

Appeal by Prudential Property Investment Managers Ltd
(PRUPIM) and Astral Developments against the refusal for
Re-development of Hartland Park, Pyestock North, Farnborough

Appeal Reference: APP/N1730/A/08/2065912 &
APP/N1730/A/08/2072087

Proof of Evidence on Noise

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1 CREDENTIALS

- 1.1 I am Ron Hawkes. I am an independent acoustic consultant. I was formerly a Chief Acoustician with Atkins Acoustics Noise and Vibration. I am a Fellow of the Institute of Acoustics and hold a BSc in Psychology and a PhD in Environmental Design and Engineering from the University of London. I have been working as an acoustician for some 43 years. During that time I have designed or assessed the acoustic aspects of, inter alia, road rail and air transport schemes, wharves and docks, industrial plant, mineral works and landfill operations, construction sites, schools, hospitals, offices, housing, and leisure facilities. I have conducted research for many Government Departments and Agencies on hospitals, schools, industrial noise, road rail and air transport noise, mineral workings and landfill sites, and on environmental noise models. Previously to joining Atkins in 1990 I was a Lecturer at the Bartlett School of Architecture and Planning, University College London, and I have also lectured at the University of Lund Sweden, University Louis Pasteur Strasbourg France, University of Louvain Belgium, Wayne State University Ohio, University of Tulsa Oklahoma, Pennsylvania State University, Georgia Tech Atlanta Georgia, St Mary's University Halifax Nova Scotia, Indian Institute of Technology Madras, and at the Universities of Wales at Cardiff, Bath, Cambridge, Derby etc.

2 INTRODUCTION

- 2.1 I have been asked by SPLAT, a group representing residents opposed to the redevelopment of Hartland Park, Pyestock North, to give evidence on noise in respect of the appeal against refusal of the planning application submitted by Prudential Property Investment Managers (PRUPIM) and Astral Developments Limited to redevelop land formerly occupied by the Defence Evaluation and Research Agency.

- 2.2 The proposal is to transform the site into a large distribution centre consisting of a number of warehouses and heavy goods vehicle loading bays with a small amount of associated office space. The distribution centre will operate on a 24 by 7 basis.
- 2.3 The proposed development has potential noise impacts resulting from:
- Construction works
 - Additional road traffic, particularly heavy goods vehicle traffic at night
 - On-site operational activities
- 2.4 Each of these is addressed separately below.
- 2.5 Noise is measured on a logarithmic scale, as this is a good approximation to the way the human ear perceives changes in noise levels. Zero on the scale corresponds to the average person's threshold of hearing. It is generally accepted that a difference of 1 decibel (dB) is just perceivable under laboratory conditions, and a difference of 3dB is needed for there to be a reliable difference in public response. However, it should be noted that when the traffic volume on a road is doubled, the increase is 3 dB, and when the distance between a road and a dwelling is halved the difference is (approximately) 3 dB. Many would not regard such changes as negligible, and indeed the noise assessment procedure set out in the Highways Agency's Design Manual for Roads and Bridges Volume 11 requires that changes of 1 dB are taken into account when assessing road schemes.
- 2.6 As the human ear is not equally sensitive at different frequencies sound levels are often measured with the different frequency components weighted in order to approximately compensate for the frequency response of the human ear. An "A" weighting is specified in most UK and international standards and the letter A appears within the abbreviation for most noise parameters.
- 2.7 Environmental noise varies through time and often it is necessary to summarise a varying noise level in a single parameter. There are two basic approaches. The first is to express the varying noise in

terms of the continuous sound that has the same energy content as the varying noise. The unit is the equivalent continuous sound level, abbreviated to $\text{dB } L_{\text{Aeq},t}$, where t is the measurement period.

- 2.8 A second approach to summarising a varying noise sound is to state the level which is exceeded for a certain percentage of the time. The two most commonly encountered percentiles are 10% which has for many years been used to assess road traffic noise in the UK (abbreviated to $\text{dB } L_{\text{A10}}$) and 90% which is used to describe the existing background noise level ($\text{dB } L_{\text{A90}}$).
- 2.9 Environmental noise also often varies over a 24-hour period, as does sensitivity to it, and therefore separate measurements and assessments are often made for the day-time and night-time. For various reasons daytime and night-time have been given marginally different time periods in different contexts. Thus in PPG 24 Annex 1 daytime refers to the 16 hour period from 07:00 to 23:00 hours, and night-time to the 8 hour remainder. In the context of road traffic noise, an 18 hour period from 06:00 to 24:00 has historically been used. The difference between the level over an 18 hour day and a 16 hour day is typically very small, unless there is something atypical about the noise level during the two 1-hour periods that are included in the 18-hour daytime but excluded from the 16-hour daytime. The difference between an 8-hour and a 6-hour night-time can be greater, because 25% of the time period becomes excluded (as against 11%).
- 2.10 On a shorter time scale, variations in noise level are often summarised over a one hour period (e.g. for construction noise) or even 5 minutes (as in BS 4142 for night-time noise).
- 2.11 Finally, assessments may be based on measurements which are either made in a "free field" situation, or 1m in front of the façade of a noise-sensitive building. Free field means there are no reflecting surfaces in the immediate vicinity of the microphone (other than the ground). For a façade measurement, the building façade itself constitutes a reflective surface. The result is that a higher noise level is received by a microphone in this position, as it receives both

the incoming and the reflected sound wave. Both types of measurement are used in environmental noise. This is not a problem if it is always clear that a particular measurement is free field or façade, as the former can be converted into the latter by adding 2.5 dB(A) (or 3 dB(A) when dealing with rounded values with slight increase in error).

3 EXISTING AMBIENT NOISE CLIMATE

- 3.1 The Environmental Statement (ES), in Table 3, presents the results of three noise surveys.
- 3.2 Measurements at three points on the edge of the Pondtail residential area are reported. At one location two measurements each of 10 minutes duration are reported. At the other two locations there is only one measurement, again of 10 minutes duration. All measurements are during the daytime, and light showers are reported.
- 3.3 Measurements are also reported for three locations on the Minley Link. Since, as the ES makes clear, these locations were between the existing bund and the carriageway they are not representative of existing residential properties and will therefore not be considered further.
- 3.4 Finally, three 5-minute measurements, at night, are reported for each of three locations at Pondtail.
- 3.5 While the measurements may be of short duration, and not all were under suitable weather conditions, they do indicate that Pondtail has a quiet ambient noise climate with L_{A90} levels in the low 40s during the day, falling to around 30 dB L_{A90} at night.
- 3.6 The Addendum reports continuous measurements over several days at a resolution of 15 minutes at two locations. Measurements at 7 Cypress Drive, towards the edge of Pondtail, confirm that this is a quiet location during both day and night. Again the L_{A90} is in the low 40s during the day, falling to an average of 34 dB at night, and on some nights to below 30 dB. (The addendum does not state whether these are free-field or façade measurements. In the light

of the Statement of Common Ground – Noise signed by Professor Attenborough and Mr Sharps dated 17th September it is concluded that these are free-field levels.)

- 3.7 Continuous measurements are also reported for 15 Oldwood Chase, which is towards the western edge of Southwood, and just south of the A327 Summit Avenue, some distance from Minley Link. It is presumed that measurements were conducted at this location for comparison with noise from on-site activities during the operational phase, but there is no such analysis within the Addendum.
- 3.8 It might be considered that the scale of the noise monitoring exercise is not proportional to the scale of the proposed 24/7 development. The lack of any measurements relevant to the residents of properties close to the Minley Link is particularly noticeable.

4 CONSTRUCTION NOISE

- 4.1 It is noted that demolition will take some 8 to 12 months and that the duration of construction will be some 6 years. However, it is also said that the phasing of construction will respond to market demand, and therefore construction works may be over a longer period, albeit intermittent.
- 4.2 It is proposed for the appellant that construction works be restricted to the periods 07:30 to 18:00 hours Mondays to Fridays and 08:00 to 13:00 hours on Saturdays. The Local Authority may also seek to ensure that no works are undertaken on Public Holidays.
- 4.3 The Local Authority has powers under Section 60 of the Control of Pollution Act 1974 to control noise from construction sites.
- 4.4 Under Section 61 of the same Act those carrying out construction works can pre-empt the Local Authority by lodging in advance an application for a Consent. Such applications have become usual practice for large projects as they provide the contractor with a degree of certainty that, provided the works are carried out in accordance with the submitted details, and those details are

sufficient for the purpose, the Local Authority will not take any action under Section 60 which might delay construction works.

- 4.5 BS 5228: Part 1:1997 provides advice on good site practice in noise control. However, such measures seek to reduce, at best to minimise, adverse impacts through noise. Even when all reasonable steps are taken on-site activity using large plant items is inherently noisy, and given the quiet noise climate at Pondtail during the daytime there will be some residual impact over an extended period.

5 NOISE DUE TO TRAFFIC

- 5.1 The proposal is to transform the site into a large distribution centre consisting of a number of warehouses and heavy goods vehicle loading bays with a small amount of associated office space. The distribution centre will operate on a 24 by 7 basis.
- 5.2 SPLAT is concerned that the noise generated by the heavy goods vehicle traffic to and from this site will cause an unacceptable impact on local residents, particularly for those close to the Minley Link at St Johns. It is noted that while it might be argued that the impact of site-generated traffic at peak hours is limited, this is achieved by heavy goods vehicle movements that are concentrated at night. What may be a gain in traffic management terms becomes a loss in terms of residential amenity.
- 5.3 The diurnal pattern of site-generated traffic is also likely to differ significantly from that which DERA operations generated.
- 5.4 In Table 5 of Chapter D of the ES the results of surveyed traffic flows are given for the Minley Link for the period 02:00 to 03:00 hours. It is reported as showing that existing traffic flows during that hour are 10 heavy vehicle movements within a total of 41 vehicle movements (i.e. c. 25 % heavy vehicles). Mr Sharps has confirmed to me that a heavy vehicle in this context is one with an (unladen) weight greater than 1.525 tonnes.
- 5.5 (That data was revised in an Addendum submitted in August 2008. However, since I wish to make comments which derive from

- Calculation Sheets which contain the earlier data, that have not been replaced, I have to use the ES data pro tem.)
- 5.6 Noise calculations are reported in the ES for a "with development" and a "without development scenario" for residential properties near the Minley Link. The calculations are for the period 02:00 to 03:00 only. The noise parameter reported is the $L_{A10,1 \text{ hour}}$.
 - 5.7 It is noted that the predictions of noise from on-site activities are derived from three-dimensional computer models, and presented as noise contour plots. In contrast, the predictions for road traffic noise are based on very simplified calculations.
 - 5.8 It is acknowledged that the calculations utilise the algorithms within the Calculation of Road Traffic Noise memorandum (HMSO for the DoT and Welsh Office 1988 hereinafter CRTN), which would also be used within a computer-based model. However, the computer programs are there to allow a comprehensive prediction taking account of the myriad of noise sources and barriers and ground surfaces in a three-dimensional context. Manual calculations require drastic simplifications in their assumptions.
 - 5.9 It is also noted that no measurement results are reported for the locations for which predictions have been generated. The continuous noise monitoring data for 15 Oldwood Drive which is shown in Figure D.3 of Appendix D is for a location within Southwood and not for a property fronting the Minley Link.
 - 5.10 There are some 33 Calculation Sheets within the Technical Appendix to the ES, four for each location for which predictions are reported. Locations are labelled A to H. (In the copy I have there is one sheet for a location J, and none for any Location I)
 - 5.11 For each location the first of the four relates to Minley Link with existing traffic flows and noise barriers, and the second to Minley Link under a future scenario with the development traffic and altered noise barriers. Similarly the third sheet relates to noise from the M3 under the existing scenario, and the fourth to noise from the M3 under a future scenario. Under this analysis the predicted actual noise level under the existing scenario would be the (logarithmic) sum of the

contributions from the first and third sheets, and under a future scenario from the second and fourth sheets.

- 5.12 I argue that the predictions as presented are unsafe and may substantially under-estimate the adverse impact of noise at night that would result from the development. There are a number of reasons for this and I will rehearse these through the Calculation Sheets, taking Sheet 1 as an example.
- 5.13 Sheet 1 relates to the Minley Link under an existing scenario. The pro forma used in the Calculation Sheets contains the instruction "Divide road scheme into segments". CRTN Paragraph 11 gives instructions as to how a road should be divided into segments, which, as the examples show, must be straight lines. In these terms the Minley Link would not be a segment but a sequence of segments. (This would also apply, a fortiori, to the M3).
- 5.14 Sheet 1 (and every first sheet of the sets of four) states that the number of vehicles per hour is 41. Paragraph 5 of CRTN states that the formulae given within that memorandum are valid for a quoted range, and extrapolation outside that range can lead to progressive and significant error. The lower limit of the range for hourly traffic is 50 per hour.
- 5.15 Paragraph 30 of CRTN contains a correction factor for use with low traffic flows. (The low flow correction does not actually extend the range of application below 50 vehicles per hour, but generates a correction for flows within the range 50 to 200 vehicles per hour, where there are receivers within a slant distance of 30 m from the source line (c.27 m from the kerbside)). Paragraph 30 notes that:
- "However it is known that for traffic flows in the range [50 to 200] veh/h... the noise level flow function takes a different form from that shown in Charts 2 and 3. For these flow ranges the noise level changes more rapidly with traffic flow than indicated."*
- 5.16 Chart 2 has been used in the calculations. The advice within CRTN is that if it is used outside its validated range the result will not only be unreliable but that it will result in an over-estimate of the L_{A10} level. This is significant in the present context. If traffic noise is

over-estimated for the existing scenario with flows outside the validated range, then any increase in traffic noise from additional traffic which takes the flow into the validated range will necessarily under-estimate the resultant increase in noise.

- 5.17 Later in the same paragraph there is the clear statement:
"Calculations of noise level for traffic flows below 50 veh/h or 1000 veh/18-hour day are unreliable and measurements should be taken when evaluating such cases."
- 5.18 While Paragraph 5 of CRTN allows a degree of extrapolation, albeit with a health warning, Paragraph 30 shows that this flexibility does not apply to low traffic flows. Indeed, the use of the L_{A10} parameter ultimately prevents any meaningful description of traffic noise from a very lightly trafficked road segment, either by measurements or calculations. The L_{A10} value refers to the noise level exceeded for just 10 % of the time. Over a period of 1 hour that is the level exceeded for 6 minutes. If, during that hour, there is a cumulative duration of more than 6 minutes when there is effectively no contribution of noise from heavy vehicle movements, a measurement of L_{A10} would not respond to noise from heavy vehicle movements that did occur during that hour, no matter how loud they were.
- 5.19 Calculation Sheet 1 shows that the low flow correction has been used outside its valid range. It is also noted that the recommendation to undertake measurements has not been followed.
- 5.20 I am aware that there is some concern within SPLAT that the number of heavy vehicle movement generated by the development may be greater than 50 per hour, and that the classification of what constitutes a heavy vehicle may not be that within CRTN but I leave that aside to be addressed within evidence on traffic. I note that the noise analysis, reportedly as advised by a traffic consultant, was built on an the assumptions that the existing hourly flow is 41 vehicles with 25 % heavy vehicles within that flow (10 heavy vehicles), that the development would generate an additional 50 heavy vehicle movements and 10 light vehicle movements, resulting

in a future hourly flow of 101 vehicles per hour with 60% heavy vehicles within the new flow (60 heavy vehicles), and that a heavy vehicle is one with an unladen weight in excess of 1.5 tonnes. Any deviation from these assumptions would require revision of the noise predictions.

- 5.21 The end value at the foot of the upper box, labelled Corrected Noise Level, is an indication of the traffic noise generated by the Minley Link. This must be corrected to give a predicted noise contribution at a receiving position, by taking into account the distance from the road segment, and either the nature of the intervening ground or any intervening screening.
- 5.22 These corrections are applied in the second box, and it is here that the simplification of treating the Minley Link as one segment becomes apparent. "Datum" within each sheet is taken to be the road surface height, and the height of the source, barrier and receiver are expressed relative to that height.
- 5.23 Within CRTN the procedure starts with the division of the road into segments. For each segment where there is a single carriageway a source line is specified which is 3.5m from the near-side kerb and 0.5m above road surface level. The distance from that segment to a particular calculation point is not the shortest distance, but the length of a line which is perpendicular to the segment and meets the receiver, extrapolating the segment if necessary. (Annex 4 of CRTN shows this treatment for a curved road.) Where the line is extrapolated, the resulting slant distance for that receiver and segment may be considerably less than the physical distance. The result is then corrected to take into account the angle of view of the actual segment. It is difficult to see how it would be possible to apply this procedure to the whole of the Minley Link, as the Minley Link is curved.
- 5.24 It will be seen that the Calculation Sheet has the option of checking the nearside or farside lane as a source line. CRTN suggests the use of the nearside lane, or both the near and farside lanes under certain circumstances. However, this is a special case in which all,

or nearly all, of the additional heavy vehicle movements during this hour will be away from the depot towards the M3, and therefore in the farside lane. The farside lane is further from the residential properties than the nearside lane and therefore the distance correction will be greater. But a more significant factor is often that the barrier correction is reduced, as the source line is no longer tucked behind the barrier.

- 5.25 An alternative adaptation of the procedure would be to treat a different part of the Minley Link as the sole segment for each receiving position and this may have been used in this case. Such a simplification might be justified as a quick approximation to guide the process of scheme design at an early stage. However, it cannot yield a reliable result that would justify a conclusion that there would be negligible impact when the change in traffic was as set out in Paragraph 5.20 above, or 5.34 below.
- 5.26 If this adaptation of the CRTN procedure has been used a comparison between the assumptions listed in Calculation Sheet 1 with the information within Section A_A suggests that the location of the calculation is not the façade of the nearest property. Specifically the calculation is for a position which has less shielding by the existing barrier than the façade of the dwelling as shown in the cross-section. The result is that the difference between the shielding due to the existing barrier (see Sheet 1) and the proposed barrier (see Sheet 2) is over-estimated, and therefore the increase in noise is under-estimated.
- 5.27 Finally Calculation Sheet 1 states that the "Total segment angle" is 90 degrees. This refers to the angle subtended at the receiver by the road segment for this calculation. A cursory examination shows that the angle subtended is greater than 90 degrees. In the other direction, the Calculation Sheets for Location D and the M3 (Sheets 15 and 16) assume an angle of view of 180 degrees, and therefore a zero correction. Again a cursory examination shows it must be less.

- 5.28 Calculation Sheet 3 relates to noise from the M3. If treating the Minley Link as a single segment is a simplification, treating the M3 as a single segment might be considered to be an over-simplification.
- 5.29 For every location the difference between the "Existing" scenario and the "Future" scenario is 0.4 dB. This is a function of the change in National traffic parameters, and for the M3 is only marginally attributable to the proposed development.
- 5.30 The change in barriers is not significant for these calculations. Either ground conditions or barriers are to be taken into account, and for the M3 it is the former that has been considered.
- 5.31 It can be seen that the corrections for the M3 range from 5.0 to 6 dB(A). In contrast the corrections for the Minley Link range from 7.3 to 11.6 dB(A).
- 5.32 Any under-estimate of the attenuation to be taken into account when calculating the noise contribution of the M3 will tend to result in a higher contribution from this source under all scenarios. That will, in turn, tend to reduce the difference between the cumulative noise level from both roads under the two scenarios.
- 5.33 With all the above reservations it is surprising to learn from STATS in their letter report dated 30th January 2008 (Page 14, second paragraph) that noise levels they measured on 14th January were in reasonable agreement with the predicted values in Table 7 of the ES. However, as the STATS measurements were in the middle of the working day, and the predictions are for the middle of the night, any numerical reasonable agreement should give cause for concern as to the reliability of the predictions.
- 5.34 The August 2008 Addendum contains revised traffic data for the period 02:00 to 03:00 hours, both for the existing and the future scenarios. The existing flow on the Minley Link is reduced from 41 to 28 veh/h, but the percentage heavy vehicles remains at 24.8. The future flow on the Minley Link is also reduced from 101 to 88, though again the percentage heavy vehicles remains at 59.6%. For the M3 there is now a future flow which is 109 vehicles greater

under both scenarios, but again the percentage heavy vehicles remains the same. As an acoustician I cannot comment in detail on traffic parameters, though I do find it surprising that all four flows change up or down by around 25% and yet the percentage of heavy vehicles remains exactly the same, to a decimal point.

- 5.35 I noted earlier that the assumed traffic flow of 41 vehicles per hour in the existing scenario for the Minley Link was below the validated lower limit of 50 per hour within CRTN. My concerns as to the reliability of the predictions, and the over-estimating of the noise contribution from that Link under the existing scenario, are consequently increased when the flow is reduced to 28 vehicles per hour.
- 5.36 The picture now painted by these parameters is that, at present, there is an interval between individual vehicle movements of, on average, some two minutes, and nine minutes between movements of heavy goods vehicles. The present subjective experience resulting from vehicles on the Minley Link at night is not so much that of traffic noise but of isolated vehicle movements close to the dwellings. Under the future flow the average interval between vehicle movements becomes about 40 seconds, and the interval between movements of heavy goods vehicles reduces to about one minute. These are substantial changes.
- 5.37 Table D.2 (Page 37) of the Addendum sets out the new predicted noise levels with the revised traffic data. The predictions also take into account barriers which are neither the existing barriers, nor the revised barriers as shown in the drawing attached to the Calculation Sheets. I will refer to them as the Addendum barriers. It is noted that there are no new Calculation Sheets within or referred to in the Addendum.
- 5.38 The Addendum claims (Chapter D Paragraph 3.6) that with the revised traffic data and the Addendum barriers the predicted noise levels from road traffic on the Minley Link would be at or below those levels predicted within the ES during the operational phase, and therefore increases in ambient noise levels would be

imperceptible. As the traffic volume on the Manley Link under the existing scenario has decreased, by a greater ratio than that under the future scenario, the increase must have become greater.

- 5.39 It is a matter of judgement whether the changes in traffic on the Manley Link set out in Paragraph 5.34 above could reasonably be called imperceptible.
- 5.40 In summary the predicted "no perceptible change" conclusion is considered unsafe. The predicted existing noise levels are derived from an over-simplified application of CRTN, outside its validated range where it is known to result in over-estimations of noise. The revised predictions in the Addendum are not supported by any calculations. The changes in traffic parameters, from a very low level, are likely to be perceived. The substantial increase in the number of heavy vehicle movements at night on Minley Link may result in increased sleep disturbance and difficulty in returning to sleep for those who like to sleep with their windows open. Finally, should the number of heavy vehicle movements at night be greater than 50, perhaps nearer to the cap of a maximum of 100 vehicle movements in any hour, the reduction in residential amenity would be even greater.
- 5.41 In the absence of a safe assessment based on science, local concerns about increased road traffic, particularly heavy goods vehicles at night, are entirely reasonable. Having one heavy goods vehicle movement about every 10 minutes outside an open bedroom window during the summer is manifestly different to having one every minute. That difference would not be imperceptible, with or without addendum barriers. The common sense perception is that the probability of sleep disturbance through peak noises during vehicle movements will increase with the development, and the limitations of the calculations as presented are such that common sense must provide the basis for judgement.

6 NOISE DUE TO OPERATIONS

- 6.1 SPLAT is concerned that the noise generated by operations on the site will cause unacceptable impact on local residents, particularly at night in Pondtail. Concern has been expressed that since all large loading bays are oriented to the west there may also be an adverse impact for the residents of Southwood.
- 6.2 Noise will be generated by the traffic entering and leaving the site, by activity on site such as loading and unloading of heavy goods vehicles, movement of goods by other means and by fixed plant such as fans and refrigeration condensers and compressors.
- 6.3 The development is speculative and multiple tenancies are likely. Each tenant may choose to operate its own facility in a different way, using different types of vehicles. Some may exclusively use docks for loading and unloading, while others may move goods outside buildings, perhaps in wheeled cages, possibly with tractors moving containers.
- 6.4 In the face of these uncertainties, some very simple assumptions have been made in the ES. The only sources of noise (excluding fixed plant to which we will return) are 50 identical sequences of heavy goods vehicles arriving, loading or unloading and departing, plus an unspecified number of uses of fork lift trucks.
- 6.5 Given those assumptions, and the application of a Soundplan model it is concluded that residents of Pondtail would be exposed to noise levels no higher than 42 dB $L_{Aeq,1 \text{ hour}}$ (revised in the Supplementary ES to 43 dB L_{Aeq} and then in the Statement of Common Ground dated 17th September down again to 42 dB L_{Aeq} , façade level). Since these are less than the WHO Guideline of 45 dB L_{Aeq} for continuous noise at night it is claimed that there will be no adverse impact.
- 6.6 The safety, and indeed the relevance of this conclusion, is questionable.
- 6.7 The development includes in excess of 100 loading bays, the nature of the development tends to result in high levels of activity at night,

and a cap of 100 vehicles movements per hour is more than 50. Working to the cap and towards the capacity of the site would result in higher predicted noise levels.

- 6.8 There may be operations by some tenants which would involve external movements of goods, and these are not taken into account in the predictions.
- 6.9 The ES chooses to separate out noise from fixed equipment as a separate consideration. If noise from on-site activities is considered to be continuous, and noise from fixed plant is also continuous, it is highly unlikely that residents would consider noise from that source separately. It would need to be added into the sum of noise from onsite activities and plant.
- 6.10 While the use of propagation terms from ISO 9613 may be reasonable in general I am aware of a paper prepared by a local resident, Mr P Poole, which has been informed by discussions with Dr R M Munt FIOA (Fellow of the Institute of Acoustics). That paper develops an argument which is well-informed, and I consider convincing, that locally there are noise propagation effects which lead them to question the validity of the modelling in this case. They consider that the noise levels that would be experienced, under particular meteorological conditions which are not infrequent, would be higher than those predicted.
- 6.11 For all the above reasons it is considered that the level of site-attributable noise that would be experienced by residents is likely to be greater than predicted.
- 6.12 Even if it were not, it is unreasonable to conclude that since the predicted noise levels are less than the WHO criteria there will be no adverse impact on residential amenity.
- 6.13 Guidance from WHO was addressed by the authors of PPG 24 in setting the boundary noise levels for different Noise Exposure Categories (See PPG 24 Annex 1). A night-time L_{Aeq} level of 45 dB free-field is set as the upper limit of NEC A at night. It would be wrong to conclude that such a noise level constitutes no adverse impact. The Annex states that for a site within NEC A:

- 6.14 *"Noise need not be considered as a determining factor in granting planning permission [for residential development], although the noise level at the high end of the category should not be regarded as a desirable level."*
- 6.15 I note the use of the words "need" and not "should", and "determining factor" and not "material consideration". I also note that noise levels at the higher end of this category should not be regarded as desirable.
- 6.16 On the above grounds, I suggest that noise from activities and plant on-site at night at the predicted levels or above should be accepted as a material consideration, and weighed in the planning balance.
- 6.17 However, none of the above responds in any way to the established fact that noise levels at night on the edge of the Pondtail area are very low. (They are also low during the day.) Where noise levels are low, residential amenity is high, and more susceptible to harm from the introduction of new sources of noise.
- 6.18 The Institute of Acoustics were asked to comment on changes to permitted development rights for householder micro-generation (e.g. small wind turbines). The response of the Institute is set out in the Acoustics Bulletin September/October 2007 edition . While I acknowledge that the subject of that consultation was not a freight depot, the following quotation sets out clearly a preferred general approach to noise assessment which would be applicable to any type of source. It should be noted that the proposals were for absolute limits to be applied.
- "The Institute is familiar with and favours an impact approach to the assessment of noise and vibration and agrees with the view that the planning system should not need to regulate development that has no impact beyond the host property. It is, however, necessary to provide a definition of impact. In the Institute's view, while assessment against absolute criteria may be appropriate in some circumstances, the impact of a development should normally take account of the change from the pre-existing situation that results from the development at some location. In terms of noise, this is*

generally the difference between the noise level resulting from the development and the pre-existing noise level, often expressed as the background noise level (the noise level exceeded for 90% of a representative time period or LA90,t), or as the energy average of the ambient noise level (the LAeq,t). An example methodology for such an assessment is provided in BS 4142: 1997, Method for rating industrial noise affecting mixed residential and industrial areas.

"The use of an absolute value, such as the limit of 30 dB LAeq for structureborne noise and 40 dB LAeq for external noise does not define an impact. In areas where background noise levels are low, this could represent a significant change in the environment at the receiver location, and hence a significant adverse impact. The specific noise limits proposed, therefore, do not address the matter of ensuring that the permitted development has no significant impact beyond the host property.

"In the Institute's view the impact of noise and vibration can only be developed by relative criteria that address the change in noise level resulting from the development. In fact the noise policies of many local authorities require that the noise level resulting from any new noise generating development should be less than the pre-existing background noise level (usually by 5 or 10 dB) to ensure that there is no perceptible change in the ambient noise levels".

- 6.19 In summary, the Institute prefers a relative approach. In passing I note that there is no suggestion that because the absolute level of the new source is low, the impact will be low. Rather, where background noise levels are low, even if the level of the new source is not in absolute terms high, a significant adverse impact can still arise. I also note the observation that many local authorities set limits which are lower than the existing ambient background noise levels (LA90S).
- 6.20 The Government sets out its advice on appropriate methods of assessing developments within PPG 24, particularly Annex 3. Paragraph 19 is headed "Noise from Industrial and commercial activities". I consider that for the purposes of this Annex the

proposed development falls within this category, and therefore falls to be assessed by the method set out in that paragraph.

- 6.21 The primary guidance in Paragraph 19 is by reference to BS 4142:1990 A method for rating industrial noise affecting mixed residential and industrial areas. (Since PPG 24 was issued in September 1994, this Standard has been revised and I will make reference to BS 4142:1997.)
- 6.22 I note that the Government advice is that BS4142 should be used for assessing noise from commercial developments. In my view this over-rides any narrower reading of the range of application of the Standard that may result from any caveats within the Standard. The authors of PPG 24 were aware of those caveats when they drafted their Guidance.
- 6.23 The question of the applicability of BS 4142 to noise from freight distribution depots has been considered by many Inspectors at Appeals. Many have considered the Standard to be applicable to the developments before them. I do not intend to occupy Inquiry time in rehearsing the reports of previous Inspectors, as no doubt the Inspector here is aware of fellow Inspectors accepting the applicability of the Standard.
- 6.24 The Appendix to the Statement of Common ground on noise sets out the views of Professor Attenborough and Mr Sharps on this issue of the applicability of BS 4142. In general I find myself in agreement with Professor Attenborough. I only add that as to Mr Sharps' first bullet point, he clearly accepts the applicability of BS 4142 to this location, as he explicitly uses it for fixed plant. It would be inconsistent to do so, and simultaneously to maintain that the Standard could not be applied as the location was not mixed residential and industrial.
- 6.25 That Standard requires a comparison between the existing ambient background noise, expressed in units of dB $L_{A90,T}$, and the rating level for on-site noise contributions, expressed in units of $L_{Aeq,T}$, where T is 1 hour during the day and 5 minutes at night.

- 6.26 The rating level takes the predicted $L_{Aeq,5 \text{ mins}}$ level and adds a correction of plus 5 dB if the noise is considered to be tonal i.e. contains a distinguishable, discrete continuous note (whine, hiss, screech, hum), or impulsive i.e. contains distinct impulses (bangs, clicks, clatters or thumps) or is irregular enough to attract attention.
- 6.27 It is a matter of judgement as to whether a particular noise climate as heard justifies such a correction. When the noise climate is one that would only exist in the future the question becomes whether they could be expected to occur. If there is no certainty that such components would not exist it would be prudent in assessing a proposal to assume that they would exist, at least for some 5 minute periods be present at night. The multiple occupation of this freight depot, with varying sizes of units, would tend to justify the assumption that a correction would be appropriate for this speculative development.
- 6.28 The predictions are for operations over an hour at average rates. There can be little doubt that that average over an hour would include 5-minute periods in which activity rates are above the average.
- 6.29 Once the Rating Level has been determined it is compared with the background noise level. If the Rating Level ($L_{Aeq, 5 \text{ mins}}$ as corrected) exceeds the background noise level (L_{A90}) by around 10 dB(A) there is an indication that complaints are likely. If the excess is around 5 dB this is of marginal significance. The interpretation to be given to the words "marginal significance" should be informed by the knowledge that it is not until the Rating Level is around 10 dB below the background noise level that there is a positive indication that complaints are unlikely, and, from the quotation above, that many Local Authorities set limits which are 5 or 10 dB below the background noise level.
- 6.30 The Statement of Common Ground records an agreement that the façade level contribution for on-site activities as modelled is around 42 dB L_{Aeq} , and that the free-field average background noise level is around 34 dB L_{A90} (though, as Professor Attenborough notes lower

levels [about] 30 dB L_{A90} have been recorded on several nights). Transforming the two measures into a common basis, whether free-field of façade, results in a difference of 5 dB.

- 6.31 On that basis alone an application of the BS 4142 test to the proposed development shows that the Rating Level is around 5 dB above the background noise level, and therefore around the marginal level. This leaves no scope for different assumptions without resulting in a rating level which is about 10 dB greater than the background noise level, at which complaints become likely.
- 6.32 There are several factors which could reasonably lead to a conclusion that the +5 dB "marginal" level will be exceeded. These are:
- As the term "around" is used in the Statement of Common Ground, the actual level of the background noise is taken to be 1 dB lower, or that of the site-generated noise 1 dB higher, or both.
 - The site-generated noise is taken to be 43 dB L_{Aeq} as recorded in the Supplementary ES, rather than the 42 dB within the ES.
 - The predicted site-generated noise level does not include the contributions from on-site fixed plant
 - A 5 dB correction is considered appropriate
 - The average level of activity may exceed the 50 vehicles per hour assumed for the purposes of the calculations
 - Short-term peaks in activity result in the noisiest $L_{Aeq, 5 \text{ mins}}$ being greater than the average $L_{Aeq, 1 \text{ hour}}$
 - Individual occupants may choose to operate in a way which generates higher noise levels than those assumed, or tonal, impulsive or irregular noise components
 - A free-field background noise level of around 30 dB L_{A90} is a common occurrence at Pondtail, as evidenced by both the continuous measurement and the short-term measurements reported within the ES.
 - Given local conditions the attenuation of site-generated noise is likely to be less than assumed in the calculations.

- 6.33 There are at least nine reasons to conclude that the marginal level is likely to be exceeded.
- 6.34 Even if it is concluded that BS 4142 is not appropriate in this case, it is clear that noise from on-site activities (assuming this to be 39 dB L_{Aeq} free-field) when added to the existing ambient noise climate (assuming this to be 36 dB L_{Aeq} free-field) would result in a level of 41 dB, which clearly constitutes a reduction in residential amenity. When noise from fixed plant at the proposed limit is added the resultant becomes 42 dB L_{Aeq} , free field, as against the 36 dB that is currently enjoyed. The increase is likely to be even greater, if one or more of the bullet points listed under paragraph 6.32 above are taken into account.
- 6.35 It is also noted that the proposed site is adjacent to areas used for quiet recreation including Fleet Pond. There are a number of Sites of Special Scientific Interest (SSSI) and proposed Special Protection Areas (SPA) in the vicinity of the application site. The Fleet Pond SSSI is located in closest proximity to the site (approximately 150m to the North West). A number of other SSSIs are located nearby including the Basingstoke Canal SSSI (250m to the south), Eelmoor Marsh SSSI and SPA (100-200m to the south) and the Bourley and Long Valley SSSI (250m + to the south of the site).
- 6.36 The ES does not estimate the noise levels at these sites, which will be higher than in Pondtail. These noise levels would damage the amenity residents enjoy from these areas and be contrary to the WHO Guidelines for Community Noise (*"Existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low."*)

7 SUMMARY AND CONCLUSIONS

- 7.1 Construction noise may well be limited. However construction works which involve demolition, breaking out of concrete and regrading are inherently noisy. There will be some residual impacts

over an extended period of some 6 years, or possibly a longer period in response to market conditions.

- 7.2 While there is reasonable evidence as to the existing ambient noise climate at Pondtail, there are no reported measurements to establish the ambient noise climate for properties adjacent to the Minley Link. This gap is not filled by calculated traffic noise levels for the existing scenario as these are deficient.
- 7.3 The development will result in significant changes to traffic parameters at night on the Minley Link. There are increases both in the number of vehicle movements, and in the percentage of heavy vehicle movements within that flow.
- 7.4 The predictions are based on a simplified use of CRTN which treats two extended roads as if they could be represented accurately as single segments.
- 7.5 Predictions of traffic noise contributions from the Minley Link under the existing scenario are unreliable as the flow is below the valid range within CRTN. The reported levels are likely to be over-estimates, and therefore any changes are likely to be under-estimates.
- 7.6 Others may argue that the assumed increases in traffic due to the depot are under-estimates, both as to volume and percentage heavy goods vehicles. If this is accepted the predictions under the future scenario would be under-estimates and therefore the changes are also likely to be under-estimates.
- 7.7 Whilst the use of a nearside lane for the source line is in accordance with usual practice it does not respond to the fact that nearly all additional traffic will be on the farside lane and therefore the effectiveness of the addendum barriers may be over-estimated.
- 7.8 The angle of view corrections within CRTN are likely to increase the calculated noise contribution from the M3, and under-estimate the contribution from the Minley Link, thereby diluting any increase.
- 7.9 It is noted that STATs report measurements during the day which are in reasonable agreement with the calculated noise level under

- the existing scenario at night. This confirms that the levels reported for the existing scenario at night are likely to be over-estimates.
- 7.10 Finally, there are substantial differences in the traffic parameters for the Minley Link under the existing and future scenarios. Looking at the change in frequency of vehicle movements, particularly the interval between heavy goods vehicle movements, suggests there would be a substantial change, and minor adjustments to the positioning of barriers and their heights, would not render this change imperceptible.
- 7.11 In the light of the above, there is likely to be a significant reduction in residential amenity for properties close to the Minley Link, and this should also be weighed in the planning balance.
- 7.12 I turn to noise from on-site activities. Mr Sharps argues that since the predicted noise levels due to on-site activities are below a WHO-sourced criterion of 45 dB L_{Aeq} there will be no adverse impact.
- 7.13 I suggest that the predictions assume a uniform pattern of operation across the site, with one type of heavy goods vehicle engaged in the same activities, and one type of fork-lift truck. Multiple tenancies, of buildings which range in size, suggest that other activities may occur outside, and at least temporarily raise the 5-minute L_{Aeq} above the 1-hour average.
- 7.14 Additionally the assumed rate of activities at 50 vehicles per hour, in a situation where there are more than 100 loading docks and activity is concentrated at night, may be unsafe.
- 7.15 I understand that a paper will be submitted to this Inquiry that evidences frequent local meteorological conditions that will result in an increase in noise propagation, and hence elevated noise levels.
- 7.16 Further to all the above, PPG 24 does not suggest that 45 dB L_{Aeq} at night constitutes zero impact. Rather it explicitly states that noise levels of this order of magnitude are not desirable.
- 7.17 Regardless of the absolute noise level with the development there is the question of the change in ambient noise climate. The Institute of Acoustics consider that this should be the normal approach, and

that there can be significant impacts when a new noise source results in a level of 40 dB L_{Aeq} .

- 7.18 Government advice also supports the use of a relative approach, as set out in BS 4124, to the assessment of noise from commercial and industrial sources.
- 7.19 That Standard involves the determination of a rating level which is the 5-minute L_{Aeq} level, corrected by adding 5 dB for tonal impulsive or irregular components where appropriate.
- 7.20 Given that the development would be occupied by a number of tenants, who may wish to move freight using different plant it would be prudent to assume that some on-site activities may result in such components and the correction should be applied.
- 7.21 Given the low background noise level at Pondtail, which averages 34 dB L_{A90} , but is repeatedly at 30 dB or less, it is concluded that the Rating Level for noise from the development is likely to be above the marginal level within BS 4142, and, depending on the precise assumptions, reach the level at which complaints are likely.
- 7.22 Notwithstanding the above, the development would result in elevations of the L_{Aeq} above that currently enjoyed, and thereby a reduction in residential amenity.
- 7.23 Finally, there is likely to be an impact from the development on the enjoyment of the public of areas for quiet relaxation
- 7.24 For the above reasons it is suggested that on-site activities within the development would have an adverse impact through noise and that impact should also be weighed in the planning balance.