MARSHALLS MONO LTD

PASTURE HOUSE QUARRY, SOUTHOWRAM

BESPOKE RECOVERY PERMIT APPLICATION

FUGITIVE EMISSIONS PLAN

September 2021

Silkstone

Environmental Ltd

Geotechnical, Mineral Waste Management
& Environmental Consultancy for Industry

PASTURE HOUSE QUARRY – FUGITIVE EMISSIONS PLAN

1.0 INTRODUCTION

1.1 This fugitive emissions plan has been prepared for approval by Silkstone Environmental Ltd acting on behalf of Marshalls Mono Ltd, for a bespoke recovery permit application at Pasture House Quarry Southowram, Halifax.

1.2 The waste recovery facility is to enable the site to be restored back to original ground levels following mineral extraction in the proposed permit area where all the mineral has now been fully exhausted.

1.3 The waste to be used is inert in nature and consists of concrete sludge from the block manufacturing plant at Brookfoot Works, approximately 700m to the South East of the site.

1.4 Due to the inert nature of the waste to be used at the recovery facility, oduour has been scoped out of this fugitive emissions plan and concentrates solely on dust nuisance.

1.5 The information within this document forms the fugitive emissions plan required to operate the waste for recovery facility at Pasture House Quarry.

2.0 DUST GENERATION

2.1 Introduction

2.1.1 'Dust' is generally regarded as particulate matter up to 75 µm (micron) diameter and can be considered in two categories. Fine dust, essentially particles up to 10 µm, is commonly referred to as PM10. Coarser dust (essentially particles greater than 10 µm) is generally regarded as 'nuisance dust' and can be associated with annoyance.

2.1.2 Nuisance dust' relates to the human perception of, or reaction to, some aspect of dust pollution, such as the long-term soiling of surfaces or the visibility of short-lived dust clouds. In the absence of standards, 'custom and practice' criteria for assessing nuisance dust have been developed.

2.1.3 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.

2.1.4 Dust emissions and propagation from a waste recycling or landfill site 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 minerals site.

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

2.1.6 Dust receptors can be within or beyond the site boundaries. 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.

2.2 Visible 'Nuisance' Dust (Directional and Deposited Dust)

2.2.1 'Nuisance' 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. Nuisance dust is commonly measured in two ways; direction and deposition. Directional dust is the horizontal passage of dust past a point, usually driven by the wind. Dust deposition is the vertical passage of dust to a surface, driven by deposition velocity.

2.2.2 In the absence of standards, a range of methods has been developed to assess nuisance dust. The two principal approaches are based either on measurement of the mass of settled dust or the assessment of change in the properties of a surface such as its loss of reflectance or dis-colouration ('soiling') on an adhesive 'sticky pad'.

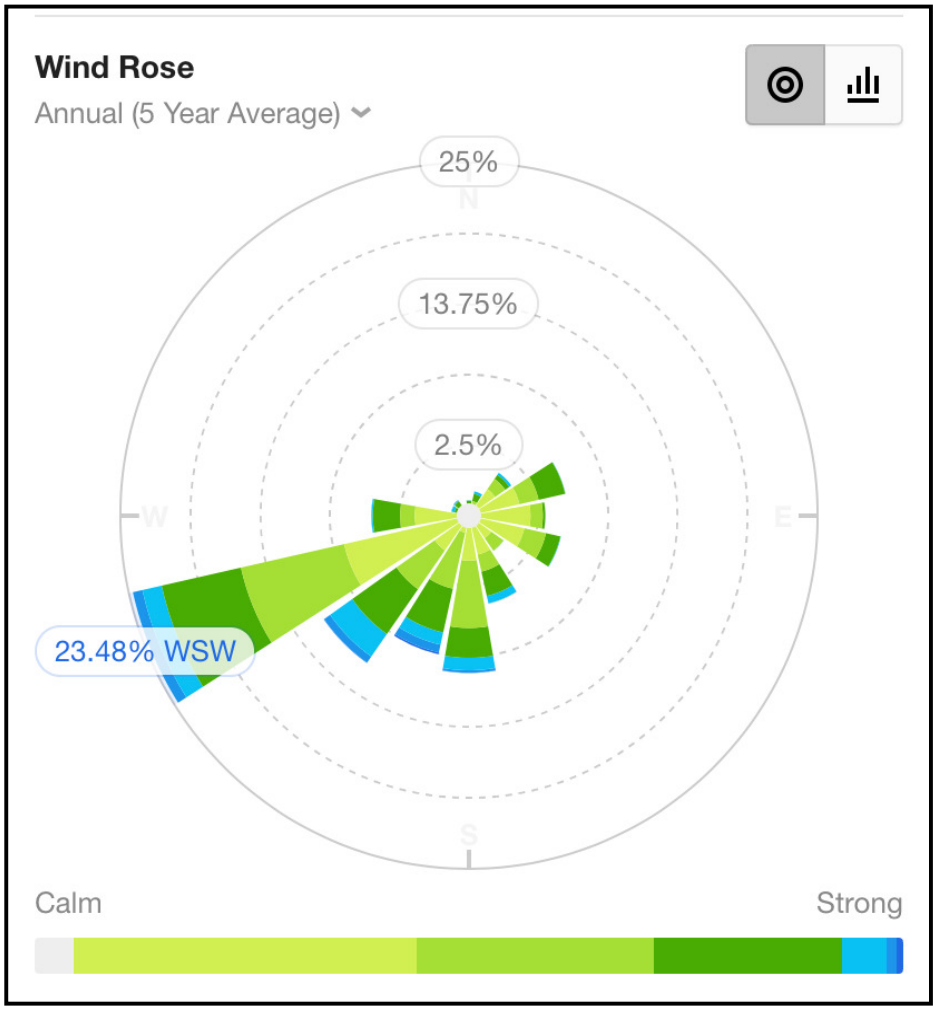
2.3 Weather

2.3.1 Local weather conditions can have a significant effect on the potential for dust propagation from a minerals site. Of particular importance are wind speed (and direction) and precipitation.

2.3.2 Dust can be carried from a source towards receptors (such as nearby homes and other businesses) according to the strength and direction of wind. Precipitation is recognised to suppress dust and 0.2 mm rainfall is considered sufficient to suppress windblown dust for a number of hours.

2.3.3 The closest weather station to Pasture House Quarry is the Bingley Samos Meteorological Station, approximately 7.1 miles from Southowram.

Figure 1 – Five year average windrose from the Bingley Samos Meteorological Station Data between 2015-2021



2.3.4 The windrose for Bingley Samos Meteorological Station illustrates a strong South-West/West-South-Westerly component, with reduced frequencies from the eastern and northern quadrants.

2.3.5 In the event that dust is generated and is transferred beyond the site boundary, receptors in the approximate direction to the northeast would have a greater risk of dust impact.

2.3.6 The mitigation measures which will be implemented in the dust management plan (Section 5.0) and the distance of the closest receptors would make it unlikely that dust could be dispersed towards these properties to cause any nuisance from dust generation from the operations.

3.0 DUST SOURCES

3.0.1 Dust emissions from the site have the potential to increase levels of suspended particulates and deposited dust in the surrounding area, both as short-term peaks and over a longer period. Fugitive dust could be blown off site to affect surrounding receptors.

3.0.2 For all sources, the creation and subsequent dispersion of dust will be highly dependent on the weather conditions. Wind speed can determine the amount of dust raised, while wind direction determines those areas that may be affected. Rainfall however, has a suppressive effect on the generation of dust.

3.0.3 The amount of dust generated by each activity thus depends on the size of particles and, crucially, upon their moisture content. The principal activities that would give rise to potential for dust emissions from Pasture House Quarry inert waste recovery facility have been identified and are considered in turn below:

- Mud on the road caused by vehicles egressing the site
- Dust from vehicle movements within the site boundary
- Dust from waste deposition and handling operations

3.1 Waste Tipping & Stockpiling

3.1.1 The imported material consists of stone and sand sludge from the stone cutting operations and the sand processing plant as well as inert waste from the concrete plant. This material is currently mixed with as dug shales from the quarry and provides an inert restoration material replacing the sandstone mineral which has been previously extracted. The material is inert in nature and whilst is a sludge when tipped (with typically 25% moisture content) it sets hard and solid when allowed to dry out. This mixture of materials and processes is expected to continue in the new permit area if approved.

3.1.2 The waste recovery area and cross sections plan 20293/100 in Appendix 2 demonstrate the levels of fill required to achieve the planning permitted restoration contours.

3.1.3 The material to be used would continue to comprise of uncontaminated inert material which provides the required engineering criteria. The table below outlines the ECW waste codes to be imported to the site:

Waste Code	Description	Source
01 01 02	wastes from mineral non-metalliferous excavation	Factory
10 13 14	Waste concrete and concrete sludge	Factory
17 05 04	Soil and stones	Excavation sites
20 02 02	Soil and stones	Excavation sites

3.1.4 The potential for emissions from stockpiling waste materials for recycling and tipping for landfilling depends on a number of components including the unloading/loading of waste, vehicle movement within the storage area and wind erosion of stockpile and adjacent ground around the stockpiles.

3.1.5 Potential for dust generation during the loading and unloading strongly depends on the timing of operations with respect to meteorological conditions and the characteristics of the material being handled. Loading operations carried out during dry and windy weather conditions are more likely to carry any dust generated beyond the site boundary. Dust could also be generated by vehicles tracking over the base of the pile as well as wind-whip, when exposed material has been allowed to dry out.

3.2 Vehicle Movements & Trackout

3.2.1 The erosive action of vehicle traffic on haul routes is also a major potential source of dust. The mechanical action of wheels on the road surface causes dust lying on the road surface to be thrown up and become entrained in a moving airflow. The deposition of this dust is dependent upon particle size and meteorological conditions which would depend on the number and size of wheels, vehicle speeds and the moisture content of the surface material.

3.2.2 The main factor in the production of dust emissions from paved roads is the re-suspension of loose material on the surface deposited by vehicles through spillages or trackout.

3.2.3 As with unpaved roads, in addition to the generation of dust from the passage of vehicles, any loose dust across the road surface can also become entrained by wind blow, with the level of dust generation depending on wind speed, rainfall and the size of dust particles.

4.0 DUST RECEPTORS

4.1 Sensitive Receptors

4.1.1 Dust sensitive receptors have been identified using Ordnance Survey data. Severe or continual concerns about dust are most likely to be experienced near to significant dust sources, generally within 100m. However, this distance can vary considerably depending on the nature of the dust source and weather conditions.

4.1.2 Particles in the size range of 10-30µm make up only a minor proportion of dust from mineral sites, but these tend to fall out of the atmosphere within 250m of the point of release.

4.1.3 The assessment has focused on seven receptors which show a good geographical spread around the site boundary which are in closest proximity to the site. The dust sensitive receptors are detailed in Table 1 below and on Drawing 20293/200 in Appendix B of this report.

4.1.4 The property in closest proximity to the facility, Pasture House Farm is in the ownership of the applicant, Marshalls Mono Ltd.

Table 1 – Dust Sensitive Receptor Locations

Receptor	Property	Distance from Site	Direction
1	Holly Royd House	70m	South-East
2	Pasture House Farm	30m	South-East
3	The Croft	245m	West
4	46 Cromwell Road	340m	North-West
5	Walter Clough Hall	600m	North-West
6	Lower Clay Royd Farm	400m	North-East

*Measurements are taken from the closest site boundary to the property.

4.2 Significance Criteria

4.2.1 The significance of an environmental effect is determined not only by the magnitude of the effect but also by the sensitivity of the receptor as shown in Table 2 below.

Table 2 – Sensitivity of Receptors

Sensitivity	Methodology
High	The location has little ability to deal with dust without suffering significant harm. e.g. a hospital
Moderate	The location has moderate capacity to deal with dust without suffering some harm. e.g. a residential dwelling
Low	The location is tolerant of dust without suffering harm e.g. an industrial development

4.2.2 In accordance with the criteria detailed in Table 2, all dust sensitive receptors are residential in nature and are therefore considered to be of moderate sensitivity and all but two are over 200m in distance from the site at their closest approach.

4.1.3 In the event that dust is generated and is transferred beyond the site boundary, receptors in the approximate direction to the northeast would have a greater risk of dust impact.

4.1.4 The two properties in closest proximity are Pasture House Farm and Holly Royd which are to the south east of the operations and therefore not in the typical prevailing wind direction.

4.1.5 Furthermore, the tipping taking place at site will be below existing ground levels within the quarry void and the existing quarry faces will act as a natural preventative barrier for dust emissions until the site is restored close to surface water where typical preventative measures will be needed.

4.1.6 Notwithstanding the above, the following sections in the dust management plan will detail the measures to be implemented to mitigate fugitive emissions to satisfy the conditions in an Environmental Permit when issued.

5.0 DUST MANAGEMENT PLAN

5.1 Introduction

5.1.1 There is potential for dust emissions to occur at various stages of the operations at Pasture House Quarry, but these can generally be controlled by best practice measures such as:

- Appropriate design and layout of the site and working procedures.
- Using and properly maintaining carefully selected equipment.
- Understanding the potential for dust emissions to occur.
- Training and supervising site staff in dust control.
- Applying appropriate mitigation measures.

5.1.2 The Site Manager will ensure that all site personnel are familiar with this dust management plan and understand how it is to be implemented at the site.

5.1.3 The aim of the dust management plan is to:

- Minimise dust generation and migration from the site.
- Ensure nuisance caused to nearby receptors from dust is kept to a minimum.
- To develop a dust minimisation strategy that shall be implemented by the site management.
- Ensure that operations at the site have consideration for potential dust generation.
- The dust management plan shall be reviewed throughout the lifetime of the site and updated to reflect changes in legislative requirements, and to ensure dust management measures remain appropriate for the site operations.

5.2 Site Management Controls

5.2.1 As set out below, the Site Manager will be responsible for maintaining good standards and reduce unacceptable dust emissions at the site by ensuring that routine checks are carried out and that regular staff training is provided. This will be facilitated by the processes and procedures set out in Tables 1 to 3 in Appendix A, which set out specific areas to enable the site manager to review and assess site dust management on a routine basis.

5.2.2 The actions in the tables in Appendix A will be reviewed and revised as appropriate during the operational life of the site, including within a review of the DMP.

Visible dust emissions

5.2.3 The site manager will be responsible for a daily inspection for visible dust emissions across the site boundary. Inspections will take place along the site access road and clay storage areas according to the working phase of the site. The results of the visual inspections will be recorded and kept with results of other environmental monitoring carried out at the site.

Weather data

5.2.4 Ambient weather conditions, notably wind speed and wind direction will be recorded at the Site Office by a hand held anemometer.

5.2.5 The table below will be used to assess whether there is potential for dust movement during operations.

Wind speed (m/s)	**Description**
Below 0.5 essentially calm	very low potential for dust movement
0.5 – 2 low wind speeds	low potential for dust movement
2 – 6 'average' wind speeds	moderate potential for dust movement
6 – 10 high wind speeds	reasonable potential for dust movement
Above 10 very high wind speeds	significant potential for dust movement

Site engineering controls

5.2.6 The Site Manager will be responsible for ensuring that unacceptable dust emissions do not arise from operations at the site by evaluating the planned site activities and dust mitigation measures in place and modifying them as appropriate.

5.2.7 Procedures to address specific processes that might lead to unacceptable dust emissions are set out below. All dust control equipment will be maintained and operated in accordance with the manufacturer's instructions.

Dust Control Measures

5.2.8 Potential dust emissions from the site may be generated from activities associated with:

- Vehicle movements to and from the site.
- Operational processes including the mixing and placement of waste
- Exhaust's from operational plant/equipment.

5.2.9 In order to minimise potential generation of dust from the site, the following preventative control measures shall be implemented;

- All inert waste will be placed in the waste reception area and deposited for restoration as soon as is practicable
- The site management will utilise a mobile water bowser throughout the site area to condition surfaces and any waste handled, to ensure mitigation of dust generation.
- If necessary, a mobile fine mist water spray will be provided for the haul road in the unlikely event that the bowser proves insufficient to suppress dust generation.
- Mud and debris, which has the potential to dry out and generate dust, will be kept clean from the site roads by the use of a road sweeper or manual labour where it is deemed necessary.
- As a matter of course, drivers will be instructed and monitored to ensure discharge heights are kept to a minimum.
- All waste handling and compaction operations on site shall be monitored by site management, and if necessary dust suppression systems (i.e. water bowser or spray system) shall be activated to mitigate dust migration.
- Vehicles discharging on site will do so within the quarry void, and below the elevation of the land immediately adjacent to the quarry, wherever possible.
- All vehicles will be fitted with exhausts venting skywards to avoid unnecessary dust generation.
- Site operating personnel, including plant operators, will be supplied with dust masks, whenever necessary, and all plant cabs shall be maintained such that as far as reasonably practical the ingress of dust is minimised.

- Vehicular speeds at the site shall be strictly controlled and the number of movements on site kept to a minimum in order to limit associated dust generation.
- Should the measures stated above be insufficient to mitigate nuisance caused by dust migration from the site then the specific activity causing dust nuisance at that time shall cease immediately. The specific activity shall only re-commence once adequate mitigation measures are taken to address dust generation from that particular activity.
- All dust suppression systems and equipment used on site shall fall under the maintenance schedule for all site plant.
- Any maintenance or repairs required to maintain the efficiency of dust suppression equipment shall be carried out as soon as reasonably practicable and recorded within the relevant maintenance log.
- Any site operations compromised by the breakdown of dust suppression equipment will cease until such systems are repaired or adequate alternative mitigation measures put in place.

Management and Review Procedure

5.2.10 The site manager will be responsible for the control and management of dust at the site. Site management will ensure that all personnel operating on site are adequately trained to implement the dust control measures and that they are strictly implemented at all times.

5.2.11 When the control measures stated are implemented, dust generation and nuisance to nearby receptors should be kept to a minimum.

5.2.12 In the event that dust nuisance is caused to a nearby sensitive receptor, and a complaint is received regarding dust migrating from the site, the following dust action plan will be implemented.

Dust Action Plan

5.2.12 If any operation at the site results in unacceptable dust generation and migration then that operation will be reviewed by the site management and improvements put in place wherever possible that satisfactorily mitigate dust generation. The operation may be suspended temporarily should site management consider it necessary to facilitate any operational improvements.

5.2.13 If a complaint is received regarding dust nuisance arising from the site, the site management will immediately investigate that complaint and determine the source of the dust. If the source is identified as being the site, then appropriate actions shall be taken to mitigate the dust generation that led to the original complaint.

5.2.14 Any mitigation action taken will be communicated to the complainant. The nature of the complaint, the findings of the investigation and any mitigation measures adopted shall be recoded in writing and kept on record.

5.3 Complaints procedure

5.3.1 In the event of a complaint from a member of the public regarding dust emissions from the site, a record will be kept at the Site Office and made available to the Environment Agency as required.

5.3.2 The Site Manager will be ultimately responsible for addressing all complaints and notifying the Environment Agency accordingly. All complaints will be investigated as soon as possible and the complainant kept informed throughout the investigation. The Environment Agency will be informed within 2 working days that a complaint is received and will be kept informed regarding the progression of any subsequent investigation.

5.4 Site records and reporting

5.6.1 The results of dust management and monitoring procedures at the site will be recorded at the site offices and kept with results of other environmental monitoring carried out at the site.

5.5 Dust Monitoring

5.5.1 Should complaints continue to be received regarding dust nuisance, dust monitoring will be undertaken. The monitoring locations and frequency will be agreed with the Environment Agency.

5.5.2 Dust monitoring shall be carried out by an independent technician.

5.5.3 Dust monitoring gauges will be set up and will comprise a Frisbee type depositional dust monitoring gauge and sticky pad adapter as shown in Figure 1 below.

Fig 1 – Directional and Depositional Dust Sampler

5.7.4 The sticky pad shall be replaced after each monitoring period and each sticky pad shall be analysed independently to determine the rate and direction of dust deposition.

5.7.5 After each dust monitoring period, the contents of the depositional dust gauge will be collected and sent for independent analysis to determine the rate of dust deposition. If necessary, the dust collected in the dust gauge may be analysed to determine its nature and origin.

5.7.6 The sticky pad and depositional dust samples recovered from the dust monitoring location will be independently analysed and the results submitted to the site operator.

5.7.7 Should dust monitoring results identify the site as being the source of significant dust migration, then the site management will undertake a full review of all site operations to establish the source of the dust generation. The operational review shall result in improvements being adopted at the site that mitigate any further dust nuisance.

5.8 Analysis Techniques

5.8.1 Baseline directional and deposited dust levels will be monitored at locations and a frequency to be agreed with the Environment Agency.

Directional Dust

5.8.2 The directional dust monitoring component of the device samples fugitive dust coming from 360° around the gauge and the deposited dust monitoring component collects dust depositing from the air onto a horizontal surface.

5.8.3 At the end of each sampling period, the sampler units are removed and placed in a protective carrying flask or case and replacement samplers fitted. For the directional samplers, the pattern of dusting on the cylinder indicates the direction and magnitude of visible dust propagation. For the depositional samplers, the dust coverage on the sticky pads indicates the magnitude of visible dust deposition at that point.

5.8.4 Assessment of dust coverage on the sticky pads uses a computer-based scanning system. Directional dust measurements are reported at 23° intervals around the sampling head by comparing the exposed ‘sampling area’ of the sticky pad with an unexposed ‘reference area’. The deposited dust data are reported as the average of the sampling area in relation to the reference area. The results are reported as Effective Area Coverage (EAC) which measures the darkness or potential soiling of dust.

Depositional Dust

5.8.5 This method measures dust deposition rate and involves the passive deposition and capture of dust within a funnel and bottle arrangement. Data is usually collected over monthly periods and results are expressed in g/m2/month (ie. the mass of dust deposited per m2 per month). This method enables determination of the relative ‘dustiness’ of sampling locations. It does not provide data on dust concentrations or enable determination of dust levels from a particular event or source. It does not give an indication of the potential health effects of the dust because it does not measure the amount of fine and very fine particles in the atmosphere.

5.8.6 Thresholds should be agreed between the site operator and the regulator and will be dependent on the site and proximity of sensitive receptors.

APPENDIX A - TABLES

Table 1 – Maintenance Items

Description	Frequency
Wheelwash – Check operating correctly and rectify any problems as necessary	Daily
Access road – Check for surface wear and rectify when necessary	Weekly
Unmade haul roads – Check for surface wear and rectify as necessary	Weekly

Table 2 – Procedural Items

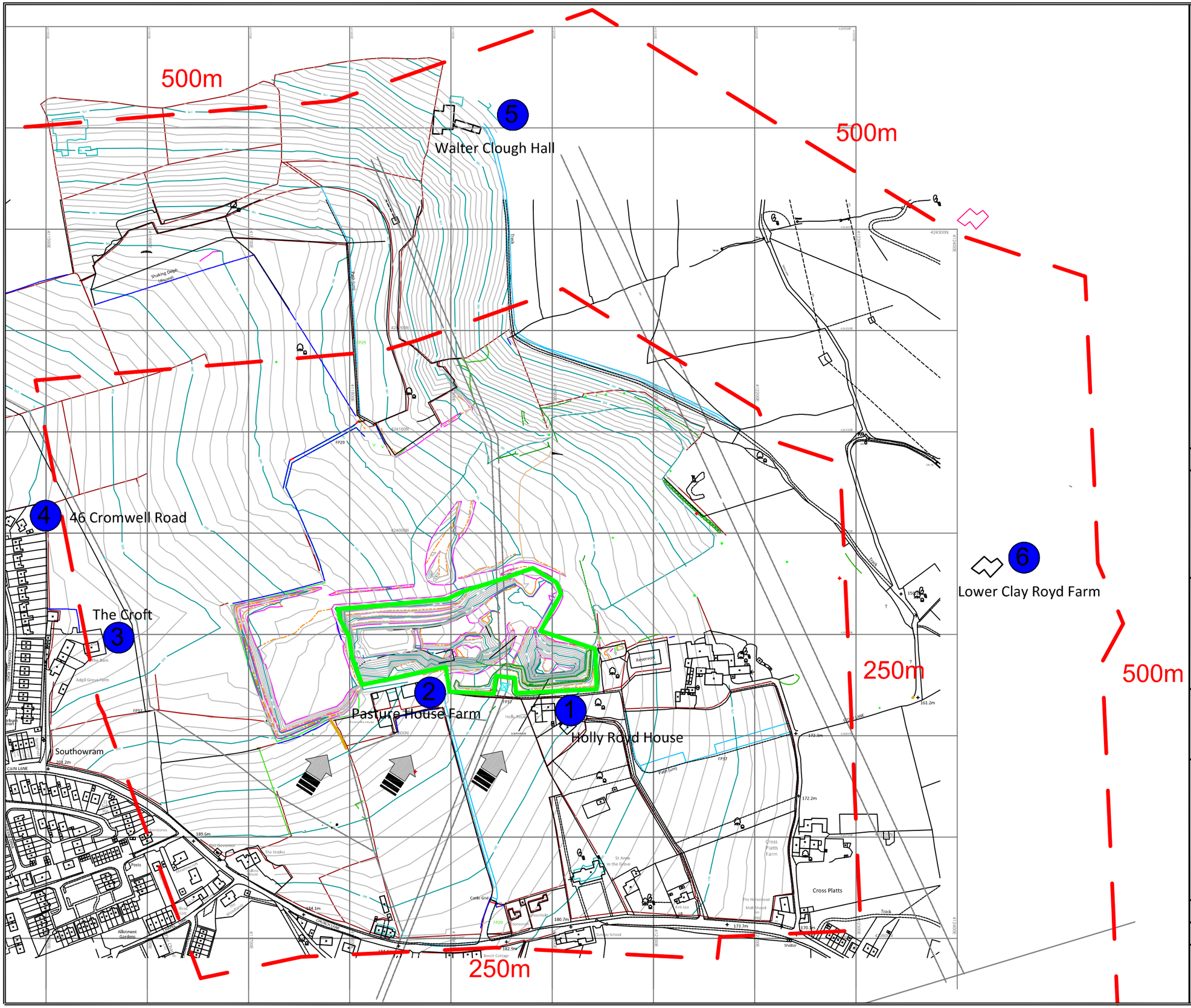
Item	Description
1	Regular environmental awareness training will be conducted to ensure all staff appreciate what are acceptable and unacceptable airborne dust levels.
2	All staff to be aware of site dust complaints procedure.
3	Material drop heights during loading of vehicles will be minimised by good operator awareness.
4	Water bowser operation to be reviewed at the start of the day and in adverse conditions its operation will be reviewed regularly throughout the day.
5	The site speed limit will be enforced, particularly in dry and windy conditions
6	The site manager (or appointed person) will assess the risk of dust emissions from exposed surfaces in dry and windy weather and appropriate action will be taken to avoid risk of wind-whip from exposed stockpiles (for example by wetting as required).

Table 3 – Monitoring Items

Description	Frequency
Site conditions and potential for fugitive dust emissions to be reviewed at the start of operations. Inspections will be made at the mineral processing site, the site access road and at the relevant extraction area according to the working phase of the site.	Daily
Visible dust propagation will be observed as well as weather conditions and other mitigating or contributory factors and recorded daily.	Daily
Track-out onto the road network and the will be kept to a minimum by ensuring that the site access road is kept clean by wetting and sweeping regularly	Daily

APPENDIX B

20293/200 – Dust Sensitive Receptors Plan



Rev	Description	Date	Drawn	Chkd

Client:

Marshalls

Project:

PASTURE HOUSE QUARRY
BESPOKE RECOVERY PERMIT
APPLICATION

Plan Title:

DUST RECEPTORS PLAN

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Project No. 20293	Dwg No. 20293/200	Rev
Date: SEP 21	Drawn: PS	Chkd:	Scale: 1:1000 @ A3