperton and Wolston, 06 July 2021 – 16 November 2021

Start Date	End Date	Wasperton (baseline)		Wolston (proxy)	
		North	South	West	East
06/07/2021	20/07/2021	103.0	BDL(1)	BDL(1)	BDL(1)
20/07/2021	03/08/2021	37.4	BDL(1)	33.0	BDL(1)
03/08/2021	17/08/2021	64.5	52.7	BDL(1)	N/A(2)
17/08/2021	31/08/2021	197.6	101.7	48.8	BDL(1)
31/08/2021	14/09/2021	32.4	17.3	19.5	BDL(1)
14/09/2021	28/09/2021	BDL(1)	BDL(1)	BDL(1)	BDL(1)
05/10/2021	19/10/2021	BDL(1)	BDL(1)	BDL(1)	BDL(1)
19/10/2021	02/11/2021	BDL(1)	BDL(1)	BDL(1)	BDL(1)
02/11/2021	16/11/2021	BDL(1)	BDL(1)	BDL(1)	BDL(1)
Average(3)		49.0	20.1	12.3	1.6

(1) BDL = Below Detection Limit
(2) Contaminated
(3) Average calculated assuming maximum potential detection limit mass for each given sample

The gravimetric results show that dust deposition rates were consistently higher at Wasperton than at Wolston. Numerous samples from all locations were Below Detection Limit (BDL), in particular at Wolston East where all non-contaminated samples were BDL. All depositional samples were BDL from mid-September onwards, suggesting that increased precipitation effectively suppressed dust deposition during the autumn.

All samples were within the 'custom and practice' threshold of 200 mg/m^2/day, although the sample collected at Wasperton North during late August was quite close to this threshold.

Similar to the depositional dust impact risk levels, it is likely that the generally higher deposition rates recorded in late summer were related to agricultural activities in the fields surrounding the monitors at Wasperton.

The average mass deposition rates for each location were also calculated. The highest average deposition rate was recorded at Wasperton North (49.0 mg/m^2/day), whilst the lowest rate recorded was at Wolston East (1.6 mg/m^2/day).

For reference and comparison, typical deposition rates have been published for numerous environments[25]:

- Rural areas: 10 to 50 mg/m^2/day;
- Suburban areas: 30 to 80 mg/m^2/day; and
- Town centre or industrial areas: 80 to 160 mg/m^2/day.

The overall average mass deposition rates recorded at all locations are therefore consistent with published rates for rural areas (10 to 50 mg/m^2/day).

5.4 Summary

Baseline dust monitoring at the proposed development site has shown that during the summer months, agricultural activities may lead to elevated dust generation in the local area.

Proxy dust monitoring at a similar sand and gravel quarry operated by the client has shown that even during the summer months, dust control measures can effectively mitigate dust generation at minerals sites. This baseline and proxy monitoring also demonstrates that arable agricultural activities can give rise to greater amounts of dust than sand and gravel quarrying operations.

Based on the results of this monitoring study, baseline dust deposition levels are consistent with typical rates recorded in rural areas.

[25] Waller Associates for DoE (1991) *Environmental Effects of Surface Mineral Workings*

6 Potential impacts

6.1 Potential disamenity dust impacts

This section sets out the potential impacts of the operation, which have been determined by means of the method outlined by the IAQM (2016).

All on-site activities associated with the operation have been assessed to have a Small or Medium residual source emission after mitigation. The potential impacts as a result of each specific site activity with each specific residual source emission are presented below in Table 6.1 to Table 6.6.

Table 6.1: Outcome of dust assessment for receptors potentially affected by site preparation and restoration as a result of the proposed development.

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R1	The Oed Seores	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R2	1 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R3	5 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R4	8 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R5	College Farm House	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R6	8, Wasperton	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R7	Holloway Farm, Round Oak School	Phases 2, 3, 4, 5, 6, 11, 12	Ineffective	Negligible Risk	Negligible Effect
R8	Wasperton Farm	Phases 2, 3, 4, 5	Ineffective	Negligible Risk	Negligible Effect
R9	Bell House	Phases 4, 5	Ineffective	Negligible Risk	Negligible Effect
R10	18, Sandy Way	Phases 3, 4	Ineffective	Negligible Risk	Negligible Effect
R11	14, Sandy Way	Phases 3, 4	Ineffective	Negligible Risk	Negligible Effect
R12	10, Sandy Way	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R13	28 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R14	20 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R15	26 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R16	24 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R17	18 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R18	54 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R19	47 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R20	41 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R21	33 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R22	29 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R23	Middle Watchbury Farm	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R24	Glebe Farm	Phases 1, 6, 8, 9	Ineffective	Negligible Risk	Negligible Effect
		Phase 7	Moderately Effective	Low Risk	Slight Adverse Effect
R25	Seven Elms	Phases 8, 9	Ineffective	Negligible Risk	Negligible Effect
R26	Marl Pit Cottages	Phases 8, 9, 10	Ineffective	Negligible Risk	Negligible Effect

Table 6.2: Outcome of dust assessment for receptors potentially affected by mineral extraction as a result of the proposed development.

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R1	The Oed Seores	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R2	1 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R3	5 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R4	8 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R5	College Farm House	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R6	8, Wasperton	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R7	Holloway Farm, Round Oak School	Phases 2, 3, 4, 5, 6, 11, 12	Ineffective	Negligible Risk	Negligible Effect
R8	Wasperton Farm	Phases 2, 3, 4, 5	Ineffective	Negligible Risk	Negligible Effect
R9	Bell House	Phases 4, 5	Ineffective	Negligible Risk	Negligible Effect
R10	18, Sandy Way	Phases 3, 4	Ineffective	Negligible Risk	Negligible Effect
R11	14, Sandy Way	Phases 3, 4	Ineffective	Negligible Risk	Negligible Effect
R12	10, Sandy Way	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R13	28 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R14	20 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R15	26 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R16	24 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R17	18 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R18	54 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R19	47 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R20	41 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R21	33 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R22	29 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R23	Middle Watchbury Farm	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R24	Glebe Farm	Phases 1, 6, 8, 9	Ineffective	Negligible Risk	Negligible Effect
		Phase 7	Moderately Effective	Low Risk	Slight Adverse Effect
R25	Seven Elms	Phases 8, 9	Ineffective	Negligible Risk	Negligible Effect
R26	Marl Pit Cottages	Phases 8, 9, 10	Ineffective	Negligible Risk	Negligible Effect

Table 6.3: Outcome of dust assessment for receptors potentially affected by materials handling and on-site transportation as a result of the proposed development.

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R1	The Oed Seores	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R2	1 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R3	5 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R4	8 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R5	College Farm House	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R6	8, Wasperton	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R7	Holloway Farm, Round Oak School	Phases 2, 3, 4, 5, 6, 11, 12	Ineffective	Negligible Risk	Negligible Effect
R8	Wasperton Farm	Phases 2, 3, 4, 5	Ineffective	Negligible Risk	Negligible Effect
R9	Bell House	Phases 4, 5	Ineffective	Negligible Risk	Negligible Effect

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R10	18, Sandy Way	Phases 3, 4	Ineffective	Negligible Risk	Negligible Effect
R11	14, Sandy Way	Phases 3, 4	Ineffective	Negligible Risk	Negligible Effect
R12	10, Sandy Way	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R13	28 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R14	20 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R15	26 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R16	24 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R17	18 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R18	54 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R19	47 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R20	41 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R21	33 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R22	29 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R23	Middle Watchbury Farm	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R24	Glebe Farm	Phases 1, 6, 8, 9	Ineffective	Negligible Risk	Negligible Effect
		Phase 7	Moderately Effective	Low Risk	Slight Adverse Effect
R25	Seven Elms	Phases 8, 9	Ineffective	Negligible Risk	Negligible Effect
R26	Marl Pit Cottages	Phases 8, 9, 10	Ineffective	Negligible Risk	Negligible Effect

Table 6.4: Outcome of dust assessment for receptors potentially affected by mineral processing as a result of the proposed development.

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R7	Holloway Farm, Round Oak School	Phase 12/plant site	Ineffective	Negligible Risk	Negligible Effect

Table 6.5: Outcome of dust assessment for receptors potentially affected by wind scouring of exposed surfaces and stockpiles as a result of the proposed development.

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R1	The Oed Seores	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R2	1 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R3	5 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R4	8 Farriers	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R5	College Farm House	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R6	8, Wasperton	Phases 6, 7	Ineffective	Negligible Risk	Negligible Effect
R7	Holloway Farm, Round Oak School	Phases 2, 3, 4, 5, 6, 11, 12	Ineffective	Negligible Risk	Negligible Effect
R8	Wasperton Farm	Phases 2, 3, 4, 5	Ineffective	Negligible Risk	Negligible Effect
R9	Bell House	Phases 4, 5	Ineffective	Negligible Risk	Negligible Effect
R10	18, Sandy Way	Phases 3, 4	Ineffective	Negligible Risk	Negligible Effect
R11	14, Sandy Way	Phases 3, 4	Ineffective	Negligible Risk	Negligible Effect
R12	10, Sandy Way	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R13	28 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R14	20 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R15	26 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R16	24 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R17	18 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R18	54 Wasperton Ln	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R19	47 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R20	41 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R21	33 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R22	29 Dugard Pl	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R23	Middle Watchbury Farm	Phase 3	Ineffective	Negligible Risk	Negligible Effect
R24	Glebe Farm	Phases 1, 6, 8, 9	Ineffective	Negligible Risk	Negligible Effect
		Phase 7	Moderately Effective	Low Risk	Slight Adverse Effect
R25	Seven Elms	Phases 8, 9	Ineffective	Negligible Risk	Negligible Effect
R26	Marl Pit Cottages	Phases 8, 9, 10	Ineffective	Negligible Risk	Negligible Effect

Table 6.6: Outcome of dust assessment for receptors potentially affected by off-site transportation as a result of the proposed development.

No.	Receptor	Dust source location	Pathway effectiveness	Dust impact risk	Magnitude of dust effects
R7	Holloway Farm, Round Oak School	Access route	Ineffective	Negligible Risk	Negligible Effect

The results of the assessment show that the vast majority of nearby receptors are likely to experience no more than Negligible effects as a result of the proposed development, even when conservatively assessing the residual source emissions for numerous activities.

Slight Adverse Effects are predicted at R24 – Glebe Farm as a result of certain activities on Phase 7 only. This is primarily due to its proximity to Phase 7 and the frequency of potentially dusty winds due to its relative location.

At just over 2.9 hectares, Phase 7 is the second smallest phase (after Phase 3); consequently, any activities that may give rise to dust impacts are anticipated to be short-

lived. However, particular care should be taken when working within this phase, especially during dry periods with westerly winds.

This assessment assumes that standard mitigation measures are in place. With reference to the IAQM minerals guidance (2016) the overall impact of the operation is therefore considered to be not significant.

6.2 Potential impacts to human health

As discussed in Section 4, the predicted annual background and monitored baseline PM_{10} concentrations are less than 17 µg/m^3, so there is little risk that the process contribution would lead to an exceedance of the relevant objectives.

Additionally, the predicted annual background and monitored baseline $PM_{2.5}$ concentration is well within the annual mean objective, so there is little risk of an exceedance.

As the operation is not likely to significantly impact the PM_{10} and $PM_{2.5}$ concentrations locally, the potential impacts to human health are considered to be Negligible.

6.3 Cumulative impacts

There are no other significant existing or planned sources of mineral dust in the vicinity of the site that have the potential to cause cumulative dust impacts.

7 Mitigation measures

The recommended dust mitigation measures are set out below.

7.1 Dust Management Plan (DMP)

As set out above, adverse impacts from the site activities identified in Section 3.5 may be mitigated using a range of measures. Suggested mitigation measures are given below, and are drawn from experience and best practice guidance.

It is recommended that the mitigation measures set out below are expanded upon in a Dust Management Plan for use during operation of the site.

7.2 Site preparation and restoration

Soil storage bunds should be stabilised by seeding and maintained appropriately.

Unacceptable dust emissions from soil and overburden stripping, storage and reinstatement can be controlled by minimising working of material in very dry, windy conditions, by reducing drop heights at material transfer points and controlling vehicle speeds. This is especially important during initial formation of screening bunds surrounding the extraction phases on the western and northern edges of site. Operations should be suspended when wind conditions would be likely to result in visible dust being carried towards off-site receptors.

Additional control measures, such as the use of water sprays or wetting down with a bowser, should be considered where there is a risk of wind-blow across the site boundary towards off-site receptors.

7.3 Mineral extraction

There is a moderate risk of airborne dust propagation emissions from mineral extraction due to the type of minerals present on site, but additional control measures (such as wetting down with a water bowser) should be considered if there is a risk of visible dust from the extraction area being blown over the site boundary towards off-site receptors.

7.4 Materials handling and on-site transportation

To avoid dust generation relating to vehicle movements, mobile plant with upward or sideways exhausts should be used. Site haulage should keep to designated haul routes. Unmade access roads should be kept in good repair and wetted as required with a water bowser or sprinkler system. Vehicle speed limits should be kept to a minimum (ideally 15 mph) but would be determined according to the site and weather conditions pertaining at the time.

When handling materials, ensure that drop heights are kept to a minimum.

7.5 Mineral processing

There is a low risk of airborne dust propagation emissions from processing of sand and gravel, as it is a wet process. Additionally, no crushing will take place and processing will only take place in the plant site, well away from receptors. However, dust can arise during windy conditions if stockpiled materials are allowed to dry out. Water sprays should be used to ensure that exposed surfaces and the material stockpiles within the plant site are kept damp.

Regular maintenance and repair of mineral processing plant should be undertaken to ensure correct operation and to minimise dust generation.

Additional control measures should be put into place if there is a risk of visible dust from the plant site being blown over the site boundary towards off-site receptors. Enclosure of specific dust-generating processes could also be considered.

7.6 Wind scouring of exposed surfaces and stockpiles

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

Extracted mineral may be wetted down to reduce the risk of wind-blow from exposed surfaces.

7.7 Off-site transportation

The effects of off-site transportation can be minimised by ensuring that the site access route is kept clean and in good repair. During dry, windy conditions it should be wetted down with a tractor and bowser. Regular use of a road sweeper on the public highway in proximity to the site entrance should be considered, and provision should be made for its use to clean the highway following an unforeseen trackout event.

All vehicles leaving the site should be sheeted to prevent dust release, and should pass through a wheel wash. The wheels and undercarriages of vehicles should be inspected before leaving the site, with the vehicles passing through the wheel wash a second time if necessary.

8 Conclusion

Smiths Concrete Ltd (Smiths) are preparing a planning application for a proposed sand and gravel quarry on land near Wasperton, Warwickshire. The proposed development involves the extraction and processing of up to 1.8 million tonnes of sand and gravel over the course of 10 to 15 years, at a rate of up to 200,000 tonnes per annum, with subsequent restoration to agriculture and wetlands using imported inert materials.

This assessment was carried out by competent professionals and with appropriate reference to relevant policy and guidance.

The assessment considered the potential impacts on the Air Quality Objectives (AQO) for PM_{10} and $PM_{2.5}$, and from 'nuisance' or 'disamenity' dust arising from the proposed development.

Baseline and proxy PM_{10} and $PM_{2.5}$ monitoring undertaken has shown that that activities associated with the proposed development are not likely to have an adverse impact on particulate matter concentrations. Consequently, exceedances of the relevant AQOs are not likely.

Provided that the dust mitigation measures contained within this assessment are expanded upon in a Dust Management Plan and are applied on site, the assessment shows there would be Negligible magnitude of dust effects as a result of the proposed development at the vast majority of nearby receptors. The assessment calculated the possibility of Slight Adverse magnitude of dust effects at receptors to the east of Phase 7 during certain activities on that phase. Extra caution should therefore be taken when working within this phase, including the deployment of additional dust suppression, and careful consideration of weather conditions during operation.

Consequently, this assessment shows that the proposed development can be operated in a manner unlikely to cause significantly adverse dust impacts in its vicinity, and with reference to best practice guidance, the overall impact of the proposed development is considered to be not significant.

The proposal is considered not to conflict with any national, regional and local planning policy.

Appendix A: Dust Source Types and Characteristics (AEA Good Practice Guide, 2010)

Activity	Relevance for mineral types	Duration of activity	Potential for dust emission
Soil handling	Most minerals	Relatively short	**Significant** but depends on dryness and silt or clay content of the material and transportation to stockpiles.
Overburden handling	Most minerals, but quantities vary considerably	Varies. Can be intermittent over life of site	**Significant** but depends on nature of overburden, particularly during unloading and haulage.
Drilling and blasting	Usually for hard rocks	Short, but can take place frequently	Without control, drill rigs **can be significant**. However, most drill rigs now use shrouds and any dust generation is very localised. Properly designed and controlled blasts have limited potential for the creation of dust.
Initial loading activities	All mineral types	Ongoing during extraction	**Can be significant** but varies depending on nature of material, whether wet or dry, volumes handled and equipment used.
Crushing and grading	Most minerals, but not always at the place of extraction	Varies, generally ongoing	**Significance varies** depending on type of equipment and exposure to wind. Controlled through the EPR permit at regulated sites.
Storage of minerals within site	Most mineral types	Usually ongoing during extraction	**Significance varies** depending on the volume of material stored, moisture content, exposure to wind, covering of stockpiles.
Transport and load-out within site	All mineral types	Usually ongoing	**Significance varies** depending on type of vehicle. If transported by road then the size of vehicle, speed and nature of roads (surfaced or unmade) are important factors.
Transport off-site (mainly by road)	All mineral types	Usually ongoing	**Not generally significant** (except near site exits due to the re-suspension of road dust) as lorries tend to be covered. Can be mitigated by road sweeping but this can also raise dust.

Appendix B: Guidance on the estimation of Residual Source Emissions (from IAQM, 2016)

A: Site Preparation/Restoration

LARGE	SMALL
Large working area	Small working area
High bunds	Low bunds
High volume of material movement	Low volume of material movement
High no. heavy plant	Low no. heavy plant
Minimal seeding/sealing of bund surface	Bunds seeded/sealed immediately
Material of high dust potential	Material of low dust potential

B: Mineral Extraction

LARGE	SMALL
Large working area	Small working area
High energy extraction methods	Low energy extraction methods
Material of high dust potential	Material of low dust
Potential high extraction rate	Low extraction rate

C: Materials Handling

LARGE	SMALL
High no. heavy plant	Low no. heavy plant
Unconsolidated/bare surface	Hard standing surface
Activities close to site boundary	Activities within quarry void
Material of high dust potential	Material of low dust potential

D: On-Site Transportation

LARGE	SMALL
Use of unconsolidated haul roads	Use of conveyors
Unpaved haul roads	Paved haul roads
Road surface of high dust potential	Road surface of low dust potential
High no. HDV movements	Low no. HDV movements
High total length of haul roads	Low total length of haul roads
Uncontrolled vehicle speed	Controlled (low) vehicle speed

E: Mineral Processing

LARGE	SMALL
Raw material of high dust potential	Raw material of low dust potential
End product of high dust potential	End product of low dust potential
Complex or combination of processes	Single process
High volume material processed	Low volume material processed

F: Stockpiles/Exposed Surfaces

LARGE	SMALL
Long term stockpile	Short term stockpile
Frequent material transfers	Infrequent material transfers
Material of high dust potential	Material of low dust potential
Ground surface unconsolidated/un-kept	Ground surface hardstanding/clean
Stockpiles close to site boundary	Stockpiles well within quarry void
Large areas of exposed surfaces	Small areas of exposed surfaces
High wind speeds/low dust threshold	Low wind speeds/high dust threshold

G: Off-Site Transportation

LARGE	SMALL
High No. HDV Movements	Low No. HDV Movements
Unconsolidated Access Road	Paved Access Road
Limited/No Vehicle Cleaning Facilities	Extensive Vehicle Cleaning Facilities
Small Length of Access Road	Large Length of Access Road

Appendix C: Directional dust monitoring results

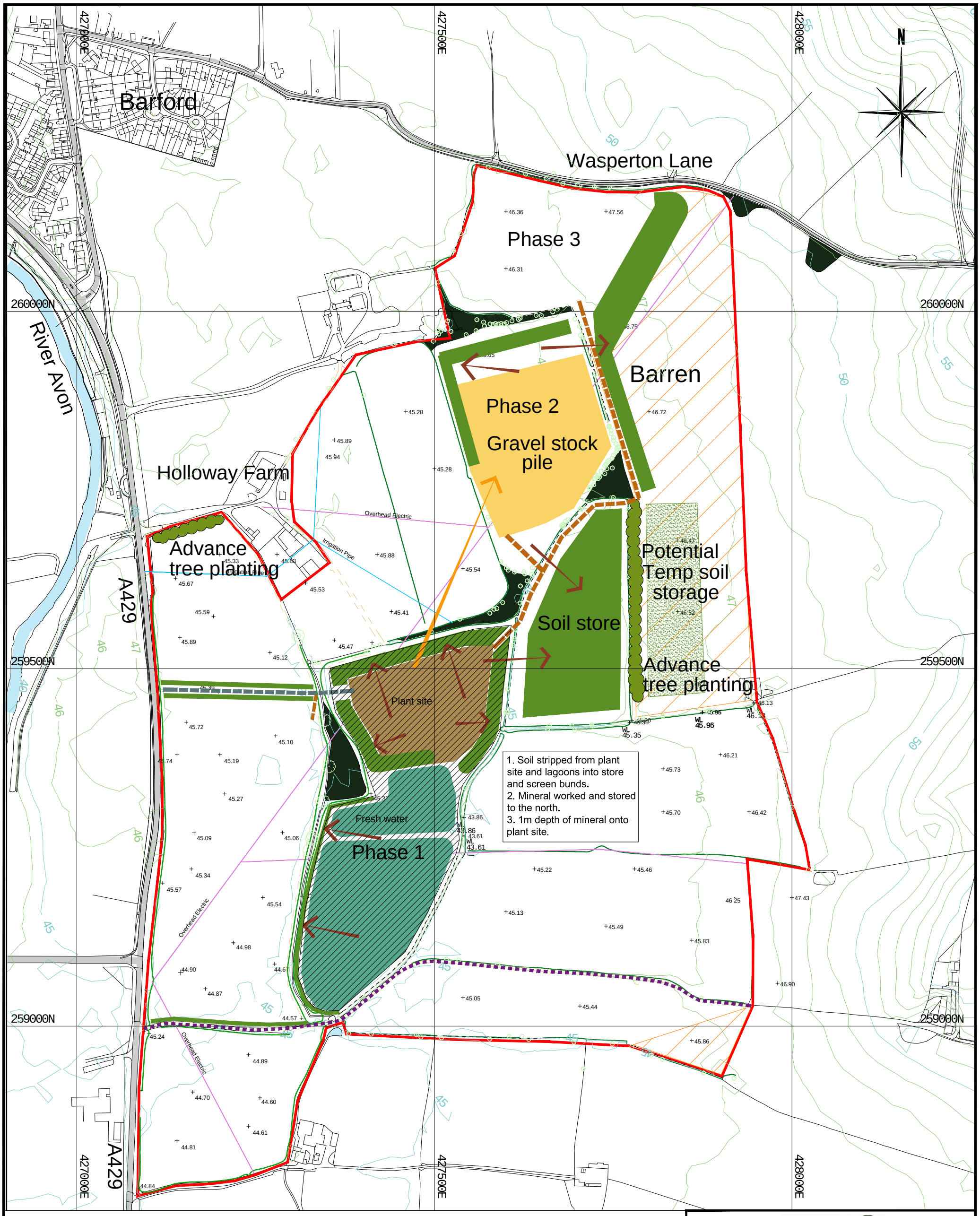
Wasperton North		Start date	06/07/2021	20/07/2021	03/08/2021	17/08/2021	31/08/2021	14/09/2021	05/10/2021	19/10/2021	02/11/2021
		End date	20/07/2021	03/08/2021	17/08/2021	31/08/2021	14/09/2021	28/09/2021	19/10/2021	02/11/2021	16/11/2021
		Duration	14	14	14	14	14	14	14	14	14
	N	000 - 015	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		015 - 030	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	NE	030 - 045	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		045 - 060	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		060 - 075	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	E	075 - 090	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		090 - 115	Very Low	Very Low	Very Low	Very Low	Medium	Very Low	Very Low	Very Low	Very Low
		115 - 120	Very Low	Very Low	Very Low	Very Low	Medium	Very Low	Very Low	Very Low	Very Low
	SE	120 - 135	Very Low	Very Low	Very Low	Very Low	Medium	Very Low	Very Low	Very Low	Very Low
		135 - 150	Very Low	Very Low	Very Low	Very Low	Medium	Very Low	Very Low	Very Low	Very Low
		150 - 165	Very Low	Very Low	Very Low	Very Low	Low	Very Low	Very Low	Very Low	Very Low
	S	165 - 180	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		180 - 195	Medium	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		195 - 210	High	Medium	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	SW	210 - 225	Medium	Medium	High	Very Low	Very Low	Very Low	Very Low	Low	Very Low
		225 - 240	Medium	High	High	Very Low	Very Low	Very Low	Very Low	Low	Very Low
		240 - 255	Medium	High	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	W	255 - 270	Very Low	High	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		270 - 285	Very Low	High	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		285 - 300	Very Low	Medium	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	NW	300 - 315	Very Low	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		315 - 330	Very Low	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		330 - 345	Very Low	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	N	345 - 360	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low

Wasperton South		Start date	06/07/2021	20/07/2021	03/08/2021	17/08/2021	31/08/2021	14/09/2021	05/10/2021	19/10/2021	02/11/2021
		End date	20/07/2021	03/08/2021	17/08/2021	31/08/2021	14/09/2021	28/09/2021	19/10/2021	02/11/2021	16/11/2021
		Duration	14	14	14			14	14	14	14
	N	000 - 015	Very Low	High	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		015 - 030	Medium	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	NE	030 - 045	Low	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		045 - 060	Very Low	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		060 - 075	Very Low	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	E	075 - 090	Very Low	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		090 - 115	Very Low	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		115 - 120	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	SE	120 - 135	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		135 - 150	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		150 - 165	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	S	165 - 180	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		180 - 195	Very Low	Very Low	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		195 - 210	Very Low	Low	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	SW	210 - 225	Very Low	Medium	High	Medium	Very Low	Very Low	Very Low	Very Low	Very Low
		225 - 240	Very Low	High	High	High	Very Low	Very Low	Very Low	Very Low	Very Low
		240 - 255	Very Low	High	High	High	Very Low	Very Low	Very Low	Very Low	Very Low
	W	255 - 270	Very Low	High	High	High	Very Low	Low	Very Low	Very Low	Very Low
		270 - 285	Very Low	High	High	Medium	Very Low	Very Low	Very Low	Very Low	Very Low
		285 - 300	Very Low	High	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	NW	300 - 315	Medium	High	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		315 - 330	Medium	High	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		330 - 345	High	High	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	N	345 - 360	High	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low

Wolston West		Start date	06/07/2021	20/07/2021	03/08/2021	17/08/2021	31/08/2021	14/09/2021	05/10/2021	19/10/2021	02/11/2021
		End date	20/07/2021	03/08/2021	17/08/2021	31/08/2021	14/09/2021	28/09/2021	19/10/2021	02/11/2021	16/11/2021
		Duration	14	14	14	14	14	14	14	14	14
	N	000 - 015	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		015 - 030	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	NE	030 - 045	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		045 - 060	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		060 - 075	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	E	075 - 090	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		090 - 115	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		115 - 120	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	SE	120 - 135	Very Low	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		135 - 150	Very Low	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		150 - 165	Very Low	High	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	S	165 - 180	Very Low	High	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		180 - 195	Very Low	High	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		195 - 210	Very Low	High	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	SW	210 - 225	Very Low	High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		225 - 240	Very Low	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		240 - 255	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	W	255 - 270	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		270 - 285	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		285 - 300	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	NW	300 - 315	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		315 - 330	Very Low	Medium	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
		330 - 345	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	N	345 - 360	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low

Wolston East		Start date	06/07/2021	20/07/2021	03/08/2021	17/08/2021	31/08/2021	14/09/2021	05/10/2021	19/10/2021	02/11/2021
		End date	20/07/2021	03/08/2021	17/08/2021	31/08/2021	14/09/2021	28/09/2021	19/10/2021	02/11/2021	16/11/2021
		Duration	14	14	14	14	14	14	14	14	14
	N	000 - 015	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		015 - 030	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
	NE	030 - 045	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		045 - 060	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		060 - 075	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
	E	075 - 090	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		090 - 115	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		115 - 120	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
	SE	120 - 135	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		135 - 150	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		150 - 165	Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
	S	165 - 180	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		180 - 195	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		195 - 210	Very Low	Very Low	Medium	Very Low	no data	Very Low	Very Low	Very Low	Very Low
	SW	210 - 225	Very Low	Very Low	Medium	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		225 - 240	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		240 - 255	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
	W	255 - 270	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		270 - 285	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		285 - 300	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
	NW	300 - 315	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		315 - 330	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
		330 - 345	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low
	N	345 - 360	Very Low	Very Low	Very Low	Very Low	no data	Very Low	Very Low	Very Low	Very Low

Appendix D: Drawings



LEGEND

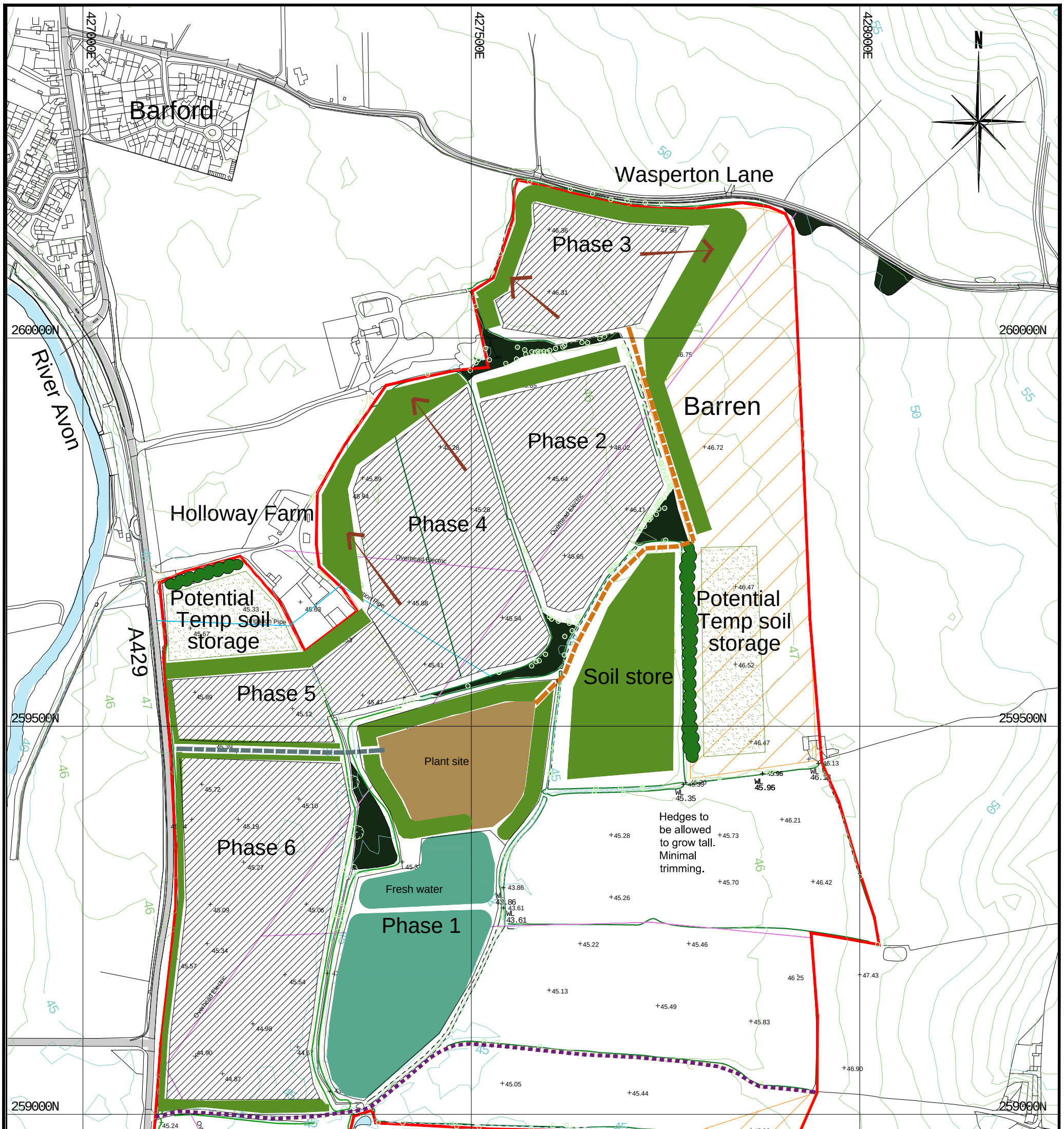
- Working phase
- Screen/storage bunds
- Existing trees
- Proposed trees
- Lagoons/water
- Gravel stock pile
- Access road
- Bridleway
- Haul route

LANDESIGN
PLANNING & LANDSCAPE

Site	Wasperton
Title	Site set up plan

Scale at A3	1:5000	Date	Feb 2021
Drawn By	JEB	Checked By	IDB

Drawing No. LD135- WSP-002

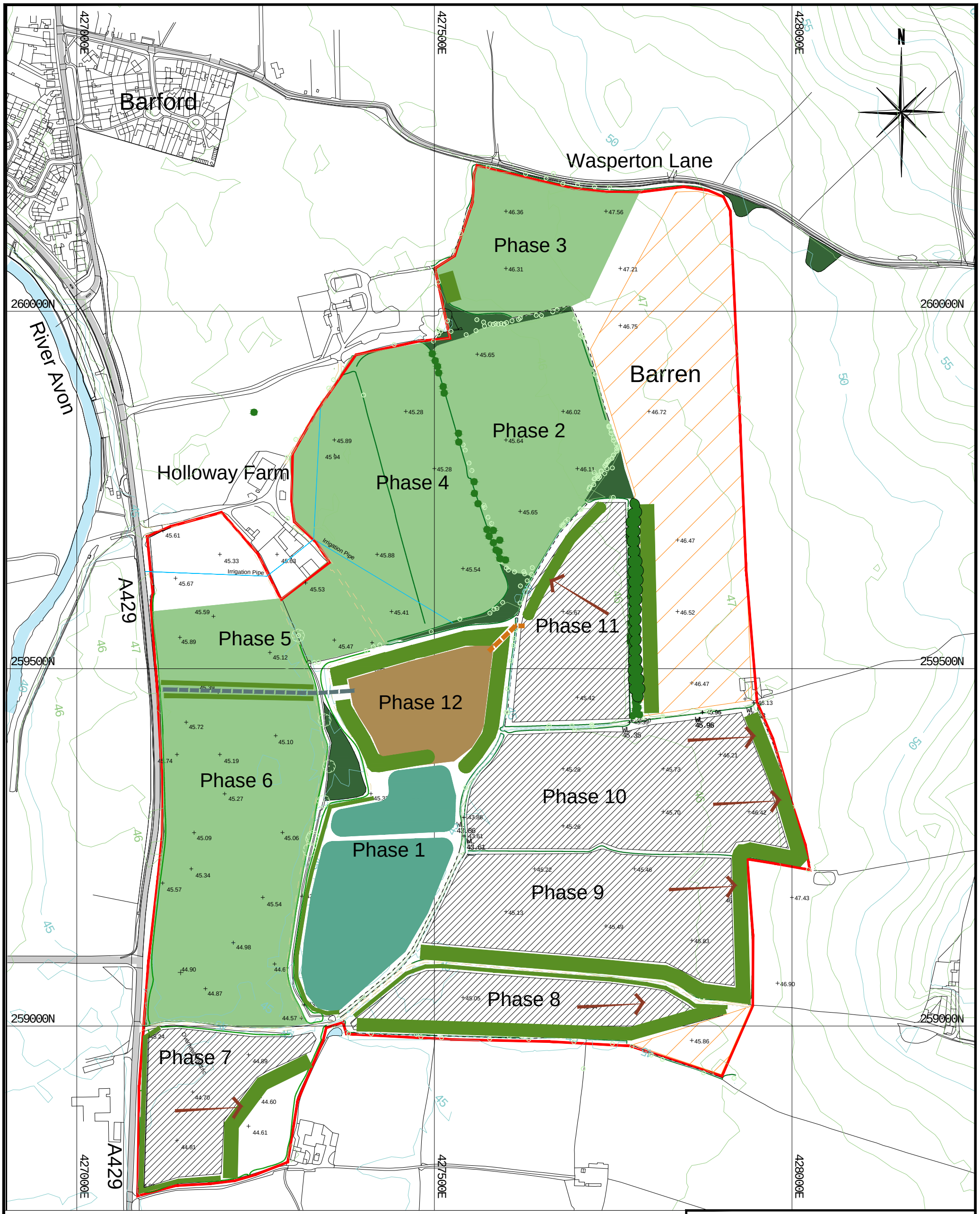


LEGEND

- Working phase
- Screen/storage bunds
- Existing trees
- Proposed trees
- Lagoons/water
- Access road
- Haul route

LANDESIGN
PLANNING & LANDSCAPE

Site	Wasperton		
Title	Plan 1 Phases 2-6		
Scale at A3	1:5000	Date	Feb 2021
Drawn By	JEB	Checked By	IDB
Drawing No.	LD135-WSP-003		

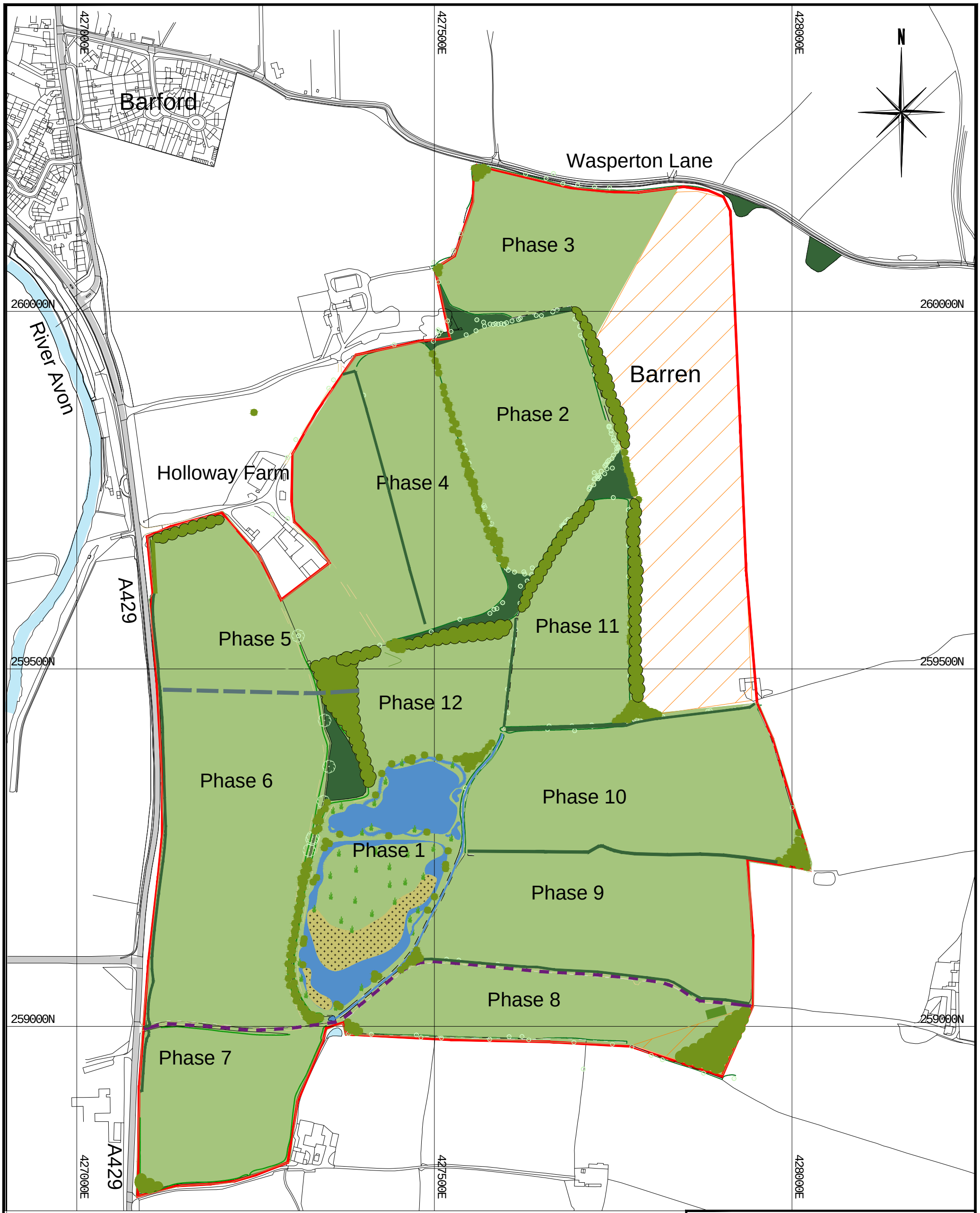


LEGEND

- Working phase
- Screen/storage bunds
- Existing trees
- Proposed trees
- Water
- Grass
- Haul route

LANDESIGN
PLANNING & LANDSCAPE

Site	Wasperton
Title	Working plan 2 Phases 7-12
Scale at A3	1:5000
Date	Feb 2021
Drawing No.	LD135- WSP-004
Drawn By	JEB
Checked By	IDB



LEGEND

- Working phase
- Screen/storage bunds
- Existing trees
- Proposed trees
- Open water
- Agricultural restoration/marsh/grass
- Haul route
- Access road
- Bridleway

LANDESIGN
PLANNING & LANDSCAPE

Site: Wasperton

Title: Final restoration
Phases 1-12 restored

Scale at A3	1:5000	Date	Feb 2021
Drawn By	JEB	Checked By	IDB

Drawing No. LD135- WSP-005

WWW.CAULMERT.COM

Caulmert
engineering environmental planning

Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG
Tel: 01248 672666
Email: contact@caulmert.com
Web: www.caulmert.com