

DUST ASSESSMENT FOR THE PROPOSED SPICER HOUSE QUARRY AT INGBIRCHWORTH MOOR, NEAR PENISTONE

1 Introduction

The extraction of mineral by surface methods and the deposit of mineral waste has the potential to cause dust arisings as the mineral is subjected to breaking, crushing and loading and the waste is deposited and pushed out in layers.

The hauling of mineral and waste over the quarry haul roads also has the potential for dust as the material on the haul roads is crushed into a fine powder.

The mineral at the proposed Spicer House Quarry is a grey mottled brown boulder clay over inter-bedded sandstone, known as the Grenoside Rock which is 10 metres thick, a blackshale which is 11 metres thick, a blue pipe clay which is 5 metres thick and then Green Moor Rock which is located in two beds, the upper bed being 6 metres thick beds with a mudstone parting up to 2 metres thick and the lower bed being 2 metres thick. Beneath the Grenoside sandstone is a black carbonaceous mudstone/shale which will provide an impermeable layer on which the imported material can be tipped and a capping layer for the eventual restoration of the site, if mineral below the Grenoside horizon is not worked. The mudstone will have a moisture content of about 12 % and will have the potential to break down into finer particles of dust if it is dry and traffic runs on the mudstone in dry periods of weather. The pipe clay is harder and the moisture content is lower at 8 to 13 % and will sustain traffic if it is maintained and kept damp.

2 Concerns about Dust

Dust forms an inherent part of the environment, being dispersed from a variety of natural and anthropogenic sources by wind and water. Therefore, the meteorological conditions in any locality are of paramount importance when considering the potential for dust dispersal - the most significant cause of dust emission from surface operations being wind blow.

Fugitive dust emissions from surface operations, of the same type as the operations that will occur at the proposed Spicer House site are generally a localised phenomenon and generally comprise of dust particles in the size range of 0.1 μm to 100 μm , typically averaging 70 μm , and they are produced through the action of crushing and abrasive forces on materials. These larger dust fractions consequently have relatively large settling velocities, resulting in them being deposited over relatively short distances.

3 Public Perception

The public's perception of the nuisance caused by the generation of dust is variable, making the analysis of dust complaints extremely difficult. It is considered that, amongst other things, perception is influenced by:

- The effects on people, the nuisance they experience and complaints they register is affected by many socio-economic factors and their tolerance

- Some individuals may be sensitive to the presence of the operations and simply complain because it is there rather than there being a real nuisance.

The main potential effect of dust in relation to this site is considered to be visual – the coating and soiling of surfaces leading to annoyance.

4 Current Regulations

As previously stated, the amount of dust that might cause a potential nuisance is extremely difficult to determine. Similarly, numerous attempts have been made at identifying a nuisance standard for dust, without success. A number of non-statutory standards are used as a guide for the assessment of nuisance, including the concept of dinginess developed by Carey (1959), Shillito (1978), and Beaman and Kingsbury (1984).

Currently, there are no statutory or recommended levels of dust deposition that may constitute an official nuisance. It is normally left to the local Environment Health Officer, under Part III Section 791(d) of the Environmental Protection Act, to determine if, in his opinion, a statutory nuisance exists.

Planning permissions incorporate a number of conditions for the minimisation of dust emissions, and these are generally based on the principle of the Best Practical Environment Option appropriate to the site under consideration.

The Government have issued guidance on dust emissions and the mitigation of dust nuisance through good practice in the annex to the Mineral Planning Statements.

5 Description of Operations

The site, which lies to the centre of a plateau of Grenoside Rock above Spicer House Lane in the district of Penistone between Spicer House and Greenley Carr which forms the outcrop of the Grenoside rock on Ingbirchworth moor. There are shale beds, mudstones and the lower lying Greenmoor rock that all outcrop on Spicer House and the beds fall northward to Ingbirchworth Reservoir. The higher ground around the wind farm site adjacent to Whitley Road forms the watershed and the flow is mainly through the sandstone units to the reservoirs and streams to the north. The site falls gently to the north east and there are no springs or watercourses shown on the area where there is exposed sandstone just beneath the surface. There is a stream that runs from Greenley Carr to the east of Spicer House and down the dip to the reservoir.

The proposed quarry will be off Spicer House Lane in a rectangular field that will provide approximately 660 000 tonnes of stone over a ten years life worked in four phases. The Grenoside rock will be worked in benches from the side of the road to the south west and the stone will be lifted by excavator in benches not exceeding four metres in height to aid the excavator to load from the top of the bench into a dumper for removal of the overburden, skegs and non dimensional stone. The blocks will also be pulled out by excavator and loaded into a dumper for onward transport to saw sheds. The roofing slate and flag lifts will be worked by quarry men to ensure that the stone is not damaged as it cannot be lifted by mechanical means if it is naturally laminated to 20mm, 25mm, 38 mm and 50 mm. At the time of the site visit, no operations were being carried out as the site is to form a planning application to work stone opposite the disused Annat Royd Quarry. The site is surrounded by rectangular and square fields bounded by dry stone walls and falls gently to the reservoir and stream to the north east.

Each phase is designed to be independent so that, at any time, the quarry workings can be closed down and restored within a relatively short period, should the research and development project prove to be unsustainable.

- 5.2 Soils from the first 4 phases to be excavated, will be lifted and stored in soil bunds. These will act to screen the developing quarry from the road and surrounding areas.
- 5.3 **Phase 1 Extraction (Plan - JGP/SH/WS-02)** – Approximately **1,300 cu.m** of topsoil to be stripped and used to construct 3m high bunds on the north eastern side of the quarry against Spicer House Lane to screen the quarry from oncoming traffic. Approximately **1,950 cu.m** of subsoil will then be stripped to expose the top of the Grenoside Rock. This will be used to construct 3m high bunds adjacent to Spicer House Lane 1m beyond the north and south boundaries of the site, again these will act to screen the quarry from traffic present on road. The **55,500 cu.m** of Grenoside Rock can then be extracted in a south-easterly direction leaving insitu a 1:10 slope 10m wide haul road with appropriate edge protection running north then west along the quarry boundaries until the top of the underlying blackshale is reached.
- 5.4 **Phase 2 Extraction (Plan - JGP/SH/WS-03)** - Approximately **1,300 cu.m** of topsoil to be stripped and used to construct a 3m high bund along the edge of Spicer House Lane beyond the Southern boundary of the Quarry to further screen the quarry from oncoming traffic. Approximately **1,950 cu.m** of subsoil will then be stripped to expose the top of the Grenoside Rock and will be added in a south-westerly direction to the existing subsoil bund to the south of the quarry constructed in Phase 1. The **78,000 cu.m** of Grenoside Rock can then be worked in a south-westerly direction.
- 5.5 **Phase 3 Extraction (Plan - JGP/SH/WS-04)** - Approximately **1,300 cu.m** of topsoil to be stripped and used to construct a 3m high bund along the edge of Spicer House Lane beyond the Northern boundary of the Quarry to further screen the quarry from oncoming traffic. Approximately **1,950 cu.m** of subsoil will then be stripped to expose the top of the Grenoside Rock and will be added in a south-westerly direction to the existing subsoil bund to the north of the quarry constructed in Phase 1. The **78,300 cu.m** of Grenoside Rock can then be worked in a south-westerly direction.
- 5.6 **Phase 4 Extraction (Plan - JGP/SH/WS-05)** - Approximately **1,300 cu.m** of topsoil to be stripped and used to construct a 2.5m high bund beyond the South Western boundary the full width of the quarry. Approximately **1,950 cu.m** of subsoil will then be stripped to expose the top of the Grenoside Rock and used to construct a 3m high bund beyond the South Western boundary the full width of the quarry. Then the final **78,200 cu.m** of Grenoside Rock can then be worked in a south-westerly direction.
- 5.7 **Phase 5 Extraction – Future Development (Plan - JGP/SH/WS-06)** – The haul road can now be extended down through the 59m x 137m blackshale box cut shown on plan.

The **101,600 cu.m** of blackshale from the box cut is then placed in the south eastern half of the quarry at least 3m away from the box cut battered up at a minimum 1:2 slope and not to exceed the original ground levels prior to extraction.

- 5.8 **Phase 6 Extraction Future Clay Extraction (Plan - JGP/SH/WS-07)** – The haul road can now be extended further through the 7m of blue shale, then the **25,800 cu.m** of blue shale can be extracted in a north-westerly direction to expose the top of the underlying Greenmoor Rock.

- 5.9 The proposals have been calculated to provide for 10 years at a rate of 60,000 tonnes of stone product per annum. This represents some 15 vehicles per day leaving the quarry. The nature of the product is such that most of the product will be transported using, flat-bed vehicles such as 6 wheel HGVs to carry blockstone chained onto the wagon, flag rock on pallets, loose dry stone walling, blocks and rockery on tipper trucks and aggregate will be carried on 8 wheeled tipper trucks that can be sheeted up. Occasionally, larger stone products may require slightly larger transport such as an articulated wagon to transport blocks away to be sawn. A separate report provides details of the traffic assessment.

6.0 RESTORATION

- 6.1 The restoration proposal would be a "delph" type scheme using scree and quarry faces to naturally regenerate, aided by establishing areas or pockets of grassland, trees, shrubs etc.
- 6.2 These proposals have been designed by specialist landscape designers to provide a comprehensive restoration scheme for the site. The enhanced proposals include details of the aims and objectives primarily to restore the quarry in keeping with similar delphs in the area, but also to enhance the variety of wildlife habitats.
- 6.3 Restored soils will be seeded and managed to establish a grass sward enhanced with wild flower and heath species. Where available, seed of a local provenance will be used to establish ground cover.
- 6.4 Tree planting will take place in small groups on benches constructed across rock faces, scree slopes and the quarry floor. Alder and Birch will provide the nurse species, while Ash and Beech (chosen for its presence in the locality) will form the climax trees. Willow and thorn species will enhance the wildlife habitat, with Broom and Bramble establishing ground cover.

7.0 AFTERCARE

- 7.1 Following mineral extraction, soil restoration and landscaping, a full 5 year aftercare scheme will be implemented as discussed in the Mineral Planning Guidance Note 7. This will ensure careful and appropriate management of the meadow grass and wild flower areas.

- 7.2 The aftercare scheme will ensure maintenance of the trees and shrubs throughout the period while the tree canopy is being established. This will control competitive weed growth and ensure the success of healthy trees and shrubs. Diseased, dying or dead trees will be removed and replaced to ensure a successful establishment of at least 75% after five years, with scope to extend this for a further period.

8.0 NOISE

- 8.1 Any quarrying operation will cause noise, due to the excavation of the rock, the type of machines used and the stripping of soils and screen construction.
- 8.2 Noise has been defined as sound that is undesired by the recipient. The affects of noise on the neighbourhood are varied including interference with speech and communications, and disturbance of work, leisure and sleep. A further complicating factor is that in any one neighbourhood, some individuals will be more sensitive to noise than others.
- 8.3 In general, the level of noise in the local environment that arises from a development site will depend upon a number of factors. The more significant are :-
- i. the sound power levels (SPLs) of the plant or equipment used on site;
 - ii. the periods of operation of the plant on site;
 - iii. the difference between the source noise and the receiving position;
 - iv. the presence or absence of screening effects due to barriers or ground absorption;
 - v. any reflection effects due to the facades of buildings, etc.

In considering potential noise impact, it is necessary to take account of the existing noise climate of the area, together with the number and position of properties in close proximity to the development.

The only properties in close proximity to the site are those located on Spicer House Lane namely the farm which is 500 metres to the west and Annat Royd which is 500 metres to the east. The screen bunds of topsoil will attenuate noise from the quarrying operations for passers by.

8.4 NOISE LEVEL PREDICTION

Prediction Methodology

The prediction methods which are generally used, are based upon that outlined within British Standards (BS) 5228: 1997 'Noise and vibration control on construction and open sites'.

The maximum barrier attenuation of 10 dB(A) quoted within BS 5228 can be conservative and is recognised as such in section D.3.2.2.1 where it states 'High topographical features and designed and positioned noise barriers could provide greater attenuation'.

Examples of the former are overburden mounds and excavation high walls whilst baffle banks and acoustic fences are examples of the latter.

8.5 MITIGATION MEASURES

Introduction

Noise attenuation (or reduction) features are either normally occurring or are engineered as part of the overall operations. J.G.Pears will instigate the following measures to ensure that noise levels are kept to a minimum.

Site Operations

Noise emissions from a site are highest when plant is operating at the surface. The guidance in Mineral Planning Guidance 11 now the Noise Annex to the Mineral Planning Statement still allows 70 dB(A) for stripping operations over an eight week period and 55dB(A) for the quarrying operation. Most of the quarrying operations will take place in the quarry void and will therefore be below ground level with the quarry face acting as a noise attenuation barrier. To assist with this abatement, all internal access ramps have been designed with easier gradients thus reducing high revolution engine noise.

Site Plant

Measures will also be taken to minimise noise emitted from the plant itself, as listed below :-

All vehicles and plant will be fitted with efficient silencers.

Pumps or generators at semi permanent or permanent locations will be acoustically clad.

Wherever practical, all plant engines will be operated with doors or cowls in the closed position.

- iv. All undue revving of engines will be avoided.
- v. All plant will be efficient and well maintained.
- vi. All plant will meet current EC standards relating to noise emission.

8.6 Summary of Noise Mitigation

It is considered that the proposed mitigation measures that have been implemented, will adequately protect the surrounding area, minimising the environmental impact of quarrying and plant generated noise, for the duration of the proposed scheme.

- 8.7 Due to the location of the site and the screening of the workings from the surrounding pasture which are away from the noise source from working the stone any noise nuisance will be mitigated by the level where the machines are and the location of the nearest noise sensitive properties.

The nearest properties are along Spicer House Lane near to Spicer House and Annat Royd Farm. These properties are above the working horizon of the quarry and it is unlikely that the noise levels will exceed 55 dbA during quarry extraction or 70 dbA when soils are stripped. The soils will be stored around the perimeter of the site and these will attenuate any noise from the site.

9.0 DUST ISSUES

- 9.1 A Dust Report has also been commissioned and is appended as part of this application statement. There is potential to generate dust from the proposed activities within the quarry, such as excavating, overburden tipping, soil lifting and replacement etc.
- 9.2 The nature of the proposals and short distances for vehicles to travel within the confines of the quarry will mean that internal traffic generation of dust will be low. Furthermore, much of the operational activity will take place within the quarry area located below the surrounding surface and sheltered from prevailing winds by the seeded topsoil bunds.
- 9.3 Mitigation measures to control dust emissions will be undertaken to include dampening haul road surfaces, vehicle speed restriction and upward facing exhaust positioning, and wetting of stone and clay excavating where necessary.
- 9.4 The nature of the splitting system for cutting and dressing stone will greatly reduce dust emissions from these sources as it is likely to be plug and feather, black powder or hydraulic excavator.
- 9.5 As a last resort, in adverse weather conditions comprising dry, strong winds, site operations may be temporarily suspended.

10.0 Provision of Stone

- 10.1 The Grenoside rock will provide a wide range of stone products including roofing slate, flag and ashlar block for sawing, walling for house construction, drystone walling and security lump stone for the landscaping of offices and industrial and retail premises. The quarry will provide work for 6 or 7 men to dress the stone and remove the block with machines to load and deliver to local saw sheds in Huddersfield and Halifax.
- 10.2 The local stone has been difficult to source and stone is being imported from the Peak District to satisfy demand. The stone around Penistone and Barnsley, south Huddersfield is mainly from the Grenoside and Greenmoor rock sequence which will allow the character of the area to be maintained.
- 10.3 The Government and the Local Authority realise the importance of the local stone quarries and clay pits being able to provide employment and provide naturally won products for the area. The materials to be won from the quarry are sustainable in that they will last for a considerable number of years even centuries. Stone will provide a durable and aesthetic building material for the area which is borne out by the character of the west of Barnsley and the Pennine region as a whole.

10.4 The applicant has also considered the pipe clay in the mineral extraction area so as not to sterilise this reserve before restoration takes place. The pipe clay can be used by the two local vitrified clay pipe manufacturers or the brick industry for the construction of houses and other buildings used for commercial and industrial purposes.

10.5 The quarry will provide stone product and no material will be wasted in the process to ensure a sustainable operation. The site is within a mineral area of search in the Barnsley Unitary Development Plan and the design of the quarry has considered expansion of the workings in the future subject to planning approval.



Signed

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6 Assessment of Potential Dust Generating Activities

The amount of dust generated and emitted from a surface quarrying operation and its impact varies with respect to:

- (a) The type of working
- (b) The character and composition of the surrounding area
- (c) Climate and topography
- (d) The excavation of mineral for capping and engineering
- (e) The crushing of waste stone to aggregate for drainage
- (f) The tipping of mineral waste
- (g) The hauling of mineral from the site prior to waste deposition
- (h) The haulage of waste material from the reception area by dump trucks
- (i) The tipping of the waste material in the quarry void
- (j) The spreading of the waste by small dozers/front end loaders

All of the above activities continue to have the potential for dust generation. The potential for dust to be generated by operations (g) and (h) is a function of the degradability of the surface of the haul road materials and dryness, wind speed and the speed of the vehicles using the haul roads.

The potential for dust generation from operations (d), (e), (f), (i) and (j) is a function of the nature of the material and wind speed.

The excavation of mineral will be by a 360 degree excavator and the lifting of the top rock and any clay inter burden will have a potential to create dust. The potential for dust generation will be low as the material will be loaded straight from the face into a dumper which will take it to a stockpile or for capping and slope engineering of the worked out quarry. The stone and clays will be wetted in periods of dry weather to mitigate dust emissions. We have studied the rain fall for the Penistone area since records began and there is up to 116 mm per month of rain. The potential for dust generation is likely to occur after three days of dry and breezy weather in the warmer months.

The processing activity will have the potential to generate dust as the non dimensional stone is processed and sized over screens. The material has to be fairly dry to allow the crusher and the screens to separate material without becoming blocked up with sticky clay like particles which reduce the efficiency of the processing plant.

There are management procedures that can be introduced to reduce the potential for dust emissions from the processing area. The conveyors and the delivery points can have shrouds over them to reduce wind blow and keep dust within the confines of the conveyor. The drop heights can be reduced so that the stockpile is near to the end of the conveyor so wind cannot blow through the material as it falls off the conveyor. The stockpiles can be damped down to reduce the potential for wind blow and they can be removed from the stockpile area to allow the material to continue to fall on the stockpile in a cone shape to reduce drop heights.

The tipping of mineral waste will be in the filled areas to cover the imported material so that the potential to generate dust will be low. The imported excavation material will be dumped in piles and pushed out by a slow moving dozer or a front-end loader to layer the earth and provide compaction. The coarser waste fraction will be tipped at the base of the site and finer material will be tipped to cover the coarse earth. The material will

be levelled up and covered with some clay or stone fines material to seal the imported excavation material.

The spreading of the material, either by dozer or front end loader, involves the slow movement of these items of plant and therefore vehicle speed is not a significant factor when considering the potential for a dust nuisance being caused.

7 Site Sensitivity

The three main factors which could potentially affect the sensitivity of the site with regard to dust are:

- The distance of inhabited areas from site activities
- The location of the inhabited areas relative to the prevailing winds
- The density of habitation

The most critical element in the consideration of the potential for a dust nuisance to be caused is the direction of the prevailing winds. The general prevailing winds in the UK are south westerlies (blowing from the southwest to the northeast). To determine the sensitivity of the surrounding area, the location of residential areas to the site activities has to be examined.

The location plan appended to this report is based on the application plan submitted to the Mineral Planning Authority for them to assess the impact of the proposed quarry. The plan shows the relationship of the centre of the activities on the site, in relation to the three zones of influence, generally recognised as being those affected by dust blow from mineral and waste activities. This plan indicates that there are a number of properties to the north of the site area, which lie within the potentially sensitive zone of 250 m. There are no properties within the second slightly sensitive zone of 500 m, where the reservoir lies to the north of the site, on the sloping land down to Horner Lane. Refer to Drawing Number sh2002//001.

The potential for dust generation from the activities on the site is generally considered to be when there have been three or more days when the rainfall has been less than 0.1 mm. The properties to the north and east of the site, along Spicer House Lane have the greatest sensitivity to the operations on the site. As the operations will be within a quarry surrounded by high quarry faces and the processing and material disposal operations will be on the floor of the quarry, for a fairly low key quarry site, it is considered that the operator can manage the stone removal, processing of primary and secondary aggregate and filling operations to ensure that the potential for a dust nuisance to be caused is minimal.

8 Control and Management

The operator shall appoint a responsible person for dealing with environmental issues on the site. The Quarry Manager will keep a daily log of the weather conditions, including the direction of the prevailing wind with a brief description of its type, i.e. gentle, breeze, moderate, strong or gale force. This log will include any complaints received, with a record of any investigations carried out and changes to the working practices on that day. The log will be available for inspection on the site.

The following shall be implemented:

- All unsurfaced roads to be dampened when necessary
- Vehicles used for the movement of materials on the site, where appropriate, shall be fitted with exhausts pointing away from the ground
- A speed restriction shall be imposed on the site

In the event that the wind is blowing towards any sensitive properties, the responsible person, identified above, shall satisfy himself that the control measures are adequate. If the control measures are insufficient to prevent dust blow from the operations to the sensitive locations, the operations shall cease until the weather conditions improve.

9 Conclusions and Recommendations

The area surrounding the site generally comprises of pasture land with boundary walls constructed in sandstone flag rock. There are three dwellings in the vicinity of the quarry which are at Spicer House, Annat Royd and Royd Moor Hall all which should not be affected by dust blow from the quarrying activity considering the location and the distance. Annat Royd has a higher risk of dust blow than the other two but this is still considered low.

The quarrying and filling operations at the site are dependent on the requirements of the stone works and the provision of aggregate. It is therefore considered that considering the guidance for the Best Practical Environmental Option, even though BPEO is now considered to be obsolete, that the cessation of the excavation, processing and filling operations during adverse weather conditions would reduce the risk of dust emissions and the potential contribution to the current level of dust in the atmosphere, as a result of the quarrying operations, is minimal.

It is recommended that any water make in the quarry is stored and used in periods of dry weather to suppress any potential for dust. There will be a water supply at the quarry for the wheel cleaner, offices and the sheds and the processing area can be damped down in periods of dry weather.

The quarry is down dip of a large area of exposed Grenoside rock which any water falling on will percolate into the fissures and joint sets and the flow northward through the Grenoside rock at the contact with the underlying carbonaceous black shale. Therefore water will flow into the quarry from the open face and flow down dip to the worked out areas. A sump can be placed in the black shale to collect any water and this water can be used for suppression.

Cromwell Wood Estate Company Limited
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