

**IN RESPECT OF THE APPEAL AGAINST THE DECISION OF
HERTFORDSHIRE COUNTY COUNCIL FOR THE DEVELOPMENT OF
LAND AT HATFIELD AERODROME, OFF HATFIELD ROAD, HATFIELD,
HERTFORDSHIRE**

PLANNING INSPECTORATE REF: APP/M1900/W/24/3346607

LOCAL PLANNING AUTHORITY REF: PL/0232/21

**Paper submitted by former Rule 6 parties now third parties at the
request of the Planning Inspector**

Air Quality

Dr Derrick Crump, 11 Smallford Lane, Sleepshyde, St Albans, Herts. AL4 0SA

Introduction

Residents of St Albans and Hatfield are concerned about the impact of the proposed quarry operations and associated infill works on the air quality of the surrounding area, particularly the consequences for those living, working or otherwise using neighbouring properties. The concerns are about the generation of fine and coarse particulate matter as well as gaseous pollutants and the risk to health of people and the adverse impact on the local amenity.

There is widespread consensus in government and UK society that air quality needs to improve and this is endorsed by the on-going (until 20/10/2024) Air Quality Public Engagement being undertaken by Hertfordshire County Council (HCC, 2024). This states; 'Despite improvements in air pollutant sources (such as the levels of pollutants emitted from the tailpipe of vehicles), poor air quality is still the largest environmental risk to public health in the UK. Long term exposure to air pollution in England causes between 26,000 and 38,000 deaths per year.' The County Council strategy concerning health and well being specifies the impact of particulate pollution with respect to deaths in the County; 'Air pollution is the largest environmental risk to the public's health, contributing to cardiovascular disease, lung cancer and respiratory diseases. The fraction of mortality (aged 30+) attributable to particulate air pollution in Hertfordshire in 2019 was 5.7%, higher than East of England average at 5.5% and England at 5.1%.' (HCC, 2022).

Both MPs representing residents in the vicinity of the proposed quarry have drawn the planning inspector's attention to the issue of air quality. The planning inspector's report to the Secretary of State recommending dismissal of the appeal concerning the proposed sand and gravel quarry at Hertford in 2019 (File Ref: APP/M1900/W/17/3178839 Land at Ware Park, Wadesmill Road, Hertford, Hertfordshire) stated that concerns of residents about the impact of the proposed works on air quality are reasonable (paragraph 396. 'Local fear and anxiety about air quality and health effects is not irrational'). As a resident concerned about the Hatfield Aerodrome application, I have reviewed the Environmental Statement (ES) and Health Impact Assessment (HIA) and subsequent documents submitted by the appellants to decide whether the evidence presented provides assurance that our air quality (and our health and local amenity) will not be adversely impacted by the proposed works.

The conclusion of that review (detailed below) is that the case made by the appellants is far from sufficient to provide appropriate assurance. I therefore consider the planning application flawed with respect to addressing air quality concerns and it is my view that the appeal should be dismissed to protect the health and well-being of local residents and the local amenity. I further regard the case made for the proposed planning conditions, if the scheme were to proceed, as being insufficient to adequately mitigate the possible risks to health and local amenity.

Also, such dismissal of the appeal is necessary because the evidence presented in the ES and HIA does not demonstrate that the proposed scheme is compatible with the requirement for HCC and other local authorities to meet the legislated government air quality targets implemented in December 2022 as well as local authority pledges concerning air quality.

My relevant qualifications and experience on air quality matters are summarised in an appendix (C) to this statement.

Background

I note the document prepared by SLR and dated 30 May 2024 which was posted on the HCC website in mid-July 2024 (*Statement of Common Ground between the Appellant and Hertfordshire County Council – Planning Policy and Need*).

The issue of air quality is briefly addressed in this SLR document in sections 3.8 and 9.0 as follows;

3.8 The Appeal Scheme does not give rise to significant degradation either by means of dust disamenity or particulate matter or emissions to air quality and future monitoring could be undertaken pursuant to a planning condition.

9.6 There are no amenity issues (noise or dust/particulate) to residential receptors surrounding the site save for Popefield Farm and then in relation to noise only.

And in section 1.11 the SLR document refers to *the statement of common ground on air quality*. This statement concerning air quality is also posted on the HCC website; *[Draft] Air Quality Statement of Common Ground: Hertfordshire County Council & Brett Aggregates and has been prepared by Gordon Allison (BSc. MSc. MIAQM) Principal Consultant on behalf of DustScanAQ (3rd June 2024).*

Item 5 of the DustScanAQ (2024) document refers to *Chapter 9 of the Environmental Statement dated 2021* prepared by SLR concerning air quality modelling and health impact assessment.

The DustScanAQ document further refers to the importance given by the inspector on planning conditions for the control of risks from dust generation (item 14) and hence the document *Draft Planning Conditions* available on the web site is highly relevant to air quality.

On reviewing these documents, it is my view that the statements on air quality contained in the draft statement of common ground are not adequately supported by the evidence presented and that the applicant demonstrates a complacency towards the risks of exposure to air pollutants, particularly with regard to particulate matter and the associated risks to the health of neighbouring residents and other users of land that will be impacted by the proposed quarrying related activities.

Outline of main concerns

1. Reliability of modelling of air quality

It is notable that factors having a major impact on dust and gaseous emissions and dispersal would be the subject of detailed drawings and plans to be submitted to the MPA for approval prior to commencement of development e.g. Processing plant and buildings, Processing plant detail, Details of additional bunding and landscaping, Phasing plans, Construction Management Plan, Access – enabling works, New access, HGV routing, Traffic Management Scheme, Provision of parking and servicing areas, Dust suppression scheme, Storage of liquid fuel, oil or chemicals.

Noting the large number of factors that impact the emission and dispersion of air pollutants, including those dependent upon proposed planning conditions, I have concerns about the accuracy and degree of uncertainty of the predicted pollutant concentrations (including deposited dust) calculated by the air quality modelling undertaken by SLR in 2021 and apparently endorsed by DustscanAQ in their preparation of the *[Draft] Air Quality Statement of Common Ground* .

Detailed criticism of the modelling exercise that underlies the applicant's assertion about air quality risks is provided in an appendix (B) to this document, including published statements (by

DustscanAQ staff) in an academic journal about the inappropriateness of such modelling to assess risks associated with particulate matter generated by quarrying (see comment 5 in appendix). Further I am concerned that the modelling has not addressed the emissions associated with the proposed importation of infill material resulting in significant under estimation by the appellants of the predicted airborne concentrations of pollutants.

2. Misleading statements on the risks to health

A small but highly significant paragraph within the DustscanAQ document is paragraph 7; *'Since the assessment was completed in 2021, the Defra guidance has been up-dated to TG(22), the PM2.5 2023 regulations have come in, however these changes do not alter the outcome of the assessment.'*

I welcome this long overdue recognition that these regulations are now on the statute book, but note that no mention of these was made in the ES or HIA even though the government bill has had a long history in Parliament and the House of Lords and was underlain by earlier government scientific reviews and public consultation. Indeed, I challenged the updated SLR (July 2023) Health Impact Assessment with respect to air quality by writing to HCC because it ignored the consequence of new legislation and government expert committee advice (see attached letter of 30 August 2023), but the issues raised were apparently ignored.

It is my view that the SLR assessment of the risks to the public from air quality (*SLR chapter 9 ES report*) was complacent and of a poor standard by not recognising developments in the understanding of the risks posed by air pollution since the outdated 2010 regulations upon which their assessment relied. I respect the statement by the government's expert committee (COMEAP, 2022; *COMEAP statement: response to publication of the World Health Organization Air quality guidelines 2021*) *'the current evidence has not identified thresholds for effect at the population level, meaning that even low concentrations of pollutants are likely to be associated with adverse effects on health.'* The WHO air quality guidelines reviewed by COMEAP were published in 2021 after a long period of development and included air quality guideline concentrations for PM2.5 of 5 $\mu\text{g m}^{-3}$ (annual mean) and 15 $\mu\text{g m}^{-3}$ (24 hour mean), as well as 10 $\mu\text{g m}^{-3}$ (annual mean) for nitrogen dioxide.

I disagree with the DustscanAQ assertion that the scientific and regulatory developments do not change the outcome of the assessment. The latest scientific evidence shows there is no safe level of exposure to PM2.5 and silica dust. The 2023 regulation (The Environmental Targets, Fine Particulate Matter, England, Regulations, 2023) reduced air quality limits aimed at managing these risks and set a target to achieve progressive reduction in exposure with a limit for PM2.5 being achieved by 2040;

The Environment Act 2021 established a new framework for environmental targets for England. The Environmental Targets (fine particulate matter) (England) Regulations 2023 set targets under this framework for the air pollutant of most harm to health – fine particulate matter (PM). The two targets, both to be met by 2040 are: Annual mean concentrations of PM to be 10 $\mu\text{g m}^{-3}$ or lower, population exposure to PM to be reduced by 35% compared to 2018 levels. The two targets are designed to work together to drive actions that both reduce concentrations where it is highest and reduce the pollution that everyone in the country experiences. (DEFRA, gov.Uk England Fine Particulate Matter Targets).

In addition, HM Government set interim targets for PM2.5 concentrations in air in the Environmental Improvement Plan 2023 as follows (UK Gov, 2023);

PM2.5 is the pollutant which is most harmful to human health. We have set two legally binding long-term targets that both reduce concentrations of, and drive down people's exposure to, the pollutant

across the country. To show our trajectory against both targets, we are setting new interim targets against both long-term legal targets. These interim targets reflect the progress we expect to make by 2028 towards our long-term targets.

Interim targets: By the end of January 2028:

- *The highest annual mean concentration in the most recent full calendar year must not exceed 12 µg/m³ of PM2.5.*
- *Compared to 2018, the reduction in population exposure to PM2.5 in the most recent full calendar year must be 22% or greater.*

There is now a duty on local authorities to address air pollution by PM2.5 as recognised by HCC Public Health in their report of February 2024 (HCC, 2024a) that states;

‘Most recently The Defra Air Quality Strategy – A Framework for local authority delivery – 2023²³ states that while PM2.5 is not currently part of the Local Air Quality Management framework, the government still expects all local authorities to effectively use their powers to reduce PM2.5 emissions from the sources which are within their control.

The absence of an Air Quality Objective for PM2.5 is addressed in Chapter 8 of the LAQM Policy Guidance 2022¹. This states that ‘The Environment Act 2021 establishes a legally binding duty to set a target on PM2.5; something that was achieved in December 2022, with the limit of 10ug/m³ of PM2.5 as an annual average by 2040.

This PM2.5 target and a population exposure reduction target has now become a statutory obligation for local authorities pursuant to the Environment Act 2021:’

I consider the air quality assessment undertaken by the applicant does not appropriately assess the risks to health and it is misleading in their conclusion that there is no risk to health. The proposed development is a source of particulate matter, including PM2.5 and silica dust for which there is no safe level of exposure and the assessment has not given due regard to legally binding targets that must be met during the planned lifetime of the proposed development and the appellant’s own modelling predict these will be exceeded (see comments in Appendix for detailed criticism). While HCC and other local authorities have a revised statutory obligation to address PM2.5 these obligations are not addressed by the ES or HIA supporting this application.

3. Inadequacy of proposed air quality monitoring

The Draft Planning Conditions also cover proposed air quality monitoring of baseline conditions and an air quality monitoring scheme during development.

While locations for siting of monitoring are to be agreed with the MPA, the proposal for the data collection within the draft conditions is unacceptable. While weekly and monthly data are required as proposed in section 47 iii, it is also important that daily checks of dust in particular are made in order that immediate action can be taken to address issues that may impact the health and amenity of residents and visitors to the site.

The scope of the suggested monitoring that is limited to NOx and PM10 is unacceptable. With respect to the health impact of particulate pollution, it is well understood that the greatest risk to health is due to the finer fraction of particle size. Hence it is important that PM 2.5 is also recorded. Also, the inadequacy of modelling to predict coarse particle deposition is well documented and therefore neighbouring properties such as Popefield farm and the University sports fields should be

monitored for deposited dusts. Given the concerns about the exposure to silica dust that is carcinogenic (and has no safe level of exposure) it is important that monitoring includes quantification of this specific fraction of the airborne dust. In my view the intention to not monitor PM2.5 in particular, should the development go ahead, demonstrates the applicant's complacency towards the important issue of air quality.

The proposed duration of baseline air quality monitoring prior to the commencement of works is insufficient because a minimum of only 6 months is required (section 37). The Environment Agency guidance M17 (EA, 2013) recommends a full year and, given the documented paucity of historic particulate monitoring in the vicinity of the proposed site, this should be regarded as the minimum period necessary to be able to establish the impact of the quarrying related activities on local air quality.

While welcoming a commitment to air quality monitoring before and during development should the application be approved, I consider the scope of the proposed monitoring to be inadequate and this further demonstrates a high degree of complacency with regards to the applicant's approach to air quality.

The main text and Appendix B of my statement of case on air quality is based on documents available on the HCC website. On 22 October 2024 further documents became available on the public inquiry website. Under the Proofs of evidence/ Brett Aggregates Ltd section, two further documents relating to air quality have been posted. In the spirit of assisting with enabling the public inquiry to proceed as efficiently as possible, I offer some initial observations on the statements made by Mr Allison of DustScanAQ in Appendix D.

Attachments

Appendix A - Letter from Derrick Crump (resident) to HCC dated 30 August 2023 concerning the updated SLR Health Impact Assessment (HIA) (July 2023).

Appendix B - Detailed Critique of the Environment Statement (ES) on Air Quality

Appendix C - Profile for Dr Derrick Crump BSc, PhD.

Appendix D - Comment on Documents prepared by DustScanAQ and posted on the planning inquiry website on 22 October 2024.

**Appendix A - Letter from Derrick Crump (resident) to HCC dated 30 August 2023
concerning the updated SLR Health Impact Assessment (HIA) (July 2023).**

Appendix B. Detailed Critique of the Environment Statement on Air Quality

The following text consists of key extracts followed by critical technical comments concerning SLR report Hatfield_ES_chp09_AQ_FINAL which demonstrate the inadequacy of the air quality assessment which forms the basis of inappropriate conclusions in the Health Impact Assessment.

9.30 The air quality assessment has been undertaken in accordance with the principles outlined within the following guidance documents: • Defra: 'LAQM Technical Guidance 16' (LAQM.TG(16)) (2021); • Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK): 'LandUse Planning and Development Control: Planning for Air Quality' (2017); • **IAQM: 'Guidance on the Assessment of Mineral Dust Impacts for Planning' (2016)**; • United States Environmental Protection Agency: 'Air Pollutant 42' (US EPA AP-42) (2021); • Australian Government: National Pollutant Inventory (NPI) 'Emission Estimation Technique Manual for Mining' Version 3.1 (2012); and • EA: 'Monitoring Particulate Matter in Ambient Air around Waste Facilities' (2013).

Comment 1;

The IAQM document relevant to mineral dust is currently outdated and subject to review with a planned update by the end of 2024. The reliance on USA and Australian guidance reflects a lack of knowledge and experience within the UK quarrying sector on matters relating to air quality. The document was prepared by a working group of consultants (including SLR and DustScanAQ) and did not include any representatives of government agencies or groups representing the public interest. It is arguable that the applicant should have updated the air quality assessment by considering the 2024 IAQM guidance relating to dust from demolition and construction (IAQM, 2024). The introduction states;

*'In terms of effects, construction sites may give rise to annoyance due to the soiling of surfaces by dust. Very high levels of soiling also have the potential to damage plants and affect the diversity of ecosystems. Additionally, there is evidence of major construction sites increasing long term particulate matter concentrations. Exposure to particulate matters has long been associated with a range of health effects, with an increasing focus on smaller particles such as PM2.5.'*¹

Given the very long-term nature of the proposed works, the impact on lifetime exposure to air pollution of local residents would be exceptional compared with the vast majority of construction projects and therefore the proposal should be the subject of comprehensive and evidence-based assessment.

9.3 As set out in Chapter 3 above, the proposed development comprises the extraction and processing of 8Mt material over a period of around 30 years (based upon an annual output of around 250,000tpa). **Excavated material** would be processed at the quarry using a combination of screening and washing plant to produce a range of graded aggregates and sands.

Comment 2

*The planning application is for the following 'APPLICATION FOR THE ESTABLISHMENT OF A NEW QUARRY ON LAND AT THE FORMER HATFIELD AERODROME, INCLUDING A NEW ACCESS ONTO THE A1057, AGGREGATE PROCESSING PLANT, AND OTHER ANCILLARY FACILITIES, **TOGETHER WITH THE IMPORTATION OF INERT FILL MATERIALS TO RESTORE THE MINERALS WORKING**'. The assurances concerning air quality impacts addressed in the ES only address the operations associated with quarry operations in the assumed first year of operation (2023). There is no consideration of the dust generated by infill operation in later years, presumably involving tipping of various construction*

wastes into worked pits in parallel with active quarry excavations. This will be a major source of additional airborne dust resulting in significant underestimation of the predicted impact on airborne concentrations of pollutants and undermining any confidence in the appellant's concern for the amenity and well-being of local residents and other users of neighbouring properties.

9.34 **There are no statutory limit values for dust deposition** above which 'nuisance' is deemed to exist as it is a subjective concept, and its perception is highly dependent upon the existing conditions and the change which has occurred.

9.35 The EA's dust monitoring guidance (M17) proposes limit values for protection against dust annoyance for different monitoring methods that are acknowledged **as coming into use through 'custom and practice'**. **A limit of 200mg/m² /day is proposed for use with dust gauges as a guide at which the onset of nuisance might be experienced**, and has therefore been adopted within this assessment.

Comment 3;

The science underlying the consequences of settled dust on health is limited and consequences for exposure, in particular to dust ingress indoors, and the potential for resuspension and long-term exposure are poorly understood. The custom and practice limit quoted should not be regarded as being known to adequately protect human health.

9.42 Modelling in relation to road traffic emissions has been undertaken through use of the Cambridge Environmental Research Consultants (CERC) ADMS-Roads dispersion model (v5.0.0.1), to predict concentrations of NO₂, PM₁₀ and PM_{2.5} at human receptor locations, for the following scenarios: • 2019 Baseline (2019 BC) - Without development base flows for the year (2019); • 2023 Do Minimum (2023 DM) - Without development flows for the proposed year of opening (2023), inclusive of any relevant committed development; and • 2023 Do Something (2023 DS) – 'Do Minimum' flows, plus all trips associated with the Proposed Development flows for the proposed year of opening.

9.44 Modelling of fugitive dust emissions generated by on-site operation activities has been undertaken through use of the US American Meteorological Society and Environmental Protection Agency Regulatory Model (AERMOD v9) dispersion model. This has focussed on concentrations of PM_{2.5} and PM₁₀ for human receptors as well as the predicted dust deposition rates (as total suspended particles (TSP)) for both human and ecological receptor locations.

Comment 4;

The assessment involves two separate models with their own inherent uncertainties. The SLR report ES Chpt 9 provides no assessment or discussion of these uncertainties leaving the reader with no perspective on the accuracy of the predicted values for receptor pollutant exposure.

Appendix 9/1 (SLR June 2021, Dispersion Modelling Methodology) does discuss verification of the roads dispersion modelling by a process of comparing real and modelled data. For NO_x the modelled value was 17.2 µg/m³ and the actual measured concentration was much higher (42.7 µg/m³, a factor of 2.4 discrepancy). Due to the lack of monitoring data for PM no such calculation could be performed for PM₁₀ or PM_{2.5} and it is assumed that the same verification factor as for NO_x applies, although there are significant differences in the behaviour of gaseous NO_x from that of particulate matter in the atmosphere. While further details on emission factors applied in the EPA AERMODv9 modelling are provided in Appendix 9/1 there is no mention of verification or uncertainty associated with the predicted pollutant concentrations.

Given the lack of PM10 and PM2.5 data relevant to the site it is surprising that this deficiency of evidence was not realised at the concept stage of this proposed project which must have been many years ago. It would have been straightforward to have placed a PM10 and PM2.5 monitor at one or more relevant locations and to have collected, at the very least, 12 months of data. This could have been used for a more meaningful validation of the ADMS model. While perhaps a bit more challenging some validation of the AEROMOD modelling could have been undertaken by focussing on the active quarry to the north of the proposed site and this would have been beneficial to providing some evidence to assess the reliability of assumptions made when assessing the cumulative effects of different local sources on the ambient air quality. The lack of such studies suggests a complacency about air quality concerns or perhaps a fear that such data may present inconvenient findings.

*The CERC ADMS model v5 applied has been updated to v6 and the applicant should consider if this has substantive implications for the AQ assessment. A highlighted improvement in the model is as follows; 'ADMS 6 is a **new generation Gaussian plume air dispersion model**, which means that the atmospheric boundary layer properties are characterised by two parameters:*

- the boundary layer depth, and*
- the Monin-Obukhov length*

rather than in terms of the single parameter Pasquill-Gifford class. Dispersion under convective meteorological conditions uses a skewed Gaussian concentration distribution (shown by validation studies to be a better representation than a symmetrical Gaussian expression).

It is notable that the ES chapter 9 does not address the risk to health from (the carcinogen) silica dust although this is a major concern for residents. There is mention in Appendix 9/2 that appears not to be picked up in the main report. Silica dust is addressed in the HIA (SLR, 2023) and the findings are highlighted in the executive summary as follows;

*'As the proposed development relates to the extraction of sand and gravel, which contains silica, detailed modelling in relation to respirable crystalline Silica has been undertaken for the emissions from the proposed works. The modelling assumed (as a worst case) that all PM10 emissions would be Silica and considered the cumulative effects of neighbouring developments. **The highest modelled concentration of Silica as a result of the development would be 21.0µg/m³**, which is well below the Air Quality Limit of 40µg/m³ where health effects are observable in the most vulnerable members of the general population. Silica dust is not therefore a health impact arising from this development.'*

This statement is completely erroneous as the PM10 air quality limit has no direct relation to exposure to silica dust and as a carcinogen there is no safe level of exposure to silica. In the main text of the HIA (page 63) it states there is no UK standard for non-occupational exposure to silica and refers to a US EPA recommendation to apply a value of 3µg/m³. It would appear therefore that according to this summary text silica dust is a very serious concern for residents.

The risk to health from exposure to silica is well documented in scientific publications. For example, Sato et al. (2018) state;

' "Silica" refers to crystalline particles formed by the combination of silicon with oxygen. Inhalation of silica particles promotes the development of pulmonary fibrosis that over prolonged periods increases the risk of lung cancer. The International Agency for Research on Cancer (IARC) classified crystalline silica as a human carcinogen in 1997.'

In the conclusion Sato et al. (2018) state; 'Furthermore, it appears that cumulative silica exposure correlates directly with lung cancer risk, supporting the decision to reduce [in the USA] the occupational exposure limit to 0.05 mg/m³.

9.45 In the absence of dust emissions factors for similar quarry operations in the UK, emission factors and associated compilation methodologies provided within the following guidance documents have been used: • Australian Government Department of the Environment and Heritage National Pollutant Inventory (NPI) 'Emission Estimation Technique Manual for Mining'; and • United States Environmental Protection Agency 'Air Pollutant 42' (US EPA AP-42);

9.46 Application of these emission factors within the context of UK schemes **is believed to be conservative** given these relate to arid regions of the USA and Australia, therefore likely to overpredict the potential impacts.

Comment 5;

The two major types of assumptions in any modelling exercise are the factors used to estimate emissions of the pollutant (from a wide variety of sources) and those used to estimate the dispersal and deposition (for particles). Despite a long history of quarrying for sand and gravel in the UK and well documented risks from particulate pollution (including silica dust) there are no emission factors relevant to UK quarrying practices and it is assumed those from Australia and USA with different geologies, climate and working practices are relevant.

Indeed, I support the view expressed in a scientific paper published in 2021 in the respected 'Atmospheric Environment' journal by authors representing the University of Portsmouth and the consultancy DustScanAQ (Bruce et al., 2021). The following is stated in the introduction section of that paper concerning emission factors (EFs);

*'Published EFs for individual dust sources are mostly unavailable due to the complexity in accurately measuring them, and so generalised emission rates are often used. Those can be based simply on the size of the site (European Environment Agency (EEA), 2016) or the quantity of materials being moved (United States Environmental Protection Agency (US EPA), 2006). Examples of emission factor calculations are shown in Table 1, which demonstrates both the large quantity of data required for complex emission calculations such as emissions from unpaved roads and the broad estimations of emissions using the EEA inventory. **Current guidance therefore recommends that detailed dust dispersion modelling is not undertaken for mineral planning due to the lack of available dust emission data'***

9.49 It is acknowledged that a recent planning application¹⁰ for an extension of a sand and gravel quarry at Hatfield Quarry off Oaklands Lane, Hertfordshire (Land Adjoining Coopers Green Lane) located 2km north east of the application site has been submitted. **To facilitate a cumulative assessment, maximum modelled PM₁₀ (1.26µg/m³) and PM_{2.5} (0.89µg/m³) concentrations reported within the accompanying health impact assessment¹¹ for all phases and receptors considered were added to the future year modelled concentrations.** This ensures the assessment and resultant modelled concentrations considers potential future localised sources of PM concentrations in line with IAQM guidance.

9.50 Where modelled contributions from road traffic and fugitive dust emissions overlap, these have been combined to provide a cumulative assessment. This is limited to PM_{2.5} and PM₁₀ concentration contributions at human receptors. In relation to the 24-hour mean PM₁₀ AQAL, given the known limitations with modelling short-term objectives for road traffic assessments, the

empirical relation provided within LAQM.TG(16) has been adopted through combination of both outputs.

9.52 Human receptors considered in the assessment are detailed in Appendix 9/1, whilst their locations are illustrated in Figure 9-1. These receptor locations are considered to capture worst-case relevant exposure relative to the Site, in accordance with LAQM.TG(16) and excludes workplace locations.

Comment 6;

According to figure 9-1 there is no receptor on the intensely used sports fields used by university students as well as a wide range of local adult and youth sports clubs. Short term exposure (hours per day) in particular should have been considered with respect to PM in particular and risks such as provoking asthma.

Also apparent is that there are no receptors recognised within the area proposed to be quarried. Within the site boundary occupational exposure will occur which the ES makes clear is not addressed, but also not assessed is the exposure of the general public making use of the remaining areas of the country park during the nearly 40 years of quarrying and restoration. These people will be in very close proximity to the active workings.

Automatic Monitoring

9.63 Automatic monitoring is undertaken by WHBC at one location; however the location of this monitor could not be corroborated due to incorrect coordinates presented within the ASR.

9.64 The nearest monitor associated with the national Automatic and Urban Rural Network is located >10km away, and therefore has not been considered as not considered relevant to the study area.

9.65 Automatic monitoring is undertaken as part of the regional Hertfordshire and Bedfordshire Air Quality Network at two locations within WHBC, titled HB016 and HB001. **Monitoring at HB016 commenced in September 2020 so therefore has not been considered. Monitoring at HB001 commenced in 2016 however limited to PM2.5. HB001 is located approximately 2.7km east of the site within Hatfield at a roadside location.**

9.73 Defra maintains a nationwide semi-empirical model of projected background air quality concentrations at a 1km grid square resolution across the UK. The data sets include annual average concentration estimates for NO_x, NO₂, PM₁₀ and PM_{2.5} using a base year of 2018 (the year in which comparisons between modelled and monitoring are made)¹⁴.

9.74 Annual mean background concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5} have been obtained from the Defra published background maps (2018 base year), based on the 1km grid squares which cover the modelled domain.

Comment 7;

The paucity of information on monitored local PM air quality means there is high uncertainty associated with assumed baseline concentrations applied in the modelling. The data applied is largely drawn from a separate empirical model and limited to 2018.

9.77 Figure 9-2 presents a wind rose recorded at Luton Airport for the cumulative period of 2015-2019. This demonstrates south-westerlies as the predominate wind in the area.

Comment 8;

The modelling relies on wind data for Luton airport. While no doubt this broadly relates to the Hatfield aerodrome site there will inevitably be local topographical effects particularly near ground level that will affect wind direction, turbulence and velocity. This adds further uncertainty to modelling predictions of pollutant concentrations. One of the few studies seeking to validate the AEROMOD model for predicting dust arising from quarrying activities (undertaken in the USA) found the model acceptable for predicting summer concentrations but not for winter when dust levels were highest (Sairanen et al. 2020). The authors state;

*‘...but the model was unable to predict the high dust concentration during the wintertime. This is suggested to be a consequence of ground inversion and more stable climatic conditions compared to the summer. This caused a significant underestimation of the modelled dust concentrations, compared to the measured ones, since the ground inversion trapped the dust particles to remain near the ground. According to these results, modelling is applicable to aggregate quarries operating during unstable (non-inversion) meteorological conditions. **Usage of on-site weather parameters is recommended to gain more reliable results.**’*

It is notable that in the UK inversions are most common in winter, when mist and fog become trapped in the cooler air low down, but inversions can happen all year round (Met Office, 2024).

9.87 Based upon the maximum predicted annual mean PM10 concentration of 21.0 µg/m³ (predicted at Receptor R30 – 2026 DS), this equates to less than 5 days where 24-hour mean PM10 concentrations are predicted to be greater than 50 µg/m³. This is well below the 35 permitted exceedences, and therefore the number of maximum exceedences is in compliance with the 24-hour mean AQAL. Cumulative effects associated with likely 24-hour mean PM10 concentrations at all assessed receptor locations are therefore considered to be not significant.

Comment 9;

Predicted annual mean concentrations of PM10 are below AQAL (2010 regulations) while exceeding 50 µg/m³ on about 5 days. As stated by the governments advisory committee (COMEAP) a level below AQAL does not mean the air quality is not harmful to health. Indeed, were the quarry in Scotland the predicted annual mean of 21 µg/m³ would exceed the annual limit and exceed or be marginal with respect to 24 h exceedances (Scotland regulation is 18 µg/m³ annual mean and maximum of 7 exceedances over 24 h of 40 µg/m³).

9.90 In accordance with EPUK and IAQM guidance, the impact of the development on annual mean PM2.5 concentrations at all assessed existing receptors is considered to be ‘negligible’. **Furthermore, there are no predicted exceedences of the annual mean PM2.5 AQAL, and are calculated to be ‘well below’ the AQAL.**

9.91 Cumulative effects associated with annual mean PM2.5 concentrations at all assessed receptor locations are therefore considered to be ‘not significant’, despite the conservative nature of the applied assessment methodology.

Comment 10;

The predicted annual mean PM2.5 concentrations for receptors R3 and R30 in table 9-10 are 11.7 and 13.5 µg/m³ respectively. The lifetime of the proposed quarry is for many years beyond 2040. The annual mean air quality target for England is 10 µg/m³ to be achieved by 2040. Hence these predicted concentrations exceed the current PM2.5 air quality target. Further they exceed the interim

target for England that by January 2028 annual mean concentrations must be $12 \mu\text{g}/\text{m}^3$ or lower. In Scotland the $\text{PM}_{2.5}$ $10 \mu\text{g}/\text{m}^3$ limit has been in force since 2020. And as for PM_{10} limit, this target for $\text{PM}_{2.5}$ does not equate to a level that does not have an adverse impact on human health (COMEAP, 2022).

Noting the use of US based modelling inputs for quarrying applied by SLR, they should also consider USA based air quality limits in their health impact assessment. The USA government web site states the following (US EPA, 2024); 'On February 7, 2024, the USA EPA strengthened the National Ambient Air Quality Standards for Particulate Matter (PM NAAQS) to protect millions of Americans from harmful and costly health impacts, such as heart attacks and premature death..... EPA is setting the level of the primary (health-based) annual $\text{PM}_{2.5}$ standard at 9.0 micrograms per cubic meter to provide increased public health protection, consistent with the available health science.'

Whilst the SLR ES and HIA preceded the revised air quality regulations introduced in December 2022 and the publication by COMEAP in 2022, and was concurrent with the revised air quality guidelines published by WHO in 2021, the scientific understanding that there is no safe level of exposure was widely recognised prior to 2021. For example, the HCC Air Quality strategy developed in 2018, and published in 2019, states; 'There is increasing evidence that poor air quality is a significant contributor to preventable illnesses and early deaths. Whilst legal limits of air pollutant levels are in place, there is no 'safe level' and health effects can be seen below these limits.'

It is even more surprising that the revised HIA produced by SLR in July 2023 was not updated to recognise the change in air quality regulations because the pending change was highlighted by the 'Proof of Evidence' provided by DustScanAQ to the previous planning appeal (acting on behalf of Brett Aggregates) in October 2021 (Allison, 2021). Item 28 of the 'Proof of Evidence' states; 'An Environment Bill is currently being passed through the UK Parliament, which will put in place the mechanism for setting future standards for these air pollutants. With respect to this proposed development, it should be noted that the significance of effects in guidance such as IAQM 2016 is evaluated with respect to meeting air quality objectives set out in legislation, and not with respect to effects on health.' Clearly for reasons unknown, SLR ignored the important change in the air quality legislation concerning $\text{PM}_{2.5}$ in the updated HIA which is a fundamentally important document to provide assurance to the public about the possible health impact of the proposed development.

It is notable that the HCC (2019) strategy highlighted the importance of minerals and waste for air quality and identified a 'Quick win' action (no. 6b) to develop guidance in the accompanying Implementation Strategy (HCC 2019a) document. It would appear that the much-needed guidance is still not available.

The HCC Cleaner Air programme states that 'Air pollution is one of the biggest health risks facing everyone in the UK. We're aiming for cleaner air for everyone by 2030' (HCC 2024a). This is preceded in 2022 by a pledge made by HCC as follows; 'We have joined local and regional authorities from across the UK in signing a letter to the UK Environment Secretary George Eustice pledging to meet World Health Organisation (WHO) targets on deadly air pollution ten years ahead of the Government's 2040 deadline.' (HCC 2022a).

Noting these serious concerns about air pollution and publicly declared HCC policies and targets prior to the 2023 update of the HIA, it is also very surprising that no mention of these local authority targets is included in the assessment.

The serious health impacts resulting from both long term and short-term exposure to $\text{PM}_{2.5}$ are expertly summarised by HCC Public Health as follows (HCC, 2024b);

' 1.4 Impact on Public Health of Particulate Matter (PM2.5)

Poor air quality is considered the largest environmental risk to the public's health and contributes to all non-communicable disease although the most commonly referenced are:

- Cardiovascular disease*
- Lung cancer*
- Respiratory diseases*
- Dementia*
- Increased chance of hospital admissions and visits to Emergency Departments.*

Evidence also states that air pollution is a significant contributor to preventable ill health and early death. Whilst legal limits are in place evidence suggests that health effects occur significantly below these limits, as recognised by the 2021 WHO guideline value of $5\mu\text{g}/\text{m}^3$. The reason why PM2.5 is such a significant air pollutant is that it can penetrate deep into the lungs and can irritate and corrode the alveolar wall impairing lung function. PM2.5 can also enter the bloodstream and cause both short term and long term health impacts with the causation thought to be oxidative stress ¹⁶.

Short term exposure to elevated concentrations is known to worsen the impact of pre-existing respiratory and cardiovascular health conditions, with the elderly and children the most vulnerable. Long term exposure is linked to a range of health impacts including respiratory and cardiovascular diseases, but also cancer and dementia ¹⁷.

1.5 Sources of Airborne Particulate Matter (PM2.5)

*Particulate matter can be classified, by how they are formed, as either primary or secondary particles. Primary particles are released directly into the air and originate from sources including road transport, stationary combustion e.g. domestic burning of logs and coal and bonfires and from industrial processes e.g. metal and cement production, construction, mining and **quarrying**.'*

This detailed assessment of the risks of exposure to particulate pollution contrasts markedly with the assessment undertaken by the appellants in the HIA (SLR, 2023). For example, on pages 58/9 the assessment of the risks posed by the predicted PM2.5 exposure is as follows; 'The highest modelled concentration as a result of development of PM2.5 would be $13.5\mu\text{g}/\text{m}^3$, this is well below the Air Quality Limit of $25\mu\text{g}/\text{m}^3$ which is where health effects are observable in the most vulnerable members of the general population.' To suggest the air quality limits for PM relate to a threshold of observable effect is incorrect.

9.104 As such, no further mitigation measures in relation to the operational phase of the development outside of those already proposed and encountered for within this assessment are not considered to be necessary. Those measures already proposed to be employed at the quarry, and evidenced to be effective in reducing on-site fugitive dust emissions are detailed in Table 9-11.

Comment 11;

It should be noted that the SLR modellers assumed best working practices regarding dust suppression which are presumably fully covered in the proposed planning conditions. Therefore, the implementation of such planning conditions is not expected to result in PM concentrations below those predicted by SLR modelling. Further, the use of water spraying to suppress dust is least effective

for the finer particulate fractions e.g. PM_{2.5}, adding to concerns that this aspect of air pollution should not be ignored by proposed monitoring.

References

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Appendix C. Profile for Dr Derrick Crump BSc, PhD.

I am an environmental and health scientist now retired from a career specialising in the measurement and assessment of air quality in indoor and ambient environments. Since beginning my postgraduate studies of air quality in 1977, I have been engaged in scientific consultancy, research, teaching and government policy work until retiring in 2023. In that time, I have led scientific teams within the (then) UK Department of Environment, BRE (and the former Building Research Establishment) and as Reader of Environmental Toxicology and Director of the Institute of Environment and Health (IEH) at Cranfield University. I have been a member of the Institute of Environmental Sciences and the Royal Society of Public Health since the late 1970s (Now retired Member and retired Fellow respectively).

Since the early 1980s the main focus of my work has concerned indoor environments and their relationship to the outdoor (ambient) environment. Major projects include the Indoor Air Quality (IAQ) Survey of England, contaminated land at Weston Village, development of methods for Volatile Organic Carbon (VOC) emission testing, air quality in new homes in England, and contaminants in aircraft cabin air.

I am currently in the process of withdrawing from national (BSI), European (CEN) and international standardisation (ISO) committees concerned with developing methods to measure indoor and ambient air pollutants and the evaluation of 'dangerous substances' used in materials. My work with standardisation bodies began in 1994 and I have been an active participant of a wide range of technical groups concerned with gaseous and particulate pollution, and served in the role of chair of the national committee concerned with IAQ measurement, convenor of an ISO working group and head of the UK delegation to ISO plenary meetings on air quality.

I have also served on several European expert groups concerned with air quality and assessment of exposure to pollution and have been chair of a European Commission expert group assessing the toxicity of chemicals used in construction products. My research and consultancy work has been reported in 180 peer reviewed journal, book and conference papers as well as numerous client reports. Following retirement from full time employment in 2016 I worked independently with a number of organisations as an expert advisor as well as in association with colleagues at IEH Consulting and as a Visiting Research Fellow at Cranfield University.

Appendix D - Comment on Documents prepared by DustScanAQ and posted on the planning inquiry website on 22 October 2024

Application Ref. PL/0232/21 Section 78 Appeal against refusal of planning permission by Hertfordshire County Council. Appeal Ref. APP/M1900/W/24/3346607 Proof of Evidence (text) of Gordon Allison BSc (Hons) MSc, MIAQM, CEnv – Air Quality October, 2024 Brett Aggregates Limited.

Item 7 ‘While I do not agree that the 200 mg/m²/day is a reliable indicator of nuisance in modern times,’

Comment A; I agree with that statement.

Item 9 ‘The DustScanAQ risk assessment also concludes that the risk of disamenity dust is negligible. At worst, there will be a temporary slight adverse effect at Popefield Farm and the nearest dwellings in Ellenbrook during the soil and overburden removal, handling and placement for the bund construction, which is estimated to last only six weeks.’

Comment B; Coarse dust will not just disappear when the period of high dust deposition ends. The dust will be present on surfaces and embedded in materials like household carpets and thereby available for re-suspension and continued exposure for adults and particularly toddlers who spend time very close to flooring. This lingering contamination will also be true for the sports fields, particularly the artificial surface sports pitches adjacent to the proposed works, and where no receptors are recognised by SLR or DustScan AQ.

Item 28. Since the assessment in 2021, new regulations setting targets for PM_{2.5} have been published by the government in 2023. Applying the new target in the same IAQM Air Quality Guidance assessment matrix to the results of the modelling assessment arrives at the same conclusion: that the impact on PM_{2.5} is negligible with respect to the new environmental target to be met by 2040.

Comment C; I consider the main text of my statement of case addresses this issue. It highlights that these new regulations were ignored in the HIA (July 2023) and that there is also a government interim target to be met by January 2028 and an HCC pledge concerning 2030 which are equally disregarded. All targets are exceeded currently, demonstrating that there is a serious air quality problem in the region and that creating a new 40-year source of particulate pollution will make meeting targets aimed at reducing the current unacceptable impact of air pollution on public health even more challenging.

I note Mr Ellis does not refer only to the conclusions of the EA and HIA to argue the impact of PM_{2.5} is negligible, but introduces additional evidence in the form of an IAQM ‘assessment matrix’.

29. In my opinion, the risk to health is negligible. By this I mean that the risk would be close to zero, and noting that for any hazard the risk is never zero, whilst there is a non-zero probability of it happening.

Comment D; I note that Mr Ellis is here considering health rather than regulation. This is a change in position from his evidence to the previous inquiry (see main text of my statement of case and Allison, 2021) where item 28 stated; ‘With respect to this proposed development, it should be noted that the significance of effects in guidance such as IAQM 2016 is evaluated with respect to meeting air quality objectives set out in legislation, and not with respect to effects on health.’

Applying the evaluation with respect to objectives set out in legislation as apparently required by IAQM means Mr Ellis should evaluate whether the relevant statement in the ES remains valid, this being; ‘there are no predicted exceedences of the annual mean PM2.5 AQAL, and are calculated to be ‘well below’ the AQAL.’ This finding is consequential, the ES being referenced in the HIA and the following conclusion drawn in the HIA assessment summary; ‘The highest modelled concentration as a result of development of PM2.5 would be 13.5µg/m³, this is well below the Air Quality Limit of 25µg/m³ which is where health effects are observable in the most vulnerable members of the general population.’

Item 31. RCS (or ‘silica dust’) in the environment has not been established to have ‘no safe level’. The most referred to ambient RCS standard is California’s, which has an RCS annual average standard of 3 µg/m³. The standard is referred to as a chronic Reference Exposure Level (REL) and was instituted in 2005¹. The key study for the derivation of the REL was a 1993 paper by Hnizdo and Sluis-Cremer studying exposure to RCS and silicosis in 2,235 white South African gold miners. The basis of the chronic REL for RCS was the calculated BMCL01, i.e. the lower bound estimate of the concentration at which 1% of the population develops silicosis. The calculated BMCL01 for the study resulted in a chronic REL estimate of 3 µg/m³, accounting for uncertainties². The reference level is derived from occupational and not environmental exposure.

*Comment E; I agree that the REL value was derived as described by OEHHA in California (in 2005). The value as stated concerns the disease silicosis. The web site referenced in the DustScanAQ document refers also to another disease outcome which is cancer and states that silica is a category one (proven in humans) carcinogen and was classified by IARC in 1997. Indeed, every page of the OEHHA document referenced is headed ‘**Determination of Noncancer Chronic Reference Exposure Levels.**’ While I imagine that Mr Ellis is more familiar with the scientific literature concerning silica than myself, I draw attention to the following text from Sato et al. (2018) referenced in the main text of my statement of case;*

‘Epidemiologic studies show that silica exposure is associated with an increased risk of esophageal, stomach, skin and most importantly lung cancer.^{19–21} The carcinogenicity of silica was reviewed by the International Agency for Research on Cancer (IARC), which concluded in 1997 that silica inhalation caused human lung cancer. This resulted in crystalline silica being classified as group 1 carcinogen.¹ There is strong and consistent evidence of a dose–response relationship between silica exposure and lung cancer risk, although the RR posed by silica is lower than certain other pulmonary carcinogens such as cigarette smoke or asbestos. An IARC meta-analysis of data collected after 1997 confirmed that silica was a pulmonary carcinogen.²² In response, the US Occupational Safety and Health Administration (OSHA) lowered the permissible occupational exposure of silica dust from 0.1 mg/m³ (0.25 mg/m³ for the construction industry) to 0.05 mg/m³ in 2013.²³’

Unless proven to be a threshold carcinogen, there is no safe level of exposure to a category 1 carcinogen. Any imposed REL that protects against silica exposure would of course be beneficial for reducing the risk of other disease, including cancer. However, when applying an REL, the scientist should be aware of limitations and uncertainties and for example the following statement is made by OEHHA in section VIII of the document with respect to the silica REL;

‘Exacerbation of asthma, which has a more severe impact on children than on adults, is a known response to some respiratory irritants. However, there is no data on such a response to silica in infants or children. The epidemiological studies used in the derivation of the REL did not include children. If children’s susceptibility were much greater than that of adults, it would be expected that clinical disease would be evident in children following exposures in the upper range of the respirable

silica levels measured in ambient air in California. No such reports have been identified in the literature. There are no data on silica's effects on the immune system of children. OEHHA is currently evaluating its risk assessment methodology, in particular the UFH, for its adequacy in protecting infants and children. Since children have smaller airways than adults and breathe more air on a body weight basis, penetration and deposition of particles in the airways and alveoli in children is likely greater than that in adults exposed to the same concentration (Phalen et al., 1985; Schiller-Scotland et al., 1994; Oldham et al., 1997; Bennett and Zeman, 1998).'

32. On behalf of different minerals sector clients, at DustScanAQ we have been reviewing the scientific literature for studies linking environmental exposure to RCS to harm to health and we have not found any evidence of it.

Comment F; I have no reason to doubt that Mr Ellis has been reviewing literature as described, but in the absence of any published peer reviewed paper or indeed reference to any relevant report (in this statement, the ES or indeed the HIA) it is not possible to assess the quality of such evidence. Perhaps the lack of evidence is simply explained by a paucity of appropriate studies.

Items 33 to 39; re Dust Soiling and NOx

Comment G; Agreed, but the draft planning conditions do not include measurement of dust deposition. Also, I would argue for additional monitoring as outlined in the main text of my statement of case.

Application Ref. 5/0394-16 Section 78 Appeal against refusal of planning permission by Hertfordshire County Council. Appeal Ref. APP/M1900/W/21/3278097 Document BAL4/2 Air Quality Appendix – Dust Risk Assessment October, 2021 Brett Aggregates Limited.

Item 2. 'There is no standard method for carrying out dust assessments for minerals sites..... together with guidance developed by Environmental Protection UK (EPUK) in conjunction with the IAQM³.'

Comment H; I note the item refers to the 2017 publication 'Environmental Protection UK and the Institute of Air Quality Management (2017). Land-Use Planning & Development Control: Planning For Air Quality (v1.2)'. This is a further document that recognised the health risk from air pollution and PM2.5 in particular well in advance of the 2023 regulations. A small extract as example; '3.3 In the UK it has been estimated that the mortality burden of long-term exposure to particulate matter (PM2.5) in 2008 was equivalent to nearly 29,000 premature deaths in those aged 30 or older⁷. The Public Health Outcomes Framework data tool shows the fraction of mortality attributable to air pollution by local authority (range 2.7 - 8.3%, average for England 5.4%)⁸. It is likely that removing exposure to all PM2.5 would have a bigger impact on life expectancy in England and Wales than eliminating passive smoking or road traffic accidents⁹. The economic cost from the impacts of air pollution in the UK is estimated at £9-19 billion every year which is comparable to the economic cost of obesity (over £10 billion)¹⁰. In 2013, the International Agency for Research on Cancer has identified outdoor air pollution as causing lung cancer, without identifying the specific pollutants that are the carcinogenic component¹¹.

Item 3; 'Potential sources or site activities that may give rise to dust as a result of the proposed development are: • Soil and overburden stripping, handling, storage and reinstatement; • Mineral extraction and handling; • On-site transportation; • Mineral processing; and • Wind scouring of exposed surfaces and stockpiles.'

Comment I; There is no explicit mention of the proposed import of infill materials and the associated dust creation activities.

Item 12; 'As there are no receptors within 250 m of the plant site, potential dust emissions from this area of the site have not been considered in this assessment.'

Comment J; While assuming their statement about the receptors they have defined is accurate, it cannot be the case that visitors to the country park will not be within this distance.

Item 30 to 36; Uncertainties, limitations and assumptions

Comment K; I agree that there are many uncertainties, limitations and assumptions associated with this desk-based screening risk assessment and it relies heavily on the judgement of the person conducting the assessment.

Item 38 and 39; 38. The results of the assessment show that for all receptors, the magnitude of dust effects from the main mineral extraction period would be Negligible. The assessment also shows that there would be up to Slight Adverse effects during some site preparation works at Popefield Farm and the north-west of the settlement of Ellenbrook; however, this would be limited to the establishment of screening bunds to the south of the site, a transient activity.

39. It can therefore be summarised that there would not be significant impacts at offsite receptors from disamenity dust associated with the proposed development.

Comment L; Given the many uncertainties, limitations and assumptions associated with this screening method I think the terms used in this text are inappropriate. The screening at best 'indicates' or 'suggests' and does not support 'shows' or justify 'would not'.