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THE NETWORK RAIL (CAMBRIDGE SOUTH INFRASTRUCTURE ENHANCEMENTS)
ORDER

REBUTTAL PROOF OF EVIDENCE

ON MATTERS OF RESEARCH

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ON BEHALF OF THE UNIVERSITY OF CAMBRIDGE

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1 INTRODUCTION

- 1.1 This Rebuttal Proof of Evidence has been prepared in response to matters raised in the evidence of Network Rail (NR), particularly the Noise and Vibration evidence W3- Lynden Spencer-Allen (Vibration) and W4- Simon Taylor (Noise).
- 1.2 In this Rebuttal I set out the current position of the University regarding certain vibration matters in the light of the evidence submitted by Network Rail on 7 January 2022.
- 1.3 Where I have not addressed specific points from the Network Rail evidence, this should not be taken to mean that I accept this evidence. Where Network Rail or other parties produce further evidence by way of rebuttal, I reserve the right to comment on this as necessary.

2 RESPONSE TO NETWORK RAIL EVIDENCE

VIBRATION- Proof of Evidence of Lynden Spencer-Allen (NRE3.1)

Occasional Exceedances (paragraph 5.3.2 on page 18)

- 2.1 Because the animals (rodents and mice) will be within the building 24 hours a day, 7 days a week, the AMB was designed for VC-A not to be exceeded.
- 2.2 As part of the design of the AMB, VC-C exceedances were considered and noted as possible at times when the MRI was not being used (i.e. at night), and it was determined that such exceedances of VC-C could be managed. As part of standard operation of the AMB, we considered this as being out of hours (namely after 6pm and during weekends). Otherwise, there is a requirement not to exceed VC-C.

Predicted Impacts from the Station Area (paragraph 6.3.2.12 on page 20)

- 2.3 Table 5.1 at paragraph 6.3.2.12 in NRE3.1 sets out the predicted exceedances at the AMB during construction of the Scheme. This appears to predict that exceedance of VC-A is only anticipated by Network Rail on the 4th floor of the AMB, however no mitigation is proposed to avoid that exceedance and it remains unclear why that is. Further, I understand from the rebuttal evidence of Rupert Thornely-Taylor that the analysis which led to these predictions may in fact have underestimated the likely effects of the scheme.

Construction Stage Mitigation proposed (paragraph 6.3.3.4 on page 22)

- 2.4 Articles included in the University's Statement of Case were included to demonstrate why the University is concerned about what effects noise and vibration could have on the AMB. The articles were not included to provide targets or thresholds (although even the paper quoted by Mr Spencer Allen confirms that vibration levels below the level identified by Network Rail could still be disruptive to more sensitive species or models). Nor does this single study provide any assurance or evidence that no impact will be felt by different research/strains of mice and under different circumstance/timeframes. Differing vibration levels will have differing research impacts depending on the specific nature of the research in question. Drawing the conclusion that *"it is therefore considered unlikely that some exceedance of VC-A would result in harm provided the exceedances are not above the limits within the published paper"* from this one piece of research is therefore not credible.
- 2.5 The AMB holds different strains of mice which will handle vibration differently as well as different types of research from those included in the available studies. It is for that reason VC-A remains the best practice guidance available. If the studies were sufficient evidence that no impact would be felt by mice, then the best practice guidance (as set out in the US National Institutes of Health Design Requirements Manual) would not be recommending 50 µm/s as the metric i.e. what the University has applied as a modified VC-A.

VC-A criteria (paragraph 6.3.3.5 on page 22)

- 2.6 I welcome that VC-A is to be applied as the criteria and vibration levels during construction, although as Mr Thornely-Taylor has explained it is necessary to apply a modified VC-A criterion in this case.
- 2.7 However, as Mr Thornely-Taylor has identified, it is important to apply the correct time period to ascertain whether which this criterion has been breached. In this respect I am concerned that Network Rail do not appear to have an adequate understanding of what vibration impacts would cause or, therefore, of the short period over which potential exceedances of the criterion must be considered. Network Rail does not seem to understand that the animals the subject of the research require a consistent environment over prolonged periods so not to add to the variability of the data.
- 2.8 In his second bullet point at paragraph 6.3.3.5, Mr Spencer-Allen states (**my emphasis added**) that *"where it is predicted that vibration levels could exceed the VC-A criteria*

and the length of time and resulting levels have been minimised to practical standards, the levels should not exceed the level of 0.025g RMS (see the Rebuttal evidence of Rupert Thornely-Taylor). I am not clear on what is meant by “minimised to practical standards” but put in the context of breeding mice, for example, even short-term interruptions would be hugely problematic. As I explained in my Proof of Evidence, such problems could include alterations to the behaviour or metabolism of mice, which may skew or alter the output of research, and disruption to breeding of mice which could lead to litter loss.

Subsequent engagement with UoC (paragraph 8.2.6.7)

- 2.9 Mr Spencer-Allen states that the University has been asked about the construction mitigation that has been implemented in relation to development in the vicinity of the AMB and whether any vibration monitoring is ongoing within the AMB. Moreover, he refers to “*similar construction*” activity occurring near the AMB. Presumably this is a reference to the AstraZeneca construction site next to Plot 9 for a multi-storey car park, which entailed the erection of a pre-fabricated structure and a metal frame over a relatively short period of time.
- 2.10 The University has not considered it necessary to implement or require mitigation in relation to the construction of the nearby AstraZeneca development. Mace, the contractor, implemented its own mitigation when installing the piling (as I would expect) including a method of auger drilling which I understand Mace determined to be the best method of ground drilling when it comes to noise and vibration. The only concrete work was done off-site. The construction techniques used, the distance of the AstraZeneca works from the AMB and the type of construction (including the type of construction materials used) meant that the University had no concerns.
- 2.11 As set out in Rupert Thornely-Taylor’s Rebuttal Proof there is a fundamental difference in vibration impacts during construction of a railway as opposed to the construction of a building (or a car park in the case of AstraZeneca). I can confirm that the University has observed no adverse effects from the AstraZeneca construction site at the AMB. For the same reasons as those set out above, the University did not consider it necessary to initiate any monitoring in relation to construction works at the AstraZeneca car park development.

Paragraphs 9.3.3 to 9.3.5

- 2.12 Insofar as Mr Spencer-Allen relies upon an identified paper to justify a proposed exceedance of the VC-A criterion, I do not consider that paper alone to be a reliable basis to set vibration criteria for the AMB for the reasons above. Mr Spencer-Allen goes on to conclude that minor exceedances of VC-A are unlikely to be detrimental to animals and research being undertaken within the AMB, based on what he describes as empirical experience of construction near to similar facilities. I am unaware, and have no detailed evidence, of what that experience may be, or how it could reliably and accurately relate to the specific and diverse activity which takes place within the AMB.
- 2.13 Mr Spencer-Allen appears to accept that the only reason for not yet being able to agree to avoiding any exceedances of the University's criteria is the lack of necessary detail about the construction phase. However, it is this lack of detail, and the associated risks to the work within the AMB, which confirms the need to apply the University's criteria, as reflected in the discussions which are taking place on proposed heads of terms for a legal agreement. The University's criteria are intended to protect against even short-term impacts which, as I have explained, do not appear to have been properly understood by Network Rail when considering any potential criteria (either in Network Rail's evidence or in what has been proposed by Network Rail in the heads of terms referred to above).
- 2.14 To the extent that Mr Spencer-Allen refers to the proposed heads of terms more generally, I am prepared to accept that when applying the VC-C criterion to the MRI equipment, there may be scope for exceptional exceedances to be planned and agreed with the University in strictly limited circumstances. The MRI equipment, while frequently in use, is not in continuous operation 24/7 and, depending on the particular circumstances, it may be possible to plan certain elements of the construction work around times when the MRI equipment is not in use. The same approach cannot however be applied in relation to any exceedances of the VC-A criterion, given the continuous operations to conduct research relating to rodents and fish and the importance of securing a consistent environment for that research, in which even any short-term impacts could risk the serious consequences I have set out in my evidence.

3 CONCLUSIONS

- 3.1 Network Rail have still not carried out a full assessment of all potential effects on sensitive receptors in the AMB. The University has therefore set out acceptability criteria which are achievable although work is required to establish the extent of the

required mitigation and to develop a workable and reliable prediction, monitoring and control protocol.

- 3.2 I understand from the Rebuttal Proof of Evidence of Rupert Thornely-Taylor that the predictions presented in Network Rail's evidence are predicated on sets of assumptions, some of which are subject to significant uncertainty. I understand some are presented incorrectly. There is as yet no draft construction programme with associated plant teams with timings and durations, such that where there is a risk of exceedance of the University's criteria it is not possible to evaluate the consequences or the extent of disruption associated with having to modify the University's research programmes in order to minimise disruption due to exceedances.

4 WITNESS DECLARATION

I hereby declare as follows:

- 4.1 This proof of evidence includes all facts which I regard as being relevant to the opinions that I have expressed and that the inquiry's attention has been drawn to any matter which would affect the validity of that opinion.
- 4.2 I believe the facts that I have stated in this proof of evidence are true and that the opinions expressed are correct.
- 4.3 I understand my duty to the inquiry to help it with matters within my expertise and have complied with that duty.

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