AIR QUALITY IMPACTS

PROPOSED SAND AND GRAVEL EXTRACTION, PROCESSING AND ASSOCIATED OPERATIONS

HARLEYFORD AGGREGATES LIMITED

LOWER HALL FARM, SAMLESBURY, LANCASHIRE

John Cowley

Mineral & Resource Planning Associates Ltd

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1 INTRODUCTION

The Assessment Background

1.1 This assessment of air quality has been undertaken in connection with the proposal by Harleyford Aggregates Ltd to undertake sand and gravel extraction operations and associated activities including wet processing by washing and screening, but excluding crushing, and the construction and use of a new access road at Lower Hall Farm, Samlesbury, Lancashire.

1.2 The assessment is provided as part of an Environmental Statement (ES) submitted in accordance with The Town & Country Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regs).

1.3 An ES undertaken in accordance with the EIA Regs is only required to address 'significant' impacts.

1.4 This assessment only relates to air quality in the external environment and is relevant only to external locations where people are expected to stay for any period of time. It does not consider transitory air quality matters. It will relate to air quality in residential gardens but cannot be used to assess indoor air quality in residential or other buildings. In any event indoor air quality is not regulated and neither is it a material planning consideration nor a matter to be addressed in an ES.

1.5 The relationship between total emissions and air quality at a particular location is complex and uncertain. There are a large amount of variables and possible interactions the impact of which in relation to air quality management add further complexity and uncertainty particularly if the air quality pollutants are exotic or consist of ultrafine particulates. Nevertheless, where an assessment of air quality relates to coarse particulates of relatively simple chemistry, relatively robust conclusions on impacts can be drawn. A bibliography of documents and research used in relation to this assessment and of wider relevance to the topic is provided. Some background information in relation to air quality emissions and their transport is provided in Appendix A

1.6 This assessment considers policy and guidance set out at national level and where relevant at local level. Specific technical advice relating to mineral extraction and construction and demolition has been produced by the Institute of Air Quality Management (IAQM). The IAQM advice is not referenced in any national or local policy. It is not policy or guidance and has no or limited policy weight in decisions. However, that advice has been noted in this assessment and a worked assessment of impacts in accordance with mechanisms set out in that advice has been undertaken and is provided in Appendix B.

1.7 Air quality in any location of a proposed development is already affected by both natural and anthropological sources. The degree of any

impacts generated locally or deposited daily, will vary significantly over time and location and over seasons.

1.8 Over the last 50 years, there has in general been a very significant decrease in outside air pollution across the UK in relation to virtually all sources of pollution. This improvement is expected to continue due to on-going structural changes in lifestyle, the economy and social activities and will be assisted by technological change both purposely and indirectly affecting air quality.

1.9 National planning policy in the NPPF confirms that the focus of planning decisions in relation to air quality should be on whether the proposed development is an acceptable use of land in relation to planning and specified air quality objectives. The control of processes or the acceptability of emissions or of specific air quality thresholds and objectives are matters for other regulatory regimes to address. The planning process should operate on the basis that such other regulatory regimes are relevant and effective.

1.10 In planning regulation the focus is only on external air quality. In a developed country such as the UK an individual may typically spend around 90% of the time inside a building etc (at home, at work, at school, in vehicles, etc) and be subject to emissions of pollutants arising within that building etc.

1.11 Such indoor pollutants include pollutants from an exceptionally and increasingly diverse range of indoor activities and products such as from cooking, heating, cleaning and washing, from furnishings, paints, hair spray, printers, glues, etc as well as from biological debris such as hair, skin, insect debris, viruses etc from people, pets and insects as well as from smoking and open fires.

1.12 Those pollutants may be formed predominantly of fine and ultrafine particulates, often of complex chemistry. In individual buildings and in many parts of the UK the totality of such indoor pollutants may considerably exceed external thresholds. Exposure to such indoor pollutants may therefore be more significantly harmful in health terms than exposure to external pollutants. However, that is a consideration which is outside the scope of this assessment.

Air Quality Constituents and Sources

1.13 The atmosphere contains particulates from many natural and anthropogenic sources. These may be both essential and useful/valuable resources to the global or local environments or become at certain thresholds of concentrations a nuisance to living organisms, including people, or at higher concentrations harmful to such organisms. ‘Clean air’ neither exists naturally nor can thresholds of risk of nuisance or harm be easily defined.

1.14 Particulates are any non-gaseous materials, solid or liquid, that may be emitted into the atmosphere. They include primary chemically stable particulates emitted directly into the atmosphere and secondary particulates formed by chemical reactions of reactive materials emitted in the atmosphere. The emission, transformation, transport and the eventual settlement of particulates is an extremely complex topic which is not wholly understood.

1.15 The terms PM10, PM2.5, etc relate to those airborne particulates of an equivalent aerodynamic diameter at or below the relevant size. The totality of PM2.5 particulates therefore refers to the mass concentration of all those particles of 2.5 microns or micrometres and below. It is not just those particulates of that specific size.

1.16 The quantity of particulates of any size is normally referenced by the total weight of those particles in micrograms, which therefore can consist of a combination weighted towards either larger heavy particulates or smaller lighter particulates and every combination in between.

1.17 Research suggests that it is the fine particles (PM2.5 or less), but more especially the ultrafine particles (PM1.0 or less), and particularly those particulates with complex chemistry or biology, which are more related to adverse health effects.

1.18 Fine to ultrafine particles provide a permanent 'regional' background which cannot be mitigated locally or through a particular development, and which may require regional, national or global action to reduce. However, there is everywhere an underlying contribution from natural sources that is beyond feasible mitigation.

1.19 Outside of main urban areas the dominance of 'regional' sources becomes more apparent where such sources may form over 90% of the PM2.5 average mean at a specific locality.

1.20 This regional background is composed of particles both natural and anthropogenic, and both primary and secondary, originating effectively from sources from a very large part of the UK and from outside the UK. The regional background can also be considerably affected by emissions from more distant parts of the UK and notably, under anti-cyclonic conditions, from the rest of Europe and beyond. In such conditions up to 50% of PM2.5 in the UK may be derived from outside the country.

1.21 The assessment, management and mitigation of outdoor air quality conditions arising from a single development, and the extent to which that development, in isolation, would give rise to significant harmful impacts is therefore complex and uncertain due to the dispersed nature of the total constituents and sources, the individual chemistry and physical characteristics of each particle, the natural variable background, and climatic and other variables.

1.22 Local air quality at a particular location will be influenced by both anthropogenic and natural constituents derived from both near and distant locations, including very distant emission sources. Natural sources include chemical emissions from volcanoes; salt spray carried inland; natural crustal 'dust' particulates; biological products such as bacteria, pollen, fungal spores, mould and fragments of animal debris; particulates from natural moor or forest fires; etc.

1.23 Anthropogenic sources of air quality particulates include emissions from a wide range of industries (chemical, manufacturing, processing, refining, etc), energy generation, road and other transport, domestic sources, agriculture and forestry, waste processing and management, mineral extraction, fires including 'controlled' moor burning and bonfires, incinerators, recreation facilities, etc.

Wet Sand and Gravel Operations, Air Quality and 'Dust'

1.24 It is acknowledged in research, policy, guidance, advice and from other environmental assessments that the primary air quality consideration from any non-coal mineral working is 'coarse' 'dust' particulate matter and that the contribution of such mineral working to other pollutants is negligible.

1.25 This assessment therefore focuses on 'dust'. It notes that other air pollutants may arise but does not assess those pollutants because they may arise but only at such an insignificant specific and total level as not to be required to be assessed in an ES.

1.26 'Dust' is a generic term and the term may be used with a wide degree of latitude. An important part of the origin of this term is the perceived general upper limit of a particle to be carried in the atmosphere and then deposited. As defined in BS6069, 'dust' describes particulate matter in the size range of 1-75 microns in diameter; although in reality the term can include airborne particulates of well over 100 microns.

1.27 Natural crustal 'dust' particulates are rock or mineral fragments. These fragments may be monomineralic (composed of a single mineral) or a combination of minerals. They include volcanic dust; 'Sahara' dust and wind eroded dust from periglacial areas; dust from beaches; from semi-arid environments and particles liberated by erosion from exposed crustal or fragmental outcrops. These natural dusts provide a background load of 'dust' particulates. They may become visible short-term phenomena on occasions but can also significantly increase mean particulate load in the atmosphere for extended periods.

1.28 The dust produced from mineral working will be similar to 'dust' produced by natural processes being essentially fragments of minerals and rocks, either monomineralic or composed of a range of minerals. In many cases, and particularly in wet sand and gravel working, the dust produced in processing etc is exactly similar in form and size to that that which is liberated naturally by water or wind from natural weathering and erosion

processes. The difference is that while the energy involved in mobilising 'natural' dust may be very substantial, thereby enabling such dusts to be carried for very large distances, the energy involved in mineral working is both very significantly smaller and much more localised, thereby severely limiting transport.

1.29 It is calculated that the total contribution of all non-coal mineral extraction dust to the total UK anthropogenic dust load is around 1% of particles of 10 microns or less (PM10); around 0.6% of particles of 2.5 microns or less (PM2.5); and makes no contribution (not identifiable [0%]) in particles of 0.1 microns or less. That contribution is for all forms of non-coal extraction. The contribution from 'wet' sand and gravel operations will be an insignificant part of that total.

1.30 The contribution of wet sand and gravel operations to 'dust' is considerably smaller than from other mineral operations. Wet processing of sand and gravel is defined in DEFRA Process Guidance Note 3/08(12), 2012, paragraph 3.2, as operations "not normally likely to result in the release into air of particulate matter except in a quantity which is trivial". Such operations are therefore excluded as an installation under the Local Air Pollution Prevention and Control regime. It is also acknowledged in relevant statutory national guidance that dust produced from such operations will normally not be perceptible nor significant beyond 100 metres from possible emission sources.

1.31 Dust from wet sand and gravel workings may therefore be associated with visible amenity impacts within 100 metres of a source (visible dust blow from dry surfaces or deposition on vegetation or hard surfaces) rather than with more dispersed impacts from normally invisible fine particles.

Outline of Proposed Operations

1.32 The proposed operations include the extraction and processing of sand and gravel, the construction and use of a private access road and associated landscaping and restoration of the site. The operations are expected to take place over some 20 years at a rate of some 150,000 tonnes of sales per annum.

1.33 The extraction, processing and transport operations on site will generate fugitive dust by activities such as site construction, soil stripping, material handling, processing, stockpiling and transhipment. As no operations are currently in place this assessment is an estimation of likely arisings and impacts given background levels and typical arisings from the proposed operations and published guidance or impact assessment, research results and advice.

1.34 Any negative impact or effect of such arisings from the proposed operations will be mitigated by existing vegetation, climate, topography and distance from sensitive receptors and by further mitigation arising from extensive new tree planting, landscaping and other proposed

works, including works at commencement and during the phased and final restoration.

1.35 The totality of the proposed development will produce a significant net gain for the existing and future air quality environment both in reducing total emissions in the provision of essential resources and in the air quality pollution mitigation provided by the landscaping and restoration works in relation to both dust and other air pollutants.

1.36 In that context the proposed development will offset any local increases in air quality pollution including any new or additional emissions arising from transport or industrial and energy developments on the adjacent Red Scar Industrial Estate.

1.37 The totality of that benefit is difficult to define and quantify. However, a recent report and tool on removal of PM2.5 particulates prepared on behalf of DEFRA/ONS suggests that the proposed tree planting will remove circa 60kg of such particulates each year at a total health impact benefit of around £0.5 million.

The Location

1.38 The development area is currently partly farmland (mainly to grass and used for grazing of cattle and sheep); and partly a former mineral working, with associated woodland, hedgerows and minor water bodies. It is bordered by the River Ribble on three sides. The immediate surroundings consist of further farmland with woodland and a restored sand and gravel working. The small and dispersed settlement of Samlesbury lies to the south.

1.39 However, this is not an isolated rural location but part of the urban fringe of Preston with the urban boundary almost immediately on the other side of the Ribble at the Red Scar Industrial Estate. The urban area extends from Preston in the north-west as an almost continuous built-up area through Bamber Bridge, Leyland, Chorley, etc to the south. The centre of Blackburn is some 10 kilometres to the east.

1.40 The M6 motorway is some 0.9 kilometres to the west and the A59 some 0.9 kilometres to the south, with Junction 31 of the M6/A59 some 1.5 kilometres to the south west. This section of the M6 is one of the busiest lengths of the UK motorway network.

1.41 To the immediate north of the site is the extensive Red Scar industrial complex (which is proposed for further expansion) which contains a wide range of industrial and commercial uses. A crematorium adjoins part of that area. There are a number of waste management facilities located in the southern part of the complex, and adjacent to the proposed development at Lower Hall Farm, dealing with household, industrial, commercial, demolition and construction waste.

1.42 Further development has been permitted at Red Scar in the area nearest Lower Hall Farm consisting of industrial, waste and energy producing

activities including an 'energy from waste' incinerator. The latter has recently been granted planning permission where, in relation to air quality, it was concluded that while the development would have a net negative adverse impact this impact was unlikely to be unacceptable or significant on the environment, including the adjacent SSSI, or on local residents.

1.43 There are other nearby large industrial activities to the east (at the former Samlesbury Airfield), also proposed for expansion. To the south are a large brewery and a waste water treatment plant.

1.44 The former Higher Brockholes Quarry lies immediately on the other side of the Ribble. This has subsequently been developed as a nature reserve and recreation/event/visitor/conference attraction facility with a target of some 250,000 visitors per annum.

1.45 There are no residential properties within 250 metres of the operations. There are only two residential properties between 250 and 500 metres of the extraction area.

Climate

1.46 Climate experienced by a location has a significant influence on dust and other airborne pollutants. The UK, and this location, can be said to experience weather changes rather than be subject to a climatic regime of wet/dry or cold/hot seasons. The air quality response to climate is however very complex potentially producing conditions where local climatic effects can significantly affect local conditions over variable periods.

1.47 The nearest Met station is located at Blackpool Airport which is located immediately on the coast and is therefore expected to display climatic and hence air quality conditions slightly different in general from the development site due to its direct exposure to the sea to the west and its flat topography. However, the typical average conditions will be similar.

1.48 The typical average conditions in the general area of the location are of a cooler, wetter, more windy and cloudy winter with a warmer, drier, less windy and less cloudy summer. Winter temperatures average around 7-8C but with a typical range of 2-9C. Summer temperatures average around 18-19C but with a typical range of 10-20C. Much colder or hotter conditions will occur at random intervals and for variable periods.

1.49 Rain may occur on any day throughout the year. The average 'rain days' per year (a 'rain day' is any day on which precipitation is in excess of 0.2mm, which is the accepted precipitation level above which wetting prevents wind from picking up and transporting dust) is around 180 to 220. The average rainfall is between 1000 to 1250mm per annum. Individual rainfall events will range between short term heavy downpours or day long 'mizzle'.

1.50 Windy conditions may also occur on any day throughout the year. Winds are from either the south or west for some 70% of the time and roughly equally from the north or east for the remainder of the year. These

proportions are generally consistent throughout the year. Average wind speeds are lower in the summer at around 10 mph and higher in the winter with average gusts exceeding 25 mph. Quiet wind periods and severe storm conditions, with high speed gusts, will occur randomly and for variable time periods.

1.51 Winds of sufficient speed to enable the transport of dust are therefore normally typically associated with significant rainfall events. This relationship therefore both inhibits dust generation and aerial transport but also helps to wet dust transport dust by run-off into soil or other sinks where it removed from future mobilisation.

Climate Change Considerations

1.52 Some air quality pollutants have potential negative impacts on climate and sustainability due to a relationship with greenhouse effects and other associated climate changes. The global relationship with the greenhouse effect is understood but the possible climatic outcomes (more cloud cover or not, wetter summers or not, more impact on temperate zones or not, etc) are less clear.

1.53 The potential impacts of climate change on UK weather and air quality remain very uncertain. It is generally thought that rainfall and storm conditions will increase in scale and frequency over the UK in the winter and that summers will become warmer and drier but this overall picture may hide significant individual events (such as more, but short term, summer severe rainfall events interspersed with hotter drier periods or longer periods of calm) which may be of more or less importance in improving or harming air quality.

1.54 Any increase in rainfall or storms would theoretically reduce conditions where dust pollutants are mobilised and transported by wind, and the distance of that transport, but more storms could increase total load and spread of salt deposits and/or mobilise by erosion more fine sediment for subsequent mobilisation as dust in drier conditions. If annual temperatures rise then the UK may be subject to drier conditions in the summer with more potential for dust generation from agricultural activities and natural sources including wildfires in peat or forests.

1.55 The postulated rapid retreat of ice sheets and glaciers could expose substantial areas of bare ground covered by fine mineral dust ('rock flour') which may be mobilised by strong drying winds. Winds associated with such regions are some of the strongest recorded on Earth and katabatic winds on the edges of ice sheets can be both strong and persistent. In the past such conditions have been very significant sources of dust across the UK.

1.56 The extent to which such dusts may contribute to the future regional background in the UK is unknown. Similarly there is uncertainty as to if 'Sahara' dust will increase or decrease in total and if there would be a shift in the area of deposition.

1.57 The Government has recently set challenging national targets on reduction in greenhouse gases including the related provision of a very substantial increase in tree cover for the UK as so as provide, inter alia, a carbon sink.

1.58 The negative impacts on climate change arising from the proposed development are negligible due to the low level of emissions of relevant anthropogenic global warming pollutants. Although as the mineral extraction and subsequent transport activities are replacing but not increasing net emissions, and will more probably reduce such emissions (because of the location of extraction nearer the market than alternatives), the net impact in that context might be a reduction.

1.59 Further, the development activities are essential economic activities providing resources to, inter alia, facilitate essential resilience to climate change. Providing those resources closer to the market thereby minimises any negative climate change air quality pollutants that might arise for these essential activities.

1.60 The development proposes planting of a significant number of trees at the commencement of operations, during the phased restoration and at cessation of extraction. This will provide positive assistance in off-setting greenhouse gases and the resulting negative impacts from climate change. This assistance, although negligible in the wider context, is significant locally and accords with the thrust of Government objectives on increasing planting to mitigate climate change and improve air quality and in support of the 25 Year Environment Plan.

2 AIR QUALITY CONSIDERATIONS FOR DUST

The UK Background

2.1 BRE and MIRO give the following potential daily deposition of dust in milligrams (one milligram is 1,000 micrograms) per square metre for typical land use locations across the UK. Such 'typical' levels must clearly be subject to considerable variation and range over seasons and years. It is also to be expected that 'open country' levels in the NW Highlands will be different in total, and in composition, from that in the Ribble Valley or in open country in East Anglia, as will that in the centre of Oban compared to the centre of Preston or London.

Table 1

	BRE mean	MIRO median	MIRO 95 percentile
Open Country	39	38	140
Outskirts of Towns	59		
Industrial Areas	127		
Residential Areas & Outskirts of Towns		56	203
Commercial Centres of Towns		90	261

Regulations and the Assessment of Harm to Air Quality

2.2 The Air Quality Standards Regulations and the Air Quality Strategy produced in accordance with Part IV of the Environment Act (1995) provide standards, objectives and strategy measures for considering air quality conditions. The basis for assessing compliance with such legislation are the Air Quality Objectives (AQO) set out in Local Air Quality Management Technical Guidance TG 16 (LAQM TG16) published by DEFRA.

2.3 The AQO objectives in TG 16 potentially relevant to mineral dust are particulate matter (PM10 and PM2.5), although as has been noted the contribution of mineral dust to such particulates is very small.

2.4 The current AQO for PM10 in England is an annual mean of 40 micrograms per cubic metre and a 24 hour mean of 50 micrograms per cubic metre which is not to be exceeded more than 35 times per year.

2.5 The previous AQO for PM2.5 in England was an annual mean of 25 micrograms per cubic metre with a target to reduce concentrations in urban areas by 15%. There is now no specific target set out for PM2.5 instead the Government seeks to work generally towards reducing emissions and concentrations of PM2.5 to progress towards achieving the WHO guideline of 10 micrograms per cubic metre in the UK.

2.6 This move reflects both the general desire to improve air quality but also some of the limitations in fixing on a specific threshold for PM2.5 encompassing all components in the air regardless of their degree of toxicity

or their individual concentration without reference to the nature and toxicity of the particulates involved. That could also lead to the situation of having a false perception and assurance that concentrations of PM2.5 at either side of a specific threshold may be perceived as 'safe' or 'dangerous'.

Nuisance Considerations

2.7 There are no thresholds or standards in relation to the level of dust emission or deposition which would qualify as causing a negative amenity impact or a nuisance either statutory or otherwise.

Health Considerations

2.8 The potential for negative health impacts is directly linked to the size of particles. Research strongly suggests that smaller particles (those less than PM2.5 in diameter) are more closely linked to adverse health effects and that that it is fine particles (PM1.0) or ultrafine particles with complex chemistries which are primarily responsible for such effects.

2.9 Research in the vicinity of mineral extraction operations, notably opencast coal extraction, but also sand and gravel workings, has not found any significant additional particulate levels at nearby locations in comparison with more distant locations. Nor has it found any definitive correlation between poor health and nearness to those operations.

2.10 A large European wide study into health issues in residential environments related to long-term exposure to air pollution from all sources (involving 22 cohorts and a total of over 360,000 participants, from across Europe), showed a relationship between particulates and health, but concluded that there is very scarce evidence for increased health risk in relation to particulates coarser than PM2.5; and no statistically significant relationship between hazard ratios and PM2.5 concentrations below a concentration of 15 microns per cubic metre.

2.11 Crystalline silica is found in many rocks and 'natural' crustal dust. It is effectively an inert mineral but exposure to silica particulates can be an inhalation hazard (respirable crystalline silica, RCS) to those working directly adjacent to silica materials such as in the construction, quarrying, ceramics and many other industries.

2.12 The workforce in quarries where blasting and/or crushing and drying of siliceous rocks takes place (such as gritstone quarries or silica sand plants) might be exposed to that hazard and strict measures are enforced by the Health and Safety Executive in such operations to ensure adequate personal protection of the workforce.

2.13 The assessment of RCS levels in the general population may be affected by the presence of natural silica particulates. This may include silica beach sand, silica sand from natural crustal rocks and silica sand from major global dust events (such as Sahara dust, but not Icelandic or volcanic dust which is mainly of a different mineralogical nature).

2.14 The extraction operations at LHF will involve the extraction and processing of siliceous minerals. However, this will be without blasting, crushing or drying and where the process involves water as a process media and in transport. Dust production of all forms is insignificant in those conditions compared to the 'dry' activities in crushed rock quarries or where sand is dried.

2.15 Research into RCS has been focussed on the exposure of the construction workforce and to the workforce in 'dry' quarries. This work has demonstrated that the risk exposure arises only within a few metres of the relevant occupational activity, not to those working or living beyond that distance.

2.16 Recent work in the UK on levels of RCS within construction sites and near dust producing operations at 'dry' siliceous mineral workings has shown that the typical mean is below the US EPA threshold. At this level there is considered to be little or no risk. This work did not assess risk at quarry margins or at property distant from quarry margins.

2.17 In this location the operations are 'wet' and the nearest residential properties are over 250 metres from those operations. While the extraction involves the processing of siliceous mineral there is therefore negligible likelihood of RCS dust creating risk to people in those distant properties or beyond.

3 PLANNING & AIR QUALITY

Policy and Guidance in the NPPF and NPPG

The NPPF

3.1 The National Planning Policy Framework (NPPF) states in paragraph 170 (e) that decisions on development should not put existing development at *"unacceptable risk from, or being adversely affected by, unacceptable levels of … pollution"* and that development *"should, wherever possible, help to improve local environmental conditions such as air … quality"*.

3.2 In relation to air quality pollutants, paragraph 181 of the NPPF states that planning decisions *"should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants"* taking account of the presence of any Air Quality Management Areas (AQMA) and cumulative impacts.

3.3 The relationship of planning decisions with controls in other pollution control regimes is potentially conflicting but is clarified in the NPPF and the National Planning Policy Guidance (NPPG). Paragraph 183 of the NPPF confirms that the focus of planning decisions *"should be on whether the proposed development is an acceptable use of land, rather than the control of processes or emissions"* which are matters for other pollution control regimes to address which, it should be assumed, *"will operate effectively"*.

3.4 Paragraph 205 of the NPPF confirms that in considering proposals for mineral extraction that planning authorities should also focus on ensuring that unavoidable dust and particle emissions are controlled, mitigated or removed at source on the basis of being either an unacceptable or acceptable use of land as defined in paragraph 183.

The NPPG

3.5 The NPPG also confirms the land use basis for decisions where it states that the *"planning system controls the development and use of land in the public interest"* by ensuring that new development is an appropriate and acceptable use for its location. In relation to pollution control the NPPG also states that the planning system should not address *"any control processes, health and safety issues or emissions themselves"* which are subject to approval by other regulatory regimes. The NPPG also reiterates the presumption that mineral planning authorities should assume that those other regulatory regimes will operate effectively.

3.6 The NPPG provides a flowchart for the form of site assessment. Given the levels noted for this location that chart confirms that a detailed assessment is not required at the application site and that for planning decision purposes a condition requiring good practice measures is adequate.

3.7 In relation to air quality the NPPG states that air quality could be relevant to a planning decision if (i) there would be an impact in an area where air quality is known to be poor; (ii) where the development is likely to adversely impact on air quality strategies, in particular leading to a breach in legislation compliance; (iii) which would significantly affect traffic in the immediate vicinity (by increasing congestion; by significant changes to traffic volumes/speed or composition; by provision of bus stations, coach or lorry parks; by increasing the turnover in a large car park; or by generating large flows of heavy goods vehicles); (iv) introduce new point sources within or close to an AQMA; (v) by providing new housing and employment in locations with poor air quality; (vi) by giving rise to unacceptable impacts during construction on sensitive locations; or (vii) where it would significantly negatively affect biodiversity, particularly designated wildlife sites. None of those situations apply at LHF.

3.8 The NPPG section on air quality also provides a flowchart of how air quality should be considered in the development management process. That outlines that (i) where a development, including mitigation, does not lead to an unacceptable risk from air pollution; and (ii) where a development would comply with limit values or national objectives; and (iii) where it would not conflict with the Habitats Regulations (if relevant); then the development should proceed to an approval with conditions and/or planning obligations as necessary.

3.9 Only if compliance with the above objectives could not be assured should consideration be given to refusing the development. As described in this statement the development will not breach those compliance requirements and as such should be granted consent with conditions as relevant.

Policy in the Adopted and Review Minerals Plan for Lancashire

3.10 Both the Adopted and the Draft Review Mineral Plans reference the need to consider the control of impacts from, inter alia, dust and other air quality matters from mineral working and that in the event that any harm can be eliminated or reduced to acceptable levels that the development should be supported. Methods to eliminate or reduce harm to acceptable levels are identified in the Plans and these are typical of the methods adopted in the application.

3.11 The Plans confirm that regulation of emissions are for other regulatory regimes to consider and that it is not the responsibility of the Mineral Planning Authority to address the merits or otherwise of any pollution control other than if the development itself is an acceptable use of land given the impacts that might arise.

Local Policy

3.12 The district local authorities in Lancashire including South Ribble are considering adopting guidance as SPG for development management

purposes in relation to air quality. South Ribble may take the draft guidance to authorisation as part of the review of the Core Strategy.

3.13 The guidance is focused on decisions in the built development and on the impact on urban areas, particularly the need to avoid increasing already unsatisfactory air quality, using an assessment process reflecting urban/built considerations. In considering decisions it indicates that development meeting the assessment tests, with or without mitigation, will be acceptable.

3.14 The draft guidance and assessment procedure does not consider sand and gravel operations. However, using, where possible, the various steps in that guidance an assessment would conclude that current good practice measures are sufficient at this application site without any further action.

Air Quality Objectives and Compliance at Lower Hall Farm

3.15 'Dust' particulates are the main Air Quality Objective (AQO) consideration arising at LHF. Other air quality pollutants may arise but with the scale of the operations these will be negligible.

3.16 The Air Quality Objectives (AQO) in England for PM10 and PM2.5 have been for an annual mean of 40 micrograms per cubic metre for PM10 and, previously, 25 micrograms per cubic metre for PM2.5. However, the current focus on PM2.5 is to work towards reducing emissions or concentrations towards the WHO level of 10 micrograms.

3.17 The typical PM2.5 background annual mean for a non-urban location varies across the UK from circa 3.5 in northern Scotland to circa 10.0 in south east England.

3.18 No AQMA is located on site or nearby. The nearest are located to the west at some 3 kilometres on New Hall Lane near the centre of Preston and at some 4.5 kilometres at Victoria Road, Walton-le-Dale. These are located upwind of LHF. The nearest AQMAs roughly downwind to the east are some 10 kilometres distant at Blackburn and some 19 kilometres distant at Clitheroe. It is inconceivable that operations at Lower Hall Farm would significantly affect air quality at either such location.

3.19 Using the DEFRA UK AIR Ambient Air Quality Interactive Map the latest background annual mean for the site and immediate surrounding area are circa 11 micrograms for PM10 and circa 7 micrograms for PM2.5 respectively and both within a very narrow range.

3.20 The current background annual means for the pollutants identified are well below the AQO thresholds for PM10 and below the WHO and UK Government target for PM2.5. The future additional contribution from the operations will still maintain levels well within the threshold for PM10 and are unlikely to lead to any increase in the levels of PM2.5 and thereby will not prevent achieving the WHO and Government targets.

3.21 Given policy and guidance in the NPPF and NPPG the development should be approved and control of dust etc managed by good practice measures.

Historic & Cumulative Impacts

Mineral Operations

3.22 There is no evidence that air quality impacts associated with extraction operations from the site of the former Ribble Sand and Gravel operations (circa 1930 to late 1950s) or at Higher Brockholes Quarry (1992-2005), or at the Lower Brockholes Quarry (2007-2017) has affected to any extent any residential or other sensitive property or has harmed any designated biodiversity interests.

3.23 There are no other current sand and gravel operations, or other mineral operations (non-coal and coal) in the immediate or wider vicinity. There are no allocated or otherwise planned mineral operations for sand and gravel or any other mineral in the immediate or wider vicinity.

Other Operations

3.24 The Red Scar industrial area lies close to the NW. This location contains a wide range of industrial processes producing various air quality pollutants, from the processes themselves and associated transport. As identified in the National Atmospheric Emissions Inventory, Red Scar together with the M6 and the urban area of Preston beyond is the main source of arisings of air pollution in the area.

3.25 Some of the emissions at Red Scar are fugitive emissions and some are emissions from point sources such as stacks of various height. Whereas the mineral operation will mainly produce dust which will be contained within the immediate location of emission, the air quality pollutants emitted from the industrial processes at Red Scar will include dust emissions but also a variable concentration of other pollutants vented both in the immediate area and into the wider area. There are currently various allocations and permissions undeveloped, and applications unpermitted, for further industrial activities at the site.

Red Scar Energy from Waste Incinerator

3.26 Planning permission was recently given for an energy from waste (EfW) incinerator which will occupy that part of the Red Scar site nearest to the proposed mineral working. This incinerator will be immediately adjacent to the Red Scar SSSI. Emissions would be both fugitive and via two tall stacks. The application was EIA development and an ES was prepared which included, inter alia, an assessment of impacts on air quality on people and the environment in respect of amenity and health.

3.27 The air quality assessment of that proposal noted that any air quality impacts and any possible harm, either during construction or operation, or in combination with existing activities at the Red Scar Industrial

Estate and adjacent areas, would not directly, indirectly or cumulatively, be significant in relation to either amenity and health impacts on people. That was accepted by the relevant regulatory agencies and the planning authorities.

3.28 Similarly the assessment noted that any air quality impacts and any possible harm, either during construction or operation, or in combination with existing activities at the Red Scar Industrial Estate and adjacent areas, would be negligible and not significant in relation to the adjacent Red Scar SSSI, the Brockholes Biological Heritage Site (BHS) or any other environmental interest. That was accepted by the relevant environmental agencies and consultees, the planning authorities and by the relevant regulatory agencies.

3.29 The conclusions of that ES are of considerable significance to the assessment of air quality in relation to this ES on the development at LHF. That ES noted the diversity and spread of pollutants that would arise from the incinerator. That is a considerably more diverse range of pollutants which will affect immediately and directly a significantly wider area than would any activity at LHF. The pollutants from the incinerator would include a substantial component of fine and ultrafine particulates originating in combustion which it is acknowledged are the particulates of main concern in relation to human health and impacts on biodiversity. Nevertheless the ES concluded that any impacts would be negligible or not significant.

3.30 The planning authority accepted or concurred with those conclusions of the ES for the incinerator and permission was granted. T

3.31 Regulation 18(4)(c) of the EIA Regulations states than an ES must be prepared taking account of the results of any other relevant environmental assessment. The purpose of this is to provide smarter regulation and avoid duplication of assessments and also prevent conflicting conclusions and decisions.

3.32 The results of the incinerator assessment are highly relevant to this ES and LHF due to the location and the form of likely emissions, assessed impacts and assessed significance of harm. Taking those results into account it can be concluded in this ES that all air quality impacts from LHF will be either negligible or insignificant and will not lead to harm to people or the environment.

The M6

3.33 The M6 lies upwind to west. This section is one of the busiest parts of the Motorway network. It is a source of a range of air quality pollutants which will be carried directly on to the adjacent Red Scar SSSI, other adjacent SSSI's and to the Brockholes Centre BHS. There is no evidence or harm or of significant cumulative effects from the M6 on such areas.

Brockholes

3.34 The current area of the former Higher Brockholes Quarry, now the Brockholes Centre and a BHS, includes large areas of partially vegetated and bare ground including unsurfaced car parking areas which will generate and mobilise dust. The arisings of other air quality pollutants from the Brockholes Centre will be negligible. The Centre is upwind of the proposed mineral operations such that dust and other pollutants would typically blow from Brockholes towards the proposed operations.

3.35 In any event most dust from Brockholes would drop-out before reaching the current application site. Further the former mineral operator planted dense belts of trees on elevated bunds and these will help mitigate air quality pollutants to the extent that any cumulative impacts with the proposed mineral extraction would be negligible.

4 THE PROPOSED OPERATIONS

Introduction

4.1 Particulate matter larger than PM10 is the main air quality consideration arising from wet sand and gravel operations although the total arisings are likely to be insignificant. The particulates are mainly crustal 'dust'. The particulates are dense (specific gravity of mineral/rock particulates are typically 2.5-2.7) non-biological and effectively chemically inert. Processing, handling and transport are often the main sources of particulate matter arising from most such mineral operations. The contribution of sand and gravel quarrying to other pollutants is negligible.

4.2 The operations at LHF will involve the extraction of the mineral while it is wet or damp followed by 'wet' processing of the sand and gravel. The product, both before and after processing and while in transit off-site, will be wet to damp. The annual production will be some 150,000 tonnes generating some 50 movements of hgvs per day.

4.3 Despite the wet nature of the product and processing some residual dust will be produced from operations on site over a range of sizes. This dust may be visible and may produce negative visual and other amenity impacts but these particles will drop out close to source (typically within 100 metres). With the 'wet' nature of the product and the process, and at the relevant distances at LHF and considering climate factors and other mitigation, such amenity impacts are very unlikely to arise at the nearest residential properties or other sensitive locations. 'Amenity' dust impacts are therefore not likely to be significant.

The Operations

4.4 The operations will commence with the development of the private access road from a construction compound adjacent to the A59 and then head north and west from the A59 to the extraction and processing area. This will be followed by construction of the screening bunds, the processing plant area and the initial silt ponds. Mineral extraction operations, in small discreet phases, will then continue for around 20 years advancing first to the northwest and then retreating towards the plant area.

4.5 Extraction operations will not involve de-watering and will initially be 'dry' extraction (working mineral above the groundwater table, with residual moisture content) followed by 'wet' working (working below the groundwater table, with saturated moisture content). The site will be restored in phases as worked out mainly to a wetland and water body with woodland, removing any current air pollution arisings associated with agricultural operations and providing new air pollution mitigation assets.

4.6 The extraction operations will therefore handle either damp or wet mineral, which will be processed using water, and stockpiled wet. Stockpiles will initially be wet and be kept damp as required by water sprays. The transported mineral leaving the site will be damp or wet (loads will be

sheeted as required to prevent wind blow) and will traverse a long surfaced road before it enters the public highway.

4.7 The typical initial in-situ moisture content (expressed as volumetric water content) of soils when in good condition for plant growth is around 30%. Actual moisture content will depend on season and soil type and recent climatic conditions and can therefore vary significantly and rapidly upwards or downwards. Subsoils may have higher moisture content which can vary less significantly and rapidly. Soil stripping and bund building operations will normally take place when moisture content is near the lowest part of the range so as to prevent harm to soil structure. But, as part of any site management scheme, such operations will not take place when wind speeds and direction could demonstrably transport noticeable levels of dust towards property.

4.8 The mineral to be extracted 'dry' will be damp with a typical initial moisture content, (outside of recent or current rainfall or flood events), of 5-30% depending on the pore space. The mineral to be extracted 'wet' is 'saturated' with a high initial moisture content of up to 30% or more depending on the pore space.

4.9 The mineral will be processed (washed and screened by size using water as the process media) in a 'wet' washing and screening plant and the processed mineral will be discharged 'wet' and clean of fines to active stockpiles with reject fines being removed in a slurry to a fines disposal lagoon. Crushing of reject oversize will not take place. The processed mineral will then be either loaded out from the active stockpiles or taken to the stocking ground. The layout of the processing plant has been designed to minimise mixing of off-road dump truck and highway hgv traffic.

4.10 The processed mineral in the surface layer of stockpiles will normally have a moisture content of 1-5% for coarse aggregate (>4mm) and between 5-15% for fine aggregate (<4mm). When initially deposited, or in wet conditions and following rainfall this will be much higher. In drying winds, moisture content will be reduced from the surface and minor quantities of residual dust on the external surfaces of these particles may be mobilised. To control dust generation the stockpiles will be watered by sprinklers as required. The internal gravel haul road, the processing plant area and access roads around the stockpiles will be wetted by mobile water sprinklers as required.

4.11 Speed limits are to be applied, through a Unilateral Undertaking, for all vehicle movements within the site. Those movements associated with extraction and haulage to the processing plant and within the processing plant and stockpile will have a limit of 10 mph. Movements on the surfaced private access road will have a limit of 15 mph.

4.12 The private access road will have a concrete surface from the plant site to Potters Lane and a blacktop surface from Potters Lane to the A59. The private access road will be swept by a mechanical road sweeper if

required. The hard clean surface of the access road, best practice and mitigation will minimise mobilisation of any dust from the private access road. The submitted scheme provides for screening bunds and tree/shrub planting alongside the private access road which will help to capture any dust mobilised by transport.

4.13 The dominant direction of wind throughout the year (70%) is from the south west taking any dust away from residential property. However, strong winds with apparently sufficient speed to transport dust from this direction are typically associated with high humidity and rainfall events and therefore will not mobilise or transport dust. Instead, these events will entrain dust in run-off and remove it from subsequent remobilisation. Wind with an easterly component tends to be 'drying' with a low humidity and has the greatest ability for dust mobilisation and transport, but such winds are of minor significance at LHF and would blow dust away from residential properties.

4.14 The intervening land between the operations and sensitive property is/will be woodland, trees, wetlands and water bodies, and agricultural land. An extensive vegetated screening bund is to be constructed immediately adjoining the mineral processing and stockpiling areas. The surrounding woodland, trees and agricultural use are to be retained throughout the life of the mineral operations. The screening bund will be in place throughout the life of the mineral operations.

4.15 The relevant mobile extraction equipment and off-site haulage vehicles will all be equipped with high level exhausts thereby preventing mobilisation of any dust deposited or blown onto the extraction area, haul road, processing site or the private access road.

4.16 The operations are of a temporary and a phased nature and at the cessation of operations the site will be restored to wetland and woodland such that any dust or air quality impacts from the mineral operations will cease and any current air quality emissions arising from agricultural activities on site will not return.

4.17 The operations will include initial, phased and final tree and shrub planting providing specific and general mitigation for dust and air quality impacts arising from the operations themselves or in the wider locality, including air pollutants associated with exacerbating climate change. The resulting operations will thereby produce a net, but insignificant in a wider context, positive improvement in air quality on closure.

4.18 The specific operations that might initiate local dust mobilisation, particularly transport to the processing plant and from the plant to the A59 will not be continuous throughout the day but will take place intermittently.

4.19 The processing plant will be electrically powered. Residues from the operation will consist of a slurry of natural mineral fines and water, to be

disposed in a silt pond; or other ‘wet’ natural mineral waste (clay and oversize gravel), to be used in restoration.

4.20 The extraction operations will proceed in small phases across the site followed by restoration thus minimising exposure of soil, subsoil and mineral in extraction and restoration stages. The staging of the operations means that the extraction operations will be closest to the nearest residential property only in the initial period and will then subsequently, and for the majority of the operating period, be further, and at times considerably further, distant.

4.21 The traffic movements on the A59 and onward to customers will replace potential long distance movements from more distant sources. However, the actual movements will reflect destinations of sales and will be highly variable. In so far as those may be additional movements on a particular sector of any length of road they will form an insignificant and negligible increase in numbers and an insignificant and negligible increase in dust and pollutants.

4.24 The net air quality outcomes in the wider context will therefore be no net significant decrease in air quality and therefore no significant negative impact in EIA terms. There will be an insignificant improvement in air quality.

5 ASSESSMENT

NEAREST RECEPTORS

Potential Residential Receptors

5.1 Residential properties are shown in Table 2 below. The nearest are a pair of semi-detached houses ('The Brambles' and 'Bezza Villa') located immediately at the junction of Potters Lane and Dean Lane. These lie in excess of 250 metres from the edge of the nearest 'operational land'. All other residential properties lie at around 500 metres or more from operational land.

5.2 Using guidance in the NPPG a detailed air quality dust assessment would not be required due to the spatial and other conditions at the site. Guidance in LAQM TG (09) is that locations where detailed assessment may be screened out are those beyond 200 metres from a source and where the background PM10 is below 16 microns per cubic metre. None of this guidance considers the existence of significant mitigation features between the source and the receptor.

5.3 None of the thresholds in the relevant policy and guidance are exceeded and a detailed assessment is not required.

Table 2

PROPERTY	From nearest edge of operational land	From nearest edge of private access road	From nearest edge of extraction	From furthest edge of extraction
The Brambles/ Bezza Villa	275 E	280NE	275 E	1425 E
The Hawthorns	500 E	450NE	575 E	1675 E
Bezza House	700 E	625NE	700 E	1850 E
Riverside Cottage	575 S	225W	650 S	1600 SE
RC Church Presbytery	825 S	225 S	950 S	1850 SE

5.4 The Brambles and Bezza Villa already benefit from existing mitigation provisions being screened by large horticultural buildings and an extensive belt of trees to the west which will remain. If consent is granted, they will benefit in relation to additional dust mitigation from the substantial screening bund to be constructed to the west of the existing tree belt and the additional tree and shrub planting associated with that bund.

5.5 The operations will therefore not give rise to any significant negative effect on any residential receptor.

Potential Residential Receptors and the Private Access Road

5.6 The nearest residential property to the private access road is Riverside Cottage, located at the northern extremity of the settlement of Samlesbury. It is some located some 225 metres to the west of the proposed route. It lies immediately adjacent to Potters Lane with the intervening land between that property and the private access road consisting of agricultural land and hedgerows with substantial trees all of which mitigate dust transport. It is located upwind from the dominant wind direction. Other properties in Samlesbury are located further away from the route. If consent is granted, Riverside Cottage and these other properties will benefit in relation to further dust mitigation by bunds and by substantial additional tree and shrub planting to be provided west of the new access road.

5.7 The RC Church presbytery lies some 225 metres to the south of the private access road with the intervening land consisting of agricultural land and woodland which mitigate dust transport. It is located upwind from the dominant wind direction. It is, however, located only some 75 metres downwind from the A59.

5.8 Guidance in the Design Manual for Roads and Bridges (DMRB) is that air quality will not be relevant consideration from traffic on highways where (i) properties are located in excess of 200 metres from the road; (ii) the daily traffic flow increase is less than 1,000 AADT; or where (iii) the increase in HGV flows is less than 200 AADT. The nearest properties are located in excess of 200 metres and traffic totals are considerably less than the two thresholds identified.

5.9 Guidance in LAQM TG (09) is that air quality will not be a consideration from traffic on the private access road because the flows from the development will not exceed thresholds in relation to distance to receptors (being more than 10 metres from the road edge) nor the total flow (including considering the contribution of HGVs) and that the background PM10 is less than 25 microns per cubic metre.

5.10 On that basis traffic on the access road has been excluded from further assessment. Such traffic on the private access road will not give rise to significant negative effects to residential receptors.

Potential Non-Residential Sensitive Receptors

5.11 The only potential non-residential sensitive properties within 1000 metres of the proposed operations are the school at Samlesbury, the Parish Church and the RC Church. These are all located in excess of 800 metres to the south of the mineral extraction site and therefore well in excess of the threshold for sensitive uses. The Parish Church and the School are some 400 metres from the private access road. The RC Church is some 225 metres from the private access road.

5.12 All of these receptors are located upwind of the dominant wind direction. The Parish Church and the school, and the RC Church are located some 225 metres and 75 metres respectively from the A59.

5.13 No significant negative effects are therefore expected to impact on these receptors from either the mineral operations or the use of the private access road.

Potential Impact on Protected Sites

5.14 There is considerable uncertainty and conflict between research and guidance on impacts, mitigation effects and required stand-off distances between dust producing operations and protected biodiversity sites.

5.15 The Red Scar and Tun Brook Woods SSSI lies on the other side of the River Ribble some 75 metres from the nearest operations. This is the closest approach and operations here will only take place over a very short period. Other operations such as processing and transport will be considerably more distant. The SSSI is in favourable status.

5.16 There is no evidence that dust or air quality pollutants associated with extraction operations from the site of the former Ribble Sand and Gravel operations (circa 1930 to late 1950s) or at Higher Brockholes Quarry (1992-2005), or the subsequent and current management of the Brockholes Centre, has affected or harmed the SSSI to any significant degree.

5.17 The SSSI has clearly been subject to the combined emissions from (i) intensive farming operations, including spraying, (ii) adjacent industrial activity at the Red Scar industrial area, and (iii) from traffic movements in that industrial area, or from the M6, for decades. These activities will continue. Regardless, the SSSI is in favourable status thus indicating that there is no significant dust or any air quality impact arising from such adjacent activities causing demonstrable harm.

5.18 The NPPF requires that where a statutory designation (such as an SSSI or SAC) is involved that consideration should be given as to if the site is particularly sensitive to dust and if significant harm would arise. On evidence of the status of the SSSI the location is not particularly sensitive to dust and significant harm does not arise.

5.19 The DMRB considers the impact of air pollutants arising from road traffic on protected sites. It notes that for the purposes of such an assessment, such sites are those relevant designated sites which are also sensitive to air pollutants. The only designated site in the vicinity is the Red Scar SSSI, although this is evidentially not sensitive to air pollution.

5.20 Only designated sites within 200 metres of relevant roads need to be considered in such an assessment. Where the scheme meets or is below relevant traffic criteria then the scheme can be considered as neutral in terms of air quality. In this case the private access road is more than 200 metres from a designated site and the volume of traffic and HGVs are below the traffic criteria, such that further assessment is not required.

5.21 Natural England (NE) has considered the ecological effects of air pollution from road transport. The assessment was mainly undertaken alongside motorways, other major roads and roads in urban areas and the summary of current evidence as to ecological effects relates to the traffic flows on such roads. The review of evidence concludes that the greatest impacts are likely to occur in the first 50-100 metres from the carriageway edge and may occur up to 200 metres from such major heavily trafficked roads. It is noted that background levels may be reached within 10-100 metres.

5.22 The work by NE does not address very small traffic movements as proposed at LHF. Such very small movements can be considered to be inconsequential and insignificant.

5.23 Given the results of research and the thresholds noted above, traffic movements at LHF will not produce any significant negative effects on designated sites and no further traffic air quality assessment work is required.

5.24 Impacts on the SSSI were a consideration in relation to the recent permission at Red Scar for the energy from waste incinerator which virtually immediately adjoined the SSSI. Surveys undertaken as part of the planning application identified that there is limited evidence of stress on the woodland as a consequence of existing air quality and that the increase in emissions of a range of pollutants associated with the incinerator would be not significant.

5.25 The relevant regulators accepted that the woodland was in favourable condition regardless of the presence of air quality pollutants and that it would be unlikely that there would be any significant impact on any protected habitat site or species.

5.26 It was however noted that the mitigation of the increase in emissions which would be caused by the incinerator (but which would not produce any significant harm) was not capable of mitigation within the development but would require mitigation (off-setting) through a wider strategic mitigation approach.

5.27 There is no guidance for non-statutory sites (such as Biological Heritage Sites). The IAQM advice notes that the level of dust likely to lead to a significant impact on vegetation from dust would have to be very high and is unlikely except on sites with the highest dust arisings close to sensitive habitats. Such conditions do not apply here.

5.28 The proposed development at Lower Hall Farm will provide net air quality mitigation and thereby offset some of the additional emissions from the incinerator.

CONCLUSION

6 CONCLUSION

6.1 The NPPF states that the basis of planning decisions in relation to air quality should be based on if the proposed development is an acceptable use of land.

6.2 The NPPF and the NPPG clarify that a planning decision should not be on the merits of the control of processes; nor on the acceptability of emission levels; nor on health impacts, nor on safety considerations. Those matters are regulated by other regulatory regimes and should be left for those regimes to address. Mineral Planning Authorities should assume that those regimes operate effectively.

6.3 Air quality may be a spatial planning consideration where a development relates to certain activities leading to a significant increase in emissions and risk and where it is located close to sensitive receptors; or it involves development which would increase pollution above thresholds, or in an AQMA. No such situations arise in this case.

6.4 Guidance in the NPPG and the DMRB confirm (a) that a detailed assessment is not required for the proposed development, and (b) that the prevention of air quality issues can be enabled by good practice. This can be provided and controlled, as required, by the MPA via a condition.

6.5 Dust is the primary air quality concern with mineral workings. Such dust would be composed of primary particulates consisting almost entirely of mineral fragments. The emission of fine and ultrafine particulates and complex chemistry particulates would be negligible and insignificant. Due to the high moisture content of the sand and gravel during extraction, processing and off-site transport at Lower Hall Farm there is a minimal potential for fugitive dust emissions. Guidance produced by DEFRA notes that the amount of dust produced from wet processing of sand and gravel is trivial.

6.6 The likely negative effects from dust arising from the development will be insignificant at any sensitive human or biodiversity receptor. Likely levels of PM10 and PM2.5 will be below the AQO thresholds and objectives and therefore not significant.

6.7 A recent ES of air quality in respect of an incinerator on adjacent land concluded that the impacts on any sensitive human or biodiversity receptor would be negligible or insignificant on their own or cumulatively. Those impacts would extend over a very much larger area than the proposed operations and involve fine and ultrafine particulates of complex chemistry. The relevant regulatory and other agencies concurred with the conclusion of the ES. Permission has been granted. The accepted conclusions of that ES confirm that the impact of emissions from the proposed mineral extraction will be insignificant.

6.8 In EIA terms the negative air quality impacts are therefore not significant. There are likely positive air quality impacts but these are also not significant. There are no cumulative impacts.

6.9 In situations outlined above the NPPF concludes that the development should be granted consent, subject to any conditions considered relevant.

6.10 The development will probably produce a net no change in greenhouse gas emissions during its operational stage and a net reduction in such emissions at cessation. The scale of such changes is probably insignificant in the wider context. The development thereby complies with climate change policy, greenhouse gas emissions policy and with related tree planting objectives of Government.

6.11 If planning permission is granted then the applicant will accept a condition to produce a dust management scheme. In that context, the development has been designed to reflect the typical mitigation measures of such a scheme.

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APPENDIX A

A1 Air in the open and inside buildings, or inside modes of transport, etc, contains particulate matter of both natural and anthropogenic origin, which may, for a very short or very long period, be suspended in the air and transported elsewhere. Such suspended particulates are normally within the range of about 100 microns (one micron = one micrometre = one thousandth of a millimetre) down to 0.0002 microns, equivalent aerodynamic diameter.

A2 Particulates come in various shapes (hair-like, chain, rods, blades, flakes, sheets, angular, sphere, ovoid, complex or disordered shapes, etc). The equivalent aerodynamic diameter is the diameter of a sphere which would experience the same resistance to motion, such as settling or mobilising by wind, as the non-spherical particle.

A3 Particulates may consist of a single substance or be a simple stable compound or have complex and unstable chemical composition.

A4 Particulates can be grouped into coarse, fine and ultrafine modes, although these groups and their boundaries are sometimes themselves divided into coarse and fine divisions and there is a degree of overlap in use of terms to reflect both origin and risks associated with a size range.

A5 There is, however, an important distinction between coarse and fine particulate distribution modes (fine will include ultrafine in this context). The boundary between these distribution modes is at around PM2.5. Coarse mode is those particulates larger than PM2.5 and fine mode is those particulates smaller than PM2.5.

A6 This is not a notional or contrived boundary. It is a size boundary which is of significance because of the distinctive character of particulates either side of this boundary. This relates to (i) fundamental differences in origin, chemistry and physical properties, (ii) the opportunity for physical and/or chemical transformation in the atmosphere of the particulates, (iii) the potential of removal mechanisms and rates, and (iv) significant differences in relation to health and environmental impacts given that it is now recognised that fine or more probably ultrafine particulates which are of major concern.

A7 The boundary around PM2.5 is also a significant distribution boundary where the quantity of coarse particulates tails off and has significantly decreased and where the quantity of fine particulates starts to significantly increase. The distribution of particulates versus size is not therefore a continuous line or curve but consists of two slightly overlapping bell curves when plotted on a logarithmic scale.

A8 Fine particulates are frequently divided into fine (<PM2.5) and ultrafine (<PM0.1) particulates. This boundary also reflects changes in the formation of these particulates and also possible greater health impacts with

ultrafine particulates. There are distribution variations within this component.

A9 The description in assessments and regulation of particulates often reference an analysis at PM2.5 or PM10.0 etc. This is not the quantity at that size but is the quantity at that size and below. Therefore PM10 includes all particulates at 10 microns and below and PM2.5 includes all particulates at 2.5 microns and below

A10 Fine and ultrafine particulates are mainly generated by nucleation and condensation of vapour, largely from natural and anthropogenic combustion emissions but also from other sources and now include particles, including ultrafine particles ('nanoparticles') which have been deliberately manufactured. While their mass may be small the number of ultrafine particulates in a given volume may be very large.

A11 Particulates larger than 1.0 microns are usually generated by mechanical processes and typically durable crustal materials often form a large proportion of these particulates. Particulates larger than 100 microns are normally too heavy to remain airborne beyond the initial saltation or emission in typical meteorological conditions but recent research has identified that crustal particulates substantially larger than 100 microns can travel 1000's of kilometres in the upper atmosphere.

A12 Particulates may, according to their size, chemistry or density lead to identifiable environmental or health impacts at certain concentrations. However, research has identified that it is the fine and particularly the ultrafine particulates that appear to be mainly associated with negative health impacts and this appears to be due to their origin (mainly combustion and chemical processes), very fine size and chemistry. This negative health impact for certain substances may arise even at very low concentrations.

A13 The health impact assessment process mainly relies on using the size of the particulate matter and is this referenced as the mass concentration in micrograms per cubic metre of PM ('particulate matter') at a specific micron size. For example currently the air quality objective for England includes an objective not to exceed a mean of 40 micrograms per cubic metre of particulates of 10 microns size (PM10).

A14 However, such a mass concentration threshold hides a mixture of particulates of different chemistry with an exceptionally wide degree of irritant potency, and hence resulting health risks and impacts. Using mass concentration of all particulates may seriously mislead the assessment of harm.

A15 The same mass concentration of particles from two different locations (one from open semi-natural countryside near the sea with no significant transport or chemical processes nearby, another from a suburban area downwind from an industrial complex) will have very different health risks. In the first case many of the particulates may be effectively inert or of

low toxicity. In the second location the particulates may be of chemistries which have a high irritant potency and toxicity.

A16 There is an effective size limit to further mechanically produced particulates near the PM2.5 size because as particles become smaller in size more and more impact energy is required to fracture a small particle into smaller particles and eventually that limit is reached in normal circumstances. This limit has been described as about 1 micron.

A17 Large particles may be produced and become airborne by natural processes such as high winds or anthropogenic processes such as emissions from stacks or explosions (including quarry blasting) but while natural processes may be so violent and spatially extensive as to inject material high in the atmosphere and carry such particles many kilometres the energy in anthropogenic sources is typically miniscule in scale and normally dissipates rapidly causing these particulates to fall to the ground within a very short distance.

A18 Large amounts of particulates are ejected into and found in the air generated naturally from volcanoes, sea spray, micro-organisms, pollen, and from wind mobilised 'dust' particulates from cold and hot desert regions, etc. These natural particulates dominate the global spectrum. They may travel around the globe and take years to settle.

A19 Coarse particulates are the main focus of attention in relation to nuisance. The term 'dust' is often used to describe coarse particles, the boundaries of which are uncertain with a different range according to different sources.

A20 Dust has a notional upper limit of 100 microns, but coarser material slightly or exceptionally larger than 100 microns can often become airborne and be transported a considerable distance, although once the lifting force drops in intensity such particles will settle quickly or immediately.

A21 The lower limit of dust is sometimes defined as 1 micron but for amenity and other assessments a lower limit of 10 microns or 20, or 30 microns may be used because of the insignificant amount of dust below those levels.

A22 Particulates become suspended in the atmosphere, for a short or long period, either by wind or by forceful ejection. This may be by natural or anthropogenic effects (a high wind or the wind of a passing train; or ejection from a fumarole or from an incinerator stack).

A23 Coarse particulates do not normally become airborne directly by the wind. They normally are lifted from a surface and become airborne by the impacts of larger saltating particles, which are too large to become airborne themselves under normal conditions, but which hop along the ground and impact on smaller particles which are then ejected into the air.

A24 Particulates remain suspended in the atmosphere or settle out due to height of injection, meteorological conditions, any regeneration of those conditions and their mass and aerodynamic properties.

A25 Particulates mobilised by volcanoes or by major dust storm events ejected high into the atmosphere may stay suspended for months and travel thousands of kilometres (assisted by high level jet streams, etc), whereas particulates mobilised by disturbance at near ground level in average wind conditions or calm air will, depending on their size, mostly settle out in tens of metres or less in a very short time.

A26 Particulates may become remobilised by subsequent events (a sequence of trains or road vehicles for example) and thereby transported further from their original point of origin and settlement.

A27 Particulates of more than 20 microns which become suspended at low level due to saltation may normally settle quickly where initial energy is lost or if they become trapped by vegetation or wet ground (unless re-suspended by further saltation impacts).

A28 However, large particulates ejected high in the atmosphere by volcanoes or dust storms may travel substantial distances. Recent research undertaken in connection with climate change models has identified that very large particles (in excess of 400 microns) may travel in excess of 3000 kilometres.

A29 The quantities of particulates naturally generated, mobilised and transported from deserts, both hot and cold, are very substantial, and affect air quality locally and at a distance. Dust storm events affecting cities in and around both hot and cold desert areas (Phoenix, Reykjavik, etc) have been recorded as having a particulate density of up to 6000 microns PM10 and up to 5000 microns PM1per cubic metre over periods up to and exceeding 24 hours. Average long-term means (>10 years) PM10 in some such cities and surrounding rural areas and hence large expanses of the globe exceeds 100 microns per cubic metre.

A30 Particulates from Saharan dust storms commonly are deposited in Southern Europe and often reach the UK and reach Scandinavia and Iceland. Such ‘Sahara dust’ also travels westward across the Atlantic to reach the Caribbean, the Gulf States of the USA and Central America, where it has been proven to supply valuable and essential nutrients to maintain both the terrestrial and marine ecosystems. Similarly particulates from Asian high deserts travel across Asia and the Pacific to the west coast of North America.

A31 Cold deserts and the dry un-vegetated bare mountain and periglacial landscapes are also significant sources of dust. Icelandic ‘dust’, which has a distinctive mineralogical signature that is different from that of Sahara dust (because it is mainly derived from ‘basaltic’ lavas and ejecta, compared with durable sandstones and ‘granitic’ rocks) has been recorded across the UK and Europe as far as the Balkans.

A32 These cold desert dusts were of much greater extent and significance during recent glacial and immediate post glacial periods. They may increase in significance with rapid climate change and possible melting of ice sheets exposing bare mineral surfaces of glacial debris to aeolian erosion and transport. It has been estimated that some 10% of the land mass of the world is covered by glacial derived airborne transported dust deposits.

A33 Dust from volcanoes is more random but can be more significant. The impacts on the UK atmosphere of recent eruptions in Iceland are well known and researched as is the devastating impact of the Laki and other fissure eruptions.

APPENDIX B

Appraisal of Mineral Dust Potential at Lower Hall Farm in Accordance with a Mechanism Proposed by the Institute of Air Quality Management

B1 Advice published by the IAQM (May 2016) on the assessment of dust from mineral operations provides a flow chart, relative to mineral type, to screen the assessment, and a detailed flow mechanism for assessing the risk of dust in such an assessment.

B2 The IAQM advice flow chart splits minerals into 'Hard Rock' and 'Soft Rock' mineral type and provides further advice on mechanisms to assess the likelihood of and level of any dust impacts. For Soft Rock mineral types (the example given being sand and gravel extraction) the screening threshold for a detailed assessment is the presence of a sensitive receptor within 250 metres of the nearest 'dust generating activities'.

B3 Where sensitive receptors are beyond this distance, the IAQM advice notes that a detailed assessment is not required unless the development location has special (unqualified) circumstances. The IAQM advice is in accordance with policy and guidance in the NPPF and NPPG and confirms that further assessment is not required at LHF.

B4 The IAQM advice suggests that (subject to a suitable distance between source and receptor) that where the background PM10 concentration is below 17 micrograms per cubic metre, there is little risk from any additional quarrying exceeding the AQO. The background figure of 17 is an average derived by the IAQM to take account of the risk of a daily exceedance potentially thereby exceeding the AQO threshold and is a 'worst case' scenario.

B5 IAQM advice suggests that the additional input of particulates from quarrying activities in the immediate location of those activities is 15 micrograms. That is for all mineral operations. The relevant DEFRA guidance notes that particulates from wet sand and gravel processing are trivial. It is unlikely that the additional inputs suggested by the IAQM will arise but that can be used to provide a 'worst case' but wholly unlikely scenario at LHF whereas the DEFRA guidance indicates a 'base case' scenario.

B6 The background mean PM10 at the general location of LHF is around 11. If the IAQM 'worst case' process contribution of 15 micrograms is then added (which is a level unlikely to be reached here given the 'wet' processing involved) that produces a maximum potential 'worst case' PM10 figure of 26 which is well below the AQO threshold of 40.

The IAQM Mineral Dust Assessment

B7 A dust assessment has been undertaken for The Brambles/Bezza Villa in accordance with the process suggested in the IAQM advice. That

assessment considers each component of an 'average' mineral operation using (i) the generic 'Source – Pathway – Receptor' concept and (ii) Appendix 4 in that advice.

B8 In relation to 'Source' the IAQM advice suggests that generally mineral processing and on-site transportation are potentially the largest source of emissions. However, while true for hard rock operations this is not true for 'wet' sand and gravel (which type of operation is not separately identified in the IAQM advice), where published statutory guidance on process regulations considers that dust arising would be "trivial" and arisings from transport will be minimised due to the wet nature of the product. This confirms that the largest 'Source' of dust emissions will be less than 'Small'.

B9 In terms of 'Pathway' the advice identifies a number of factors which will affect the effectiveness of the 'Pathway', including those of a detailed meteorological nature, which factors may be very event, location and property specific and highly variable. Erring towards the precautionary 'worst case' approach would suggest that dry winds of relevant speed from the source to any property are very infrequent such that the 'Pathway' is ineffective. Mitigation works consisting of extensive planting will provide further disruption to the 'Pathway'.

B10 In respect to 'Receptors' the nearest residential properties are located, at their closest, distant from the 'Source'. There are no sensitive other built developments nearby. Further mitigation works close to such receptors is proposed. This confirms that receptors are distant from the 'Source'.

B11 Such an assessment confirms that dust arising from the 'Source' will be 'Small', that the 'Pathway' to any receptor is 'Ineffective' producing a 'Negligible Risk' of a dust impact and a 'Negligible Effect' at the nearest 'Receptor'. This negligible effect would be an insignificant negative effect on any sensitive receptor.

B12 Appendix 4 of the IAQM advice provides a very broad assessment process of the scale of potential dust emissions based on the characteristics of a mineral extraction proposal for certain elements of such an operation. It identifies operations as being either 'Large' or 'Small' sources of dust (without any intermediate, higher or lower grading), based on the scale of certain individual activities. It considers (i) site preparation and restoration; (ii) mineral extraction; (iii) material handling; (iv) on-site transport; (v) mineral processing; (vi) stockpiles and exposed surfaces; and (vii) off-site transport.

B13 In relation to site preparation and restoration a 'Small' dust potential would be associated with a small working area; bunds lower than 4 metres and seeded, volume of material movement being less than 20,000 cubic metres, less than 5 mobile plant operating at the same time, and moving material with high moisture content. At LHF some bunds will be higher and the volume of material moved during site preparation will exceed 20,000 cubic metres. Other considerations will have a less than 'small' dust

potential and the overall dust potential at LHF during site preparation and restoration would be 'Small'.

B14 In relation to extraction a 'Small' dust potential would be associated with a small working area of less than 20 hectares, use of hydraulic excavator, low dust potential material and an extraction rate lower than 200,000 tonnes per annum. On that basis the operations at LHF will have a less than 'Small' dust potential.

B15 In relation to material handling at LHF a 'Small' dust potential would be associated with using less than 5 items of mobile plant, working more than 100 metres from the site boundary and handling material with high moisture content. On that basis the operations at LHF will have a less than 'Small' dust potential.

B16 In relation to on-site transport at LHF a 'Small' dust potential would be associated with less than 100 movements per day, with a haul road surface of compacted aggregate (of less than 500 metres length) and a maximum speed of 15 mph. The haul road is marginally longer than 500 metres but given other conditions and a lower speed limit the operations at LHF will have a 'Small' dust potential.

B17 In relation to mineral processing a 'Small' dust potential would be associated with a fixed processing plant, processing less than 200,000 tonnes per annum or mineral with high moisture content. On that basis the operations at LHF will have a less than 'Small' dust potential.

B18 In relation to stockpiles a 'Small' dust potential would be associated with short-term retention on site and a stockpile material of low dust potential over an area of less than 2.5 hectares located in excess of 100 metres from the site boundary in an area of low wind speeds. Total production should be less than 200,000 tonnes per annum. On that basis the operations at LHF will have a less than 'Small' dust potential.

B19 In relation to off-site transport a 'Small' dust potential would be associated with less than 25 HGV movements per day, paved long length of surface access road with effective cleaning. Movements at LHF will be marginally larger but the distance to property and length of access road is considerably larger. This indicates general compliance with this guidance such that the operations at LHF will have a 'Small' dust potential.

B20 Applied to Lower Hall Farm an assessment undertaken following the IAQM guidance would generally confirm that the potential for dust arisings in all elements of an operation would therefore be less than 'Small' producing an insignificant negative effect on any receptor.