NRE3.1

Proof of Evidence Summary – Vibration (Mr Lynden Spencer-Allen)

(Inquiries Procedure (England & Wales) Rules 2004)

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CAMBRIDGE SOUTH INFRASTRUCTURE ENHANCEMENTS VIBRATION PROOF OF EVIDENCE SUMMARY

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1. INTRODUCTION

1.1.1 My name is Lynden Spencer-Allen.

1.1.2 I am employed by Ramboll UK as a Director with responsibility for vibration engineering. I am a chartered civil engineer with 17 years' experience following graduating with a Master of Engineering degree from University of Cambridge (UoC).

1.1.3 I have been involved with the Cambridge South Infrastructure Enhancements Project (CSIE Project) since September 2020 during the production of the Environmental Statement. Since the Transport and Works Act Order (TWAO) submission I have been involved in ongoing stakeholder engagement with the MRC and UoC to discuss their objections.

2. CSIE PROJECT OVERVIEW AND KEY VIBRATION ASPECTS

2.1.1 The CSIE Project will deliver a new passenger railway station and associated infrastructure required to maintain capacity and train performance. This involves modifications to the existing railway lines and construction of new station infrastructure.

2.1.2 The vibration sensitive receptors near to the CSIE project can be grouped as follows and are shown on the figure below:

- Residences near to Shepreth Branch Junction;
- Scientific research institutions on the Cambridge Biomedical Campus;
- Hospital facilities on the CBC;
- Residences near to the area of the station development.

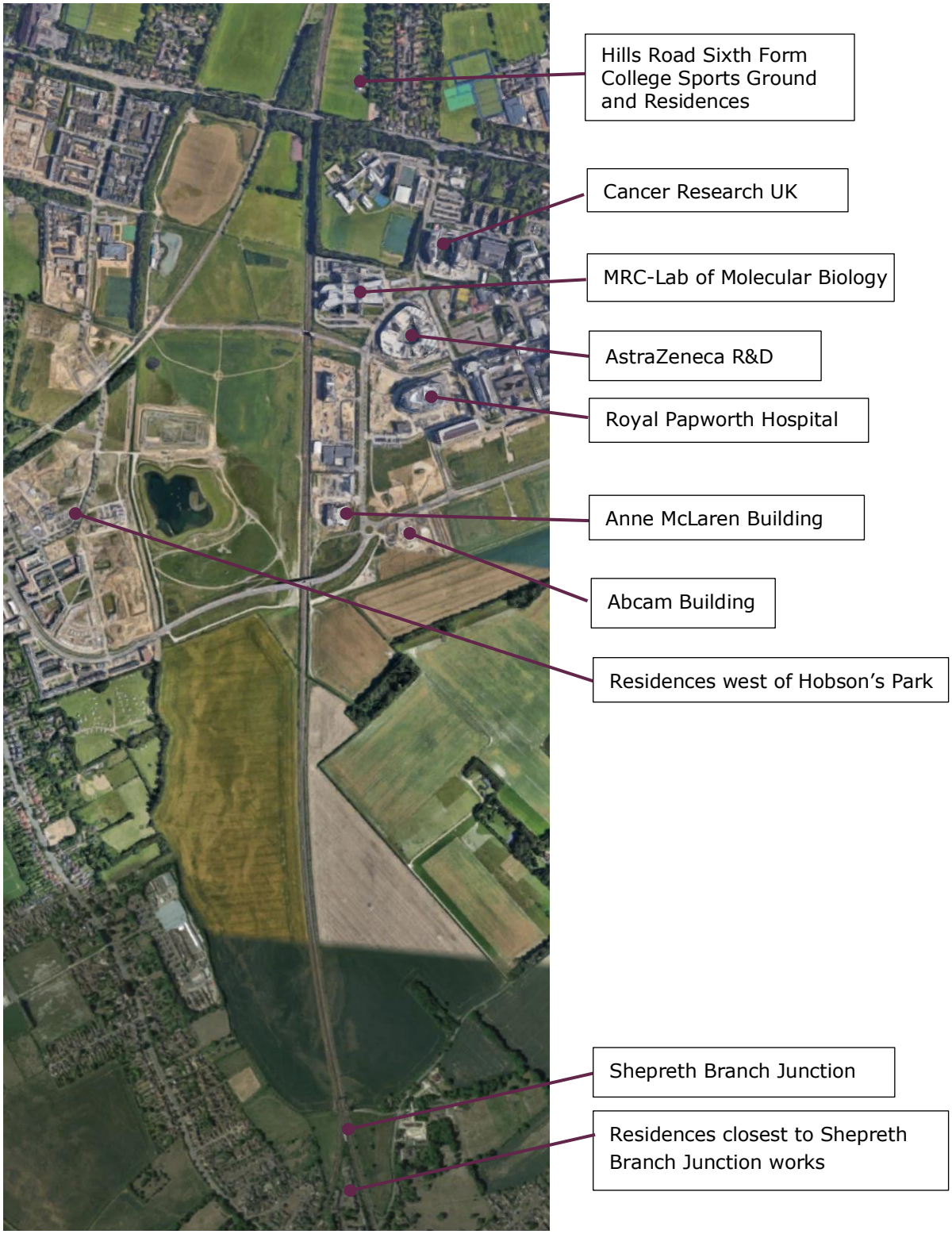

Figure 1 – Overview of the area of the CSIE Project development for context

2.1.2.1 The following aspects have been identified as key sources of new or elevated vibration levels:

- Line speed increases through the existing Shepreth Branch Junction;
- Construction works to facilitate the above line speed improvements;
- The change of track layout in the area of the new station to create two bay platforms, in particular the addition of switches and crossings into areas that are currently plain line track;
- Construction works in the vicinity of the station area.

2.1.3 Vibration Sensitivity of the Receivers

2.1.3.1 For each of the residential receptors a Variable Dose Value[1] assessment is undertaken as set out in ES Chapter 6 section 6.2.58 and Table 6-8.

2.1.3.2 The sensitivity of the Royal Papworth Hospital is governed by the medical imaging area at ground floor as set out in the ES Chapter 6 section 6.2.44.

2.1.3.3 The vibration sensitivity of scientific research institutions was established through consultation with the stakeholders. The sensitivity of each is set out in the ES Chapter 06 section 6.2.35 to 6.2.46.

2.1.4 Significant Effects due to New and Increased Vibration Levels

2.1.4.1 The **construction works in the Shepreth Branch Junction** area were found to potentially have a significant adverse effect on the nearest residential receptor.

2.1.4.2 A potential significant adverse effect was predicted for the **Medical Research Council Laboratory of Molecular Biology** in both the construction and operational phases.

2.1.4.3 A potential significant adverse effect is predicted on the **University of Cambridge Anne McLaren Building during some aspects of the construction phase** but not in the operational phase**.**

2.1.4.4 All the other receptors identified have no significant adverse effect predicted and are not covered in the proof of evidence.

[1] Vibration dose value is the method for assessing vibration effects on humans as set out in BS 5228-2. It allows the magnitude of vibration and the length of time the vibration occurs for to be combined and compared with thresholds of annoyance in humans.

3. LEGISLATIVE AND POLICY CONTEXT

3.1.1 UK legislation provides a high-level requirement for the control of vibration but does not set specific requirements for vibration. National and local planning policy do set out more specific requirements for the assessment of noise and vibration albeit these are typically more detailed for noise than for vibration.

3.1.2 In the absence of specific legislation in relation to very vibration sensitive facilities the principles of Agent of Change are applied. This principle has been used as the basis for the assessment of the onset of significant adverse effects on sensitive facilities which are more onerous than would be required for human occupation alone.

4. ENGAGEMENT WITH STAKEHOLDERS

4.1.1 Specific stakeholder consultation with reference to vibration impacts was undertaken during the production of the Environmental Statement scoping document and the ES chapter itself.

4.1.2 Following submission of the TWAO extensive engagement with the MRC and UoC has been carried out following the receipt of their objections and statements of case.

5. UNDERSTANDING THE LEVEL OF SENSITIVITY

5.1.1 The proof of evidence provides context for the very low vibration levels required for the scientific receptors on the CBC. These buildings require vibration levels far lower than human perception. These levels are defined as vibration criteria (VC) levels which start at VC-A and become more onerous down to VC-E.

6. FINDINGS OF THE ENVIRONMENTAL STATEMENT AND FURTHER ASSESSMENT WORK

6.1 Shepreth Branch Junction Receptors

6.1.1 Construction works near to Shepreth Branch Junction shows potential significant effects for one residence due to the close proximity of construction activity. Mitigation is proposed and secured through the requirement for a Code of Construction Practice part B

6.2 University of Cambridge Anne McLaren Building

6.2.1 Construction phase activity has the potential to cause significant adverse effects during works closest to the AMB. Construction activity associated with the station area is sufficiently far away to not result in significant adverse effect.

6.2.2 No significant adverse effect from the operational phase is predicted.

6.3 Medical Research Council Laboratory of Molecular Biology

6.3.1 The ES found that construction phase activity has the potential to cause significant adverse effects during works closest to the LMB. Engagement with MRC and refined analysis has shown that this can be mitigated to avoid significant adverse effects.

6.3.2 The ES found that the operational phase had the potential to cause significant adverse effect on the most sensitive areas of the LMB. Subsequent detailed design post TWAO submission has allowed mitigation to be planned and assessed to allow a revised conclusion that no significant adverse effect is expected.

7. OBJECTIONS RAISED

7.1.1 Two objections that reference vibration were received. These were submitted on behalf of University of Cambridge and the Medical Research Council in relation to their buildings on the Cambridge Biomedical Campus.

7.1.2 In addition to these objections, Cambridge City Council and South Cambridgeshire District Council have also referenced vibration within their statement of cases. These references are addressed and mitigated by requirement for a Code of Construction Practice Part B.

8. RESPONSE TO MRC/UOC OBJECTIONS/STATEMENT OF CASES

8.1 Response to University of Cambridge Statement of Case

8.1.1 Responses to each point in the UoC statement of case are included in Technical Note 5 in Appendix B.

8.1.2 The construction phase assessments undertaken have shown that no significant adverse effect is predicted except for the closest track works. For construction activity in that area the predictions using available published data show there is a risk of VC-A exceedance on upper floors and a potential marginal exceedance of VC-C.

8.1.3 As of 6th January 2022 it has not been possible to reach agreement with UoC on the construction phase mitigation that would satisfy them that there would be no overall significant adverse impact if vibration levels higher than their original criteria were to occur.

8.1.4 To secure agreement, Network Rail have issued proposed Heads of Terms to UoC which give a commitment to producing a detailed construction methodology, monitoring vibration levels within the AMB and controlling vibration levels during construction to below the VC-A and VC-C criteria except when agreed otherwise. The Heads of Terms also secure commitments on the key mitigations for the operational phase.

8.2 Response to MRC Statement of Case

8.2.1 Responses to the MRC statement of Case are provided in Technical Note 7 which is in Appendix E. Ongoing engagement since the issue of this document and further to Technical Note 10 (Appendix G) being issued it is understood that sufficient evidence and mitigation has been proposed to satisfy MRC.

8.2.2 Network Rail have issued proposed Heads of Terms to MRC which secure the operational and construction phase mitigations to avoid any significant adverse effects occurring. Subject to final details being agreed it is expected this will result in the MRC objection being withdrawn.

9. CONCLUSIONS

9.1.1 Three receptors with potential significant adverse effects were identified in the ES and objections relating to two of them were received.

9.1.2 One residential receptor near to Shepreth Branch Junction has the potential for significant adverse effect but the proposed mitigation, which will be confirmed in the Code of Construction Practice Part B, is considered appropriate.

9.1.3 Objections raised by UoC in relation to the AMB have been subject to ongoing engagement. No significant adverse effect is predicted for the operational phase; the relevant mitigation is being secured through a legal agreement between UoC and Network Rail.

9.1.4 In the construction phase, UoC are not willing to accept any exceedances of their criteria and it has not been possible to agree the technical approach to this due to the early stage of the construction planning; the necessary level of detail is not currently available. As such Network Rail have proposed draft Heads of Terms for a legal agreement with UoC which commits that construction activity would not exceed the VC-A and VC-C levels within the relevant areas of the AMB except when agreed otherwise.

9.1.5 Potential significant adverse impact was predicted for the construction and operational phases of the MRC LMB. Through detailed design and extensive engagement with MRC mitigation for both phases has been agreed and determined to avoid significant adverse effects occurring. Network Rail have issued draft Heads of Terms to MRC to secure the mitigation in a legal agreement with MRC.