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The Cambourne to Cambridge Order

Cambridgeshire County Council

Transport and Works Act 1992
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Inquiry into:
THE CAMBOURNE TO CAMBRIDGE ORDER

PROOF OF EVIDENCE
of
Toby Lewis MSc LLM CEnvH CSci FIOA FCIEH MEnvSci MIAQM
of WSP
On behalf of Cambridgeshire County Council

29 July 2025

CONTENTS

Section	Page
1. INTRODUCTION	1
1.1 Qualifications and Experience	1
1.2 Scope of Evidence	1
2. KEY STAKEHOLDER ENGAGEMENT	1
2.1 Statutory Consultees	1
3. NOISE AND VIBRATION	3
3.1 Introduction	3
3.2 Relevant Policies	3
3.3 Study area	4
3.4 Assessment methodology	5
3.5 Baseline	6
3.6 Potential impacts and effects	6
3.7 Conclusions	9
4. REPRESENTATIONS MADE RELEVANT TO MY EVIDENCE	10
4.1 Introduction	10
4.2 Representation CD2-OBJ-210 S Choudhary	10
4.3 Representation CD2-OBJ-213 Clare Hall	10
4.4 Representation CD2-OBJ-252 Nigel Maquire (PX Farms)	21
4.5 Representation CD2-OBJ-290 P Godfrey Deere	21
4.6 Representation CD2-OBJ-311 A Gannon	21
5. CONCLUSIONS	22
6. STATEMENT OF TRUTH	22

1. INTRODUCTION

1.1 Qualifications and Experience

- 1.1.1 My name is Toby Lewis and I am a Chartered Environmental Health Practitioner and Chartered Scientist, specialising in environmental noise and planning. I am a Technical Director in the acoustics team for WSP for whom I have worked since January 2015. Prior to that I was employed by local authorities as an Environmental Protection Team Leader specialising in environmental noise whilst also active as a part time consultant, trainer and lecturer.
- 1.1.2 My qualifications include an MSc in Environmental Health, an MSc in Applied Acoustics, an LLM in Environmental Law, an MSc in Pollution Control, a PgD in Acoustics and Noise Control and an HNC in Environmental Monitoring and Analysis. I am a Fellow of the Institute of Acoustics (IoA), a Fellow of the Chartered Institute of Environmental Health (CIEH), a member of the Institution of Environmental Sciences (IEnvSci) and a member of the Institute of Air Quality Management (IAQM).
- 1.1.3 My duties and responsibilities throughout the last thirty-three years have included the measurement, prediction and assessment of environmental noise for the purposes of informing the planning and licensing processes and determining and pursuing statutory nuisances. In my current role I regularly advise national and local government as well as institutions, organisations, and businesses.
- 1.1.4 I have been involved with the assessment and interpretation of noise impacts in the context of national and local planning policies for many years and I sit on a number of working groups involved in the development of noise guidance and the formulation of policy, including the IoA Parliamentary Liaison Group, the IoA Membership Committee, the CIEH Noise and Planning Satellite Panels and the Association of Noise Consultants (ANC) working group on BS 4142 .

1.2 Scope of Evidence

- 1.2.1 The evidence I have presented in this Proof of Evidence (PoE) does not unnecessarily replicate all of the technical information presented in the Noise and Vibration section of the Environmental Statement (ES) Volume 1 (CD1-10.01, page 95, **section 7.3**) or the Technical Report 1 – Acoustics which is in volume 2 of the ES (CD1-11.01).
- 1.2.2 My evidence addresses issues raised by five objections to the scheme that refer to noise or vibration. I consider the Statement of Case on behalf of Clare Hall, University of Cambridge (CD23-17) in detail as that includes a Statement of Case – Acoustics, at pages 135 to 152, produced by Create Consulting, with the primary author understood to be Mr Jody Blacklock.

2. KEY STAKEHOLDER ENGAGEMENT

2.1 Statutory Consultees

- 2.1.1 I emailed the Environmental Health Officers (EHOs) at Cambridge City Council (Mr Greg Kearney) and South Cambridgeshire City Council (Mr Peter Gibson), on 10 January 2022 to propose a noise survey approach, including monitoring locations and timings.

- 2.1.2 Constructive email exchanges and a brief video call with Mr Gibson followed prior to the survey approach being agreed by both EHOs on the 11 January 2022. I have provided the email exchanges with the two Councils at Appendix A (CD26-01-APP-W11-2).
- 2.1.3 On 12 January 2022 I exchanged several emails with the Domestic Bursar at Clare Hall, to request permission to undertake baseline sound level measurements at a quiet location on land in proximity to the south boundary of the grounds, adjacent to the proposed busway. The email exchanges, which included the college porters, are included at Appendix A (CD26-01-APP-W11-2).
- 2.1.4 More detailed proposals on the wider approach to the noise assessment were submitted in Section 12 of the ES Scoping Report, dated 7 February 2022 (CD1-10.05, page 152). This document summarised the relevant policies, guidance documents and assessment criteria proposed to assess any predicted noise or vibration impacts from the construction and operational phases of the scheme. It proposed, at paragraph 12.7.1, that the assessment of vibration from the operational phase was scoped out.
- 2.1.5 The scoping opinion from the Department for Transport (CD1-10.05, page 152), dated 25 March 2022, agreed with the approach proposed in the Scoping Report and made no comments on noise or vibration.
- 2.1.6 A belated scoping response was received from the Greater Cambridgeshire Shared Planning Service (GCSPS) which is summarised in the Scoping Opinion Response Tracker dated 22/07/2022 (CD1-10.05, page 261). That includes comments on noise (Points 76 to 95). The majority of these comments did not require a response and are simply acknowledged in the tracker.
- 2.1.7 The only noteworthy point is in relation to Point 93 of the Tracker (CD1-10.05). The GCSPS suggested that individual noise events exceeding 45 dB L_{Amax} '*should be avoided*'. That metric is applied inside proposed bedrooms during the night-time and is drawn from the ProPG¹ which seeks to limit levels above that to less than ten per night (based on a 'typical' night). The ProPG is applicable where residential development is proposed in proximity to road or rail noise sources – not the other way around.
- 2.1.8 Noise from road schemes proposed in the UK are usually assessed based on DMRB LA111² (CD15-05) which does not consider L_{Amax} levels. Noise assessments for road schemes typically rely on the L_{A10} or L_{Aeq} levels. As stated in paragraph 3.1.11 of Technical Report 1 (CD1-11.01, page 7) the assessment of operational noise from the busway presented relies on DMRB.
- 2.1.9 Whilst it is recognised that maximum noise events (such as a passing bus) during the night have the potential to result in sleep disturbance or arousal, it is relevant that the busway will only operate during the very beginning and very end of the night-time period. For the majority of the night, it will produce no noise.

¹ Professional Practice Guidance Noise and Planning New Residential Development. ANC, IoA, CIEH 2017.

² Design Manual for Roads and Bridges. LA111 Noise and Vibration. Revision 2. May 2020.

- 2.1.10 To provide additional context it may be relevant that the NIR³ (CD15-06) set a noise threshold with respect to new or altered roads of 68 dB L_{A10,18h} (Regulation 2(1)) at the façade of a residential window for that receptor to be potentially eligible for noise insulation works (Regulation 3(1)). The sound levels predicted from the busway are very substantially below that threshold.

3. NOISE AND VIBRATION

3.1 Introduction

- 3.1.1 The assessment of potential noise and vibration effects is described in brief in Section 7.3 of the ES Main Report (CD1-10.01, page 95). The details of the noise and vibration assessment are presented in Technical Report 1: Acoustics (CD1-11.01), dated November 2024, which was appended to the ES.

3.2 Relevant Policies

- 3.2.1 The relevant legislation, policies and guidance are described in Section 3 and Appendix C of Technical Report 1 (CD1-11.01, page 42).
- 3.2.2 The key national policies are set out in the National Planning Policy Framework (NPPF) December 2024 (CD8-01, page 54) in paragraphs 187 and 198.
- 3.2.3 The relevant parts of those paragraphs are set out below.

Paragraph 187

Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability

Paragraph 198

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁷²;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

- 3.2.4 Footnote 72 to paragraph 198(a) of the NPPF says:

³ Noise Insulation Regulations 1975, as amended (1988).

See *Explanatory Note to the Noise Policy Statement for England* (Department for Environment, Food & Rural Affairs, 2010).

- 3.2.5 The Noise Policy Statement for England (NPSE) (CD15-07) explanatory note explains, at paragraph 2.20 – 2.24, the concepts of ‘adverse impacts’, as those which exceed the Lowest Observed Adverse Effect Level (LOAEL), and ‘significant adverse impacts’ as those which exceed the Significant Observed Adverse Effect Level (SOAEL).
- 3.2.6 The concepts of LOAEL and SOAEL are also explained at paragraphs 003-005 of the Planning Practice Guidance Note for Noise (CD8-04, page 3). The pdf version presented as CD8-04 is missing the link to the Noise Exposure Hierarchy Table which can be accessed via the online version of the Note⁴ and provides some example outcomes which may help interpreting the magnitude of noise impacts.
- 3.2.7 Although national policy does not define LOAELs and SOAELs in terms of sound levels, the absolute sound levels aligned with LOAEL and SOAEL for operational sound from highways by the National Highways authorities for England and the devolved regions are set out in DMRB LA111 (CD15-05) and replicated in Table TR1-3-4 of the ES Technical Report 1: Acoustics (CD1-11.01, page 11). That Table is reproduced below.

Time period	LOAEL	SOAEL
Day (06:00 – 24:00)	55 dB $L_{A10,18hr}$ façade	68 dB $L_{A10,18hr}$ façade
Night (23:00 – 07:00)	40 dB L_{night} , outside (free-field)	55 dB L_{night} , outside (free-field)

- 3.2.8 The sound levels from the operational phase of the busway were predicted and assessed in the ES Technical Report 1 Acoustics (CD1-11.01, page 11). in terms of $L_{Aeq,T}$ values in free-field conditions. For that reason, the LOAEL and SOAEL values presented for the daytime need to be converted from those in the table above, to account for the index ($L_{A10,18h}$) and façade reflection, by subtracting 4.5 dB. The corresponding daytime values, in terms of $L_{Aeq,16h}$ free-field, are therefore 50.5 dB for the LOAEL and 63.5 dB for the SOAEL.
- 3.2.9 For the night-time period, the L_{night} metric is, in-fact, an $L_{Aeq,8h}$ value. For that reason, the sound levels predicted and assessed in the ES Technical Report 1 Acoustics (CD1-11.01) need to be converted to account for the different time base. The busway will only operate during two hours of the night-time period (23:00-00:00 and 06:00-07:00), with no noise generated during the majority of the night, so a -6 dB correction needs to be applied to the predicted values to convert them to an $L_{Aeq,8h}$ value and enable a comparison of them with the night-time LOAEL and SOAEL.

3.3 Study area

- 3.3.1 The initial study area is described in in Section 12 of the ES Scoping Report (CD1-10.05, page 152) and extends to include the receptors within 50 m of the scheme and

⁴ <https://www.gov.uk/guidance/noise--2>

of road links which are likely to experience a change of 1 dB $L_{A10,18h}$ on scheme opening.

- 3.3.2 The 50 m buffer extended to encompass virtually all of the Clare Hall Herschel Road site.

3.4 Assessment methodology

- 3.4.1 The assessment methodologies are described in Section 3 of Technical Report 1 (CD 1-11.01, page 7) and comprise five main elements:

- 1) Noise from the construction phase, which relied on prediction methodologies and assessment thresholds drawn from BS 5228:2014 Part 1⁵ (CD15-01 paragraph E.3.2 – Example Method 1).
- 2) Vibration from the construction phase, which relied on prediction methodologies and assessment thresholds drawn from BS 5228:2014 Part 2⁶ (CD15-02, page 31 – Table B1).
- 3) Noise from operational road traffic, which relied on predictions undertaken based on the CRTN⁷ (CD15-04) and assessment thresholds drawn from the DMRB LA111⁸ (CD15-05 – Table 3.54a).
- 4) Noise from the travel hub, predicted in a three-dimensional noise model in the CadnaA® computer package, assessed based on BS 4142:2014+1:2019⁹ (CD15-03).
- 5) Hourly average sound levels from the off-line busway were predicted using the NAC¹⁰ (CD15-11) guidance based on the anticipated number of bus movement in any given hour. The predicted sound levels were assessed based on the DMRB LA111 (CD15-05 – Tables 3.54a and 3.49.1) and the target sound levels for internal and external residential amenity recommended in BS 8233:2014 (CD15-08 – Table 4 and paragraph 7.7.3.2).

- 3.4.2 It is noteworthy that Table TR1-3-3 of ES Technical Report 1 (CD1-11.01, page 10) indicates potential significance of effect for short-term changes in sound level of 1 dB or more (a minor impact) prior to the wider consideration of context. This is contrary to the initial assessment approach set out in Table 3.58 of the Design Manual for Roads and Bridges: Sustainability and Environment Appraisal LA 111 Noise and vibration (CD15-05) which would suggest potential significance for short-term sound level changes of 3 dB or more (a moderate impact). As such, I consider the initial assessment of the potential significance of noise from road traffic and the busway to be very stringent leading to an overly precautionary initial assessment.

⁵ BS 5228:2014 Code of practice for noise and vibration control on construction and open sites - Part 1: noise

⁶ BS 5228:2014 Code of practice for noise and vibration control on construction and open sites - Part 2: vibration

⁷ CRTN – Calculation of Road Traffic Noise, Department of Transport Welsh Office 1988

⁸ DMRB - Design Manual for Roads and Bridges LA111 Noise and Vibration. Highways England (and the developed authorities) May 2020

⁹ BS 4142:2014+1:2019 Methods for rating and assessing industrial and commercial sound

¹⁰ NAC – A Guide to Measurement and Prediction of the Equivalent Continuous Sound Level Leq. The Noise Advisory Council. 1978.

- 3.4.3 For the three operational phase assessments (items 3-5 above), the first stage of each assessment presented in the ES Technical Report 1 (CD1-11.01) was based on the changes in sound levels predicted to occur at assessment locations due to the operation of the busway and travel hub. In each case these initial assessments were subject to wider contextual considerations to derive the actual potential impact and its significance.
- 3.4.4 These contextual considerations included the absolute sound levels (with reference to CD15-5 paragraph 3.49.1 and CD15-08 Table 4 and paragraph 7.7.3.2), the acoustic context and the likely perception of changes in noise levels by residents.
- 3.4.5 It is important to recognise that meaning of the '*significant effects*' in the ES Technical Report 1 (CD1-11.01) is not the same as the SOAEL which is set out in national policy (CD8-01 and CD15-07). Whilst the assessment in the ES (CD1-11.01) focussed on the ES significance criteria, which are relative levels (i.e. predicted changes to existing baseline sound levels) I have also referred to the absolute LOAEL and SOAEL values throughout my evidence as these are important in the context of a planning decision.
- 3.5 **Baseline**
- 3.5.1 The noise baseline assessment is described in Section 2 and Appendix B of Technical Report 1 (CD1-11.01, page 37).
- 3.5.2 In summary, baseline sound level measurements were undertaken over multiple days at five monitoring locations (ML1 – ML5) that were considered representative of the lowest sound levels that would occur at clusters of residential receptors in proximity to the scheme. Capturing the lowest possible baseline sound levels underpins a precautionary assessment, as any assessment based on predicted increases in sound levels that might arise from the scheme will be indicative of greater impacts.
- 3.5.3 ML5 was positioned at a location within the Clare Hall grounds where it was thought that the lowest possible baseline sound levels would be captured. It was remote from any significance noise sources, around 370 m west from Grange Road and the only significant noise sources noted were road traffic and birdsong. For that reason, the use of those baseline sound levels in assessments at receptors much closer to Grange Road (where road traffic sound levels would be higher) contributes to a worst-case assessment outcome.
- 3.5.4 An aerial photograph, and photographs of the sound level meter in-situ, are presented at Appendix B (CD26-01-APP-W11-2).
- 3.5.5 Three additional 'shortened procedure' measurements were made in proximity to existing road links, to quantify the road traffic sound levels attributable to those particular road links.
- 3.6 **Potential impacts and effects**
- 3.6.1 The potential noise and vibration impacts and effects are described in detail in Section 5 of Technical Report 1 (CD1-11.01, page 14) and are summarised in Section 7.3 of the ES (CD1-10.01, page 95).
- 3.6.2 Some potentially significant noise effects were identified based on the adopted significance criteria set out in Section 3.2 of Technical Report 1 (CD1-11.01, page 8).

Construction Phase

3.6.3 The significance threshold adopted for construction noise ($> 65 \text{ dB } L_{Aeq,T}$) in the ES was based on the absolute sound levels presented in Table TR1-3-1 of Technical Report 1 (CD1-11.01, page 9) and the durations of noisy works anticipated at assessment locations, as set out in paragraph 3.2.3 of Technical Report 1 (CD1-11.01 page 9), which were:

- 10 or more days or nights in any 15 consecutive days or nights; or
- A total number of days exceeding 40 in any 6 consecutive months.

3.6.4 Based on these criteria it was predicted that significant adverse noise effects could arise from the construction phase at localised receptors in proximity to three distinct elements of the scheme - the travel hub, the retaining walls north of St Neots Road and Bin Brook Bridge.

3.6.5 In reality it is likely that the magnitude of the construction noise impacts will be less, as the noisy operations assumed in the assessment predictions are likely to be interrupted by periods of respite when quieter works are undertaken. These interruptions could affect both the sound levels (which are averaged over a working day) and the overall duration of noisy works in any particular location.

Operational Phase

3.6.6 The significance threshold for operational noise from the busway was initially based on the changes in noise level predicted at assessment locations as set out in Table TR1-3-3 of Technical Report 1 (CD1-11.01, page 9) together with relevant contextual factors, including those set out in paragraph 3.2.14 of Technical Report 1 (CD1-11.01, page 9).

3.6.7 For assessment locations near to the off-line sections of the scheme the absolute sound levels predicted are an important contextual factor as the baseline sound levels are lower than at those locations in proximity to the A428 where existing road traffic noise is dominant. This is particularly the case at the east and west extremities of the scheme where the existing baseline sound levels are lowest.

3.6.8 Based on the changes in noise levels predicted in the precautionary assessment presented in Technical Note 1 (CD1-11.01) it was anticipated that significant adverse noise effects would be possible at some residential receptors in proximity to the off-line sections at Camborne and Newnham at either end of the proposed busway if operations extended into the night-time period (23:00-07:00).

3.6.9 Contextually, however, the absolute sound levels predicted, even from that precautionary assessment, from operations on the off-line sections are relatively low. The average ($\text{dB } L_{Aeq,T}$) sound levels predicted were:

- $48 \text{ dB } L_{Aeq,1h}$ at the closest receptors in Camborne at the west end of scheme (see paragraph 5.4.34 of CD1-11.01, page 26).
- $49 \text{ dB } L_{Aeq,1h}$ at the closest receptors at Clare Hall, Cambridge at the east end of scheme (see paragraph 5.4.65 of CD1-11.01, page 29).

- 3.6.10 As these hourly sound levels are averages, based on a constant number of assumed hourly bus movements, they are also representative of the 16-hour daytime L_{Aeq} (because the busway will operate continuously throughout that period).
- 3.6.11 As I explain in paragraph 3.2.9, to convert the above hourly sound levels to the night-time $L_{Aeq,8h}$, a subtraction of 6 dB has to be applied. Once this subtraction has been applied the levels predicted at the closest receptors are as follows:
- 48 dB $L_{Aeq,16h}$ at Camborne and 49 dB $L_{Aeq,16h}$ at Clare Hall during the day.
 - 42 dB $L_{Aeq,8h}$ at Camborne and 43 dB $L_{Aeq,8h}$ at Clare Hall during the night.
- 3.6.12 The daytime sound levels predicted above are significantly below the SOAEL and also below the LOAEL (63.5 and 50.5 dB $L_{Aeq,16h}$ respectively, as explained at paragraph 3.2.8 above). For that reason, no planning response (in terms of additional mitigation) would be necessary or justified on noise grounds during the daytime based on national planning policy (see paragraph 3.2.3 above).
- 3.6.13 The night-time sound levels predicted above are significantly below the SOAEL but marginally above the LOAEL (55 and 40 dB $L_{Aeq,8h}$ respectively). Under those circumstances the appropriate planning policy response (see paragraph 3.2.3 above) is to '*mitigate and reduce to a minimum potential adverse impacts*'.
- 3.6.14 The ES Technical Note 1 recognised that the sound levels predicted at Camborne and Clare Hall were based on assumed numbers of Euro VI diesel buses which may be over precautionary assumptions (see paragraphs 5.4.40 and 5.4.77 of CD1-11.01, page 27). Potentially significant noise effects were identified during the night-time at Camborne and Clare Hall on that basis (based on the ES significance criteria set out at TR1-3-3- of CD1-11.01 – they would not have exceeded the SOAEL).
- 3.6.15 The operational sound levels from the busway could be reduced to below the night-time ES significance criteria threshold and the night-time LOAEL by reducing the numbers of hourly Euro VI diesel bus movements during the 06:00-07:00 and 23:00-00:00 periods to 6 at Camborne and 9 at Clare Hall.
- 3.6.16 Sound levels at Camborne and Clare Hall could be reduced still further by using fuel cell electric buses, because these are relatively quiet at low speeds (the speed limits at Camborne and Clare Hall will be 20 mph (see CD1-16.04)). Indeed, based on the use of electric buses, the sound levels would be below both the ES significance criteria and the LOAEL even without any reduction in the relatively high numbers of hourly movements assumed in the ES (16 at Camborne and 20 at Clare Hall).
- 3.6.17 I understand that the applicant would be content to accept a restriction to the numbers of bus movements during the 06:00-07:00 and 23:00-00:00 periods in accordance with the above until such time as the bus fleet are electric. I have presented a draft condition suitable to secure this restriction below:

No diesel fuel buses will run on the approved busway between 00:00 and 06:00. For the single hours immediately before and after this period (vis 2300-0000, and 0600-0700) diesel bus services will be limited as follows:

- *west of Bourn Airfield no more than a total of 6 hourly bus movements*

- *east of Charles Babbage Road no more than a total of 9 hourly bus movements*

With EV buses in operation, the service may operate according to the proposed full timetable of up to 16 total movements west of Bourn Airfield and 20 movements east of Charles Babbage Road.

- 3.6.18 I understand that the applicant would be content to accept this condition and, on that basis, the noise impacts predicted to arise from the operational of the busway would fall below both the ES significance criteria and the SOAEL from the outset and would fall below the LOAEL once the fleet is electric.

3.7 Conclusions

- 3.7.1 As stated at paragraph 5.1.11 of Technical Report 1: Acoustics (CD1-11.01, page 15) potentially significant adverse noise effects from the construction phase were predicted at six properties.
- 3.7.2 One of these is an isolated dwelling in proximity to the retaining walls proposed north of St Neots Road (Childerley Gate) which is immediately adjacent to the A428 (and thus already exposed to significant noise). Three are the houses that are closest to the proposed travel hub. The final two are Gillian Beer House and 9/9A Hershel Road which are the Clare Hall buildings that are closest to the Bin Brook Bridge. The locations of these receptors are shown in plates TR1-5-2 and TR1-5-3 of CD1-11.01, page 16.
- 3.7.3 The ES concluded (at paragraph 5.2.3 of CD1.11.01, page 17) that significant adverse vibration effects from the construction phase could be avoided at all residential receptors based on the appropriate usage of appropriately selected plant. However, it was recognised that construction vibration could potentially affect seven facilities within 60 m of the scheme that may have particularly vibration sensitive equipment. These facilities are identified at paragraph 5.2.5 of CD1.11.01, page 18.
- 3.7.4 As stated at paragraph 5.2.6 of CD1-11.01, page 18 consultation with the operators of those facilities will be undertaken in due course to ensure that their concerns are taken into account during the planning and phasing of construction activities. Some additional assessments may be necessary (depending on the nature of the consultations), but these will not change the conclusions of the ES.
- 3.7.5 No significant adverse effects are predicted from the operational phase at any receptors in proximity to the travel hub or the online sections of the scheme.
- 3.7.6 Potential significant adverse noise effects were identified as possible from the operation of the busway at receptors in proximity to the offline sections at either end of the scheme, at Camborne and Clare Hall, during the 23:00 – 00:00 period (see paragraphs 5.4.39 and 5.4.76 of CD1-11.01, page 27).
- 3.7.7 As I explain in paragraph 3.6.15 to 3.6.18, the potential adverse noise impacts from the operational phase can be avoided via management controls that the applicant is content to commit to. For that reason, no adverse noise effects are anticipated from the operation of the busway.

4. REPRESENTATIONS MADE RELEVANT TO MY EVIDENCE

4.1 Introduction

- 4.1.1 I am aware of five objections to the scheme that mention noise which I consider in the following sections.

4.2 Representation CD2-OBJ-210 S Choudhary

- 4.2.1 Objection reference CD2-OBJ-210, made by S Choudhary, states:

'Construction activities and the eventual operation of the guided busway will significantly increase noise pollution in the area. This is especially concerning for residents with health conditions, as noise disturbances can adversely affect sleep, exacerbate stress, and deteriorate overall well-being'.

- 4.2.2 I agree that both construction and operation of the scheme will increase noise at some locations, although noise from the construction phase will be temporary and is unlikely to result in significant effects at many receptor locations, if at all. The increase in sound levels from the operation of the busway will not be significant and, as I explain in paragraphs 3.6.15 to 3.6.18 above, subject to the proposed restriction, it will be below the LOAEL so no adverse noise effects would be anticipated.

- 4.2.3 Objection reference CD2-OBJ-210 also states:

'If this project is to go ahead, we request specific measures to mitigate noise pollution during construction and operation, including restrictions on working hours and the installation of noise barriers'.

- 4.2.4 As explained at paragraph 4.1.1 of CD1-11.01, page 13, noise from the construction phase will be minimised via controls based on the submitted draft Code of Construction Practice (CD1.26). These will include working hours and the use of barriers. No noise barriers have been identified as necessary from the operational phase.

4.3 Representation CD2-OBJ-213 Clare Hall

- 4.3.1 Objection reference CD-OBJ-213, made by Clare Hall suggests that noise and vibration have been 'inadequately addressed' and has included an 'Acoustic Note', written by Jody Blacklock of Create Consulting Engineers (henceforth referred to as the 'Create TN') as Document 9 of its Statement of Case (CD23-17).

- 4.3.2 At paragraph 1.5 of the Create TN (CD23-17) it states that Clare Hall '*will be adversely impacted by the construction... [and]... operation of the proposed busway*'.

- 4.3.3 I agree that there may be adverse noise impacts from construction of the scheme, but I consider those impacts to be acceptable in the context of the development as they will be minimised through the implementation of the draft CoCP (CD1.26) and the approved LEMP (**condition 9 of CD1-14**). As I explain in paragraphs 3.1.15 to 3.6.18 above – adverse noise impacts identified as possible from the operation of the scheme in the ES (paragraphs 5.4.39 and 5.4.76 of CD1-11.01, page 27) are not expected to occur given that the applicant has committed to control measures to adequately reduce noise during the night.

4.3.4 The Create TN addresses the following points with respect to the WSP assessment set out in Technical Note 1 (CD1-11.01). The list starts at number 2, to match the section headings in the Create TN, before drawing overall conclusions:

- 2) General observations.
- 3) Baseline Acoustic Environment.
- 4) Construction Noise.
- 5) Construction Vibration.
- 6) Operational Noise.
- 7) Operational Vibration.

4.3.5 I address each of the Create TN sections in the following paragraphs.

2) General Observations.

4.3.6 This section of the Create TN (CD23-17) describes the types of buildings and amenity spaces at the Herschel Road Clare College site and the glazing and ventilation on some of the building facades that will be most exposed to the busway.

4.3.7 None of these observations are material, given that the WSP assessment considered potential noise impacts in external amenity spaces and in habitable rooms with windows open (i.e. as a worst-case).

4.3.8 Paragraph 2.1 of the Create TN (CD23-17, page 4) states that there was '*very little attention given the Clare Hall college campus within the WSP report*'. I do not accept this criticism. WSP engaged directly with Clare Hall to ensure that an optimal baseline monitoring location was utilised with its grounds (via on-site discussions and the emails presented at Appendix A), used precautionary background sound levels in the assessment and included multiple receptor points (representative of the buildings on the campus) within its detailed noise model.

4.3.9 At paragraph 2.2 the Create TN (CD23-17, page 4) states that '*the majority of Clare Hall campus is used as residential accommodation, which consideration to this appears to have been omitted from the WSP report*'. It is clearly not true that WSP failed to consider the prevalence of residential accommodation at Clare Hall. All of the assessment criteria set out in Section 3.2 of Technical Report 1 (CD1-11.01, page 8) are specifically applicable to residential receptors. Furthermore, there are nine receptor points (each aligned with a building which includes accommodation) identified with the Clare Hall grounds in the model plot presented at WSP Plate TR1-5-1 (CD1-11.01, page 14), all of which are assessed as residential receptors.

3) Baseline Acoustic Environment.

4.3.10 Paragraph 3.2 of the Create TN (CD23-17, page 7) mentions that WSP monitoring location 5 (ML5) was 200 m west from the Brian Pippard building. It makes no comment on the potential significance of this. As I have explained in paragraph 4.3.8 above, however, ML5 was selected as a low noise location, on a precautionary basis, to underpin a robust assessment of potential noise impacts at receptors closer to Grange Road. A monitoring location closer to the Brian Pippard building would be

exposed to higher noise levels and would have yielded a higher (more permissive) baseline.

- 4.3.11 At paragraph 3.3 the Create TN (CD23-17, page 7) critiques the absence of reported meteorological conditions from Technical Report 1 (CD1-11.01).
- 4.3.12 WSP recorded the weather conditions (wind speed, wind direction, precipitation etc) from the MET Office observation station at Cardington (Bedford) for each day of the survey. Cardington is around 23 km from Camborne and 31 km from Clare Hall. Only two short periods were noted when windspeeds or precipitation were outside the ideal range. These were:
- 14/01/2022 04:00 – 07:00 when there was mist; and
 - 19/01/2022 12:00-17:00, when there were elevated wind speeds.
- 4.3.13 On analysis no evidence was found that the former incident had influenced the measured sound levels.
- 4.3.14 The latter incident could only have affected ML1 (which was the only instrument deployed at that time – see Table TR1-B-1 at Appendix B of CD1-11.01, page 37) but that was well screened from the wind (north-westerly) by buildings and the sound level data logged at that time were commensurate with those recorded during other periods. There were no justifications to discard any of the sound level monitoring data during the WSP analysis.
- 4.3.15 The Create TN (CD23-17, page 8) confirms, at paragraph 3.5, that Create made its own sound level measurements at Clare Hall but it provides no supporting information. This is concerning as I would expect the surveyor to be identified, detailed descriptions and photographs of monitoring locations, durations, instrumentation and data analysis to be provided with any reference to a sound level measurement. I requested this information from Mr Blacklock at Create via email on 19 June 2025. Mr Blacklock replied on the 01 July 2025, stating that no report is available but providing some limited additional information. I present my email, and Mr Blacklock's reply, at Appendix C1 (CD26-01-APP-W11-2, page 21).
- 4.3.16 In his email, Mr Blacklock identified the Create assessors, the equipment and the monitoring locations. Both of the Create measurement locations appear to have been 'façade' positions (where the measured levels would include some energy reflected by the façade of the building) in contrast to those I made, which were in free-field conditions. They were also closer to Grange Road than WSP ML5. For those reason, I would have expected the Create measurements to have been higher (and therefore more permissive in an assessment).
- 4.3.17 Notwithstanding the lack of detailed supporting information, and the apparent differences in the measurement conditions, Create states that its data were '*within 2 dB of those measured by WSP, which is relatively well correlated for the purposes of environmental monitoring*'. This appears to be an acknowledgement that the WSP baseline data are representative, appropriate and fit for use.
- 4.3.18 At paragraphs 3.7 and 3.8 the Create TN (CD23-17, page 8) comments on the sound exposure level (SEL) WSP assumed for in the predictions of sound from passing buses

Create stated that they had measured different SELs of guided buses on the busway close to Kings Hedges Road. Again, there is a concerning lack of information provided in the Create TN, so it was not apparent who made those measurements, exactly where or how, with what equipment or at what speed the buses were travelling during the measurements. I requested this information from Mr Blacklock at Create via email on 19 June 2025. Mr Blacklock replied on the 01 July 2025, confirming that no assessment report is available but providing some, limited, additional information. I present my email, and Mr Blacklock's reply, at Appendix C (CD26-01-APP-W11-2).

- 4.3.19 Based on the limited additional information supplied it is evident that the busway conditions for the majority of the seventeen measurements made by Create were materially dissimilar to the busway conditions that will be adjacent to Clare Hall. The Create measurements were in proximity to the busway T-junction at Kings Hedges, in proximity to a bus stop and the activities comprise buses stopping, turning and pulling away as well as pass bys.
- 4.3.20 Based on my discussions with the GCP project manager and my review of Streetview images I understand that the busway close to Kings Hedges Road includes guide rails and that additional noise is generated at that location by the interface between the guide wheels on the buses and the rails to either side. Guide rails will not be fitted on the busway proposed adjacent to Clare College, so that additional noise would not be generated by buses passing in proximity to that location.
- 4.3.21 The Create measurement location that I would expect to be most comparable with the busway proposed at Clare Hall was monitoring location 3 (as shown in the picture at Appendix C (CD26-01-APP-W11-2)). This was around 50 m away from the bus stop and 30 m away from the nearest guide rails. Create made four measurements at that location, two of which were described as 'pass by' and two of which were 'pass by at 20mph'. Three of the four buses were described as diesel with the fourth unspecified. The range of sound exposure levels reported at a distance of 1 m (presumably, horizontal distance from the alignment of the busway kerb) were between 76 and 85 dBA. The lowest measurement was attributed to a diesel bus.
- 4.3.22 Create applied a distance correction to their 1 m measurement data based on an assumed line source (an infinitely long line, perpendicular to the measurement point, generating sound equally along its entire length) using the calculation $10 \times \log_{10}(10/1)$. This led to an assumed sound level reduction of 10 dB at 10 m distance.
- 4.3.23 I believe the Create calculations will have underestimated the actual level of distance attenuation that will occur in reality. The primary noise sources on a bus (engine, exhaust, wheels) travelling at 20 kph (8.3 m/s), measured over a period of 1 second, at a distance of 1 m, do not resemble a line source. I would expect the level of distance attenuation to be higher (resulting in lower assumed source levels) than that assumed by Create.
- 4.3.24 The busway proposed in proximity to the Clare College accommodation will be a straight section with a 20 mph speed limit and is around 175 m from the proposed T-junction with Grange Road. For that reason, it is likely that buses will be travelling more slowly and steadily (generating less noise) than many of those observed by Create during their measurements at Kings Hedges.

- 4.3.25 The differences in measurement conditions, including the generation of noise from the guide rails, and the underprediction of distance attenuation, may have contributed to Create adopting higher SELs as representative of the buses that will pass Clare Hall than should actually be the case. This would have led to the Create predictions being representative of greater noise impacts than could occur in reality.
- 4.3.26 Notwithstanding these concerns, the SEL adopted by WSP for a bus pass by (72 dB SEL at 10 m) was still within the upper region of the range observed by Create (65 – 77 dB) and was only 2 dB below the average presented by Create. The SEL adopted data by Create and WSP are, therefore, reasonably consistent and do not undermine the WSP assessment.
- 4.3.27 Paragraph 3.9 of the Create TN (23-17) states that the WSP assumption of 15 dB outside-to-inside sound level reduction for an open window is optimistic. I do not accept that. The 15 dB is a well-established figure taken from BS 8233¹¹ (CD15-08). However, an April 2024 paper by Harvie-Clark et al¹² (CD15-09) demonstrated that in real-world conditions four out of the six window types tested when slightly open (by 2° to 8°) achieved an outside-to-inside reduction of 18.0 – 20.3 dB ($D_{n,e,w} + C_{tr}$), meaning that far higher levels of sound reduction can typically be achieved while still ventilating rooms naturally via open windows.
- 4.3.28 At paragraph 3.10 of the Create TN (CD23-17, page 9) it states '*Create also undertook sound insulation measurements of the building façades facing onto Rifle Range Road and found that the sound insulation was below that with the vents open and the windows closed. The lowest performance was measured to be 13 dB Dw*'. Once again, this statement is made without any supporting information whatsoever. This is particularly concerning for two reasons. Firstly, because the methods available for the acoustic performance of façades are very sensitive, error prone and need to be conducted carefully by an appropriate expert. Secondly, because the 13 dB Dw value cited by Create is far too low to be credible, which suggests that the test method has been incorrectly applied, or the data misinterpreted.
- 4.3.29 Additional information with respect to the sound insulation measurements was requested by Womble Bond Dickinson (the applicant's solicitor) on 21 May 2025 and the following additional information was provided by 'Clare Hall's consultant' via Dentons on the same day:
- "The sound insulation testing for the glazing was conducted in general accordance with BS EN ISO 16283-3. In particular the "Element Loudspeaker Method" as detailed in section 9.5 of the standard. BS EN ISO 16283-3:2016. Field Measurement of Sound Insulation in Buildings and of Building Elements – Part 3: Facade Sound Insulation"*
- 4.3.30 Harvie-Clark et al state '*that recent findings question its [the loudspeaker method's] accuracy*' (CD15-09, top of page 6) and rely on the alternative method of using environmental sound for the testing procedure in their studies.
- 4.3.31 The additional information received from Create did not reassure me and Womble Bond Dickinson requested additional information on my behalf on 23 May 2025. I also

¹¹ BS 8233:2014 Guidance on sound insulation and reduction in buildings – Annex G.1.

¹² Harvie-Clark et al. Assessing noise and overheating in dwellings: aligning acoustic and thermal models for partially open windows. CIBSE Technical Symposium, UK April 2024

requested further details via an email direct to Mr Blacklock on 19 June 2025. Both of these emails are presented at Appendix C (CD26-01-APP-W11-2).

- 4.3.32 Mr Blacklock emailed me on the 01 July 2025 confirming that there was no report available with respect to the façade testing, which is presented at Appendix C (CD26-01-APP-W11-2) but that additional information would be provided in due course in his Proof of Evidence.
- 4.3.33 WSP did not undertake any acoustic testing of windows or vents as it is simply not necessary for the assessment. The WSP approach, of assessing all receptors with windows open, is the most precautionary approach possible and underpins a particularly robust assessment of potential noise impacts. Vents will generally provide far better acoustic attenuation than open windows.

4) Construction noise.

- 4.3.34 At para 4.1 of the Create TN (CD23-17, page 10) it incorrectly states that WSP wrongly identified just two receptors between Brook Bridge and Grange Road. The WSP Plate in question (TR1-5-3 of CD1-11.01, page 20) actually identifies those receptors closest to the proposed Bin Brook Bridge works where significant adverse effects are predicted from the construction phase on the basis of the duration of the works to Bin Bridge. It was clearly not intended to identify all of the noise sensitive receptors within the construction noise buffer (which is shown in purple on Plates TR1-5-1, TR1-5-2 and TR1-5-3 of CD1-11.01, page 15). Most of the receptors within the noise buffer between Bin Brook and Grange Road would not be potentially subjected to significance adverse effects from works to Bin Bridge, as Create appear to have implied.
- 4.3.35 Paragraph 4.2 of CD23-17, page 10 is immaterial.
- 4.3.36 Whilst Create broadly agree with the WSP approach on construction noise, they do suggest, at paragraph 4.4 of CD23-17, page 10, that, in their experience, additional plant would be used leading to higher sound levels and a wider area around the busway that would be subject to levels that could result in a significant effect (encompassing most of Clare Hall College and some houses on Rifle Range Road).
- 4.3.37 Based on the additional information provided by Mr Blacklock in his email of 01 July 2025 (Appendix C1 (CD26-01-APP-W11-2)) and the associated plant list attachment (Appendix C4 (CD26-01-APP-W11-2)) Create has assumed that handheld pneumatic breakers would be used to break up the existing path surface in proximity to Clare Hall. However, I understand that this path will be dug out using a tracked excavator, which was accounted for in the WSP calculations (and generates significantly less noise). Noisier handheld breakers would only be used in specific areas, such as the Grange Road junction, which is around 70 m away from the noise sensitive receptors at Clare Hall. That is around thirteen times further away than assumed by Create (and would account for a sound level reduction of around 22 dB).
- 4.3.38 I consider the WSP construction noise predictions to be sufficiently worst-case to underpin a precautionary assessment. However, even if one adopted the higher Create sound level predictions, it would not result in a higher incidence of significant

adverse effects, based on the ES criteria, due to the limited duration of the works (see CD1-11.01 paragraphs 3.2.3, page 9 and 5.1.10, page 15).

- 4.3.39 Create also challenge the assumptions presented in CD1.11-01 paragraph 5.1.10, page 15 with respect to the duration of various phase of construction works and associated application of the duration thresholds for significant effects (CD23-17 paragraph 4.12). Create suggest that, in the absence of any detailed schedule, the works may take longer than anticipated by WSP.
- 4.3.40 I do recognise that there is uncertainty with respect to the duration of noisy works and accept that operations associated with the construction phase could be occurring in proximity to Clare Hall for many months. But the incidence of noisy works, and their location, will change throughout that period, such that individual receptors are unlikely to be affected for periods which exceed the periods set out in CD1-11.01 at paragraphs 3.2.3, page 9 and 5.1.10, page 15.
- 4.3.41 The draft CoCP (CD1.26) sets the framework for noise mitigation. It is anticipated that this will be finalised during the Inquiry or at a subsequent date prior to the commencement of any construction works. In due course, the appointed principal contractor would be expected to prepare a Local Environmental Management Plan (LEMP) that builds on the approved CoCP and specifies the mitigation measures that will be employed during the construction phase. If necessary, this LEMP could control the timings and durations of the works as well as the noise levels in conjunction with agreements with the LPA, to ensure that unacceptable noise impacts are avoided.
- 4.3.42 At paragraph 4.16 of CD23-17 Create suggest that construction noise would exceed the '*requirements of BS 8233*' (CD15-08). This point is immaterial for four main reasons:
- 1) Firstly, BS 8233 (CD15-08) does not include '*requirements*' to achieve specific acoustic criteria – it provides guidance. On page iii it states: '*As a guide, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it*'.
 - 2) Secondly, at clause 1 BS 8233 (CD15-08) states: '*it is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building*'.
 - 3) Thirdly, the data referred to by Create (Table 4 of CD15-08, page 12) are based on annual average data and do not have to be achieved under all circumstances.
 - 4) Fourthly, given the relatively short duration of the proposed works, construction noise would not lead to exceedances of the criteria referred to by Create in any event.
- 4.3.43 At paragraph 4.18 (CD15-08) Create states that the works on Bin Brook Bridge would last longer than 10 days and it is therefore of the opinion that noise therefrom would lead to a significant adverse impact. The Create position is fundamentally flawed.

- 4.3.44 The WSP significance criteria adopted (set out in **Section 3 of CD1-11.01**, page 7 and based on guidance in CD15-01 and CD15-05) are based on noise comprising a moderate or major impact for 10 days in any 15 consecutive days. Periods of respite whilst work is not taking place, or when work is relatively quiet, would not be included in the 10-day limit. For that reason, the total duration of works on Bin Brook Bridge could last significantly longer than 10 days without necessarily causing a significant adverse noise impact. I would anticipate that management practices agreed in the approved CoCP (CD1-26) and LEMP would ensure that significant adverse impacts are avoided.
- 4.3.45 At paragraphs 4.19 and 4.20 of CD23-17, page 145 Create suggests that additional mitigation would be required to reduce sound levels to acceptable levels for the residents of the Clare Hall buildings closest to the scheme. I do not agree with Create's assumptions or conclusions. I also consider it unnecessary and impractical to seek to predict detailed construction noise levels and mitigation solutions at this stage of the project. In my expert opinion, the draft CoCP and the commitment to developing more detailed controls in the LEMP, as greater details on the construction phase become available, are appropriate and will provide adequate protection for residents.

5) Construction vibration

- 4.3.46 Create broadly agree with the WSP assessment approach but criticise the WSP assumption that a vibratory roller that generates relatively low levels of vibration would be used.
- 4.3.47 Given the sensitivity of some of the assessment locations, I think it is reasonable to assume that the least impactful type of equipment should be used (as assumed by WSP) and that to do so could be a requirement of the LEMP. On that basis the plant assumption made by WSP is reasonable and realistic.

6) Operational Noise

- 4.3.48 At paragraphs 6.1 to 6.6 of CD23-17, page 148 Create refers to the differences in the SEL data adopted for bus movements adopted by Create and WSP (which I explain at paragraphs 4.3.18 - 4.3.22 above) and a difference in the assumed distance from the edge of the busway to the facades of Clare Hall and the Brian Pippard Building.
- 4.3.49 Create adopted an SEL value of 74 dBA whilst WSP adopted a value of 72 dBA. I explain possible reasons for the higher level adopted by Create at paragraphs 4.3.18 to 4.3.22 above.
- 4.3.50 The SEL adopted by WSP was based on a number of measurements of noise from bus movements made by WSP, verified by comparison with data published by others in a research paper¹³ (see Figure 1 of CD15-10, page 7).
- 4.3.51 It is noteworthy that the maximum sound level attributed to a diesel bus moving at 30 kph (19 mph) in Figure 1 of CD15-10 is 76 dB at 7.5 m. Distance correcting this value to 10 m (the distance adopted by WSP and Create) reduces this value to 73.5 dBA. There would also be a further downward correction to account for the difference between

¹³ Laib et al. Modelling noise reductions using electric buses in urban traffic. A case study from Stuttgart, Germany. Transport Research Procedia 37 (2019) 377-384.

the L_{Amax} value (which is the metric presented in Figure 1 of CD15-10) and the SEL value used by WSP and Create, which it is not possible to precisely define. In summary, the values shown in CD10-15 agree very well with the value adopted by WSP.

- 4.3.52 It can be seen that at a speed of 30 kph (the approximate speed limit of the busway proposed adjacent to Clare College) the sound level reduction expected to be achieved once the bus fleet is all electric is in the order of 10 dB, which is a very large reduction and would certainly reduce any predicted impacts to below the night-time LOAEL (see Table TR1-3-4 of CD1-11.01, page 11 and paragraph 3.6.13 above) and to a negligible magnitude (in terms of the ES criteria set out in Table TR1-3-3 of CD1-11.01, page 10) even during night-time hours.
- 4.3.53 Create suggest at paragraph 6.4 of CD23-17, page 148 that they have predicted operational sound levels at the closest facades at Clare Hall of 56 dB $L_{Aeq,1h}$ which they say is *'up to 8 dB higher than the ambient sound levels measured at the Clare Hall campus'* during the daytime.
- 4.3.54 Create do not explain how they have made the predictions or if the ambient sound levels to which they refer are the sound levels they measured (for which little supporting information has been provided) or the values adopted by WSP. This is surprising, and disappointing, as I would expect full details of measurements, predictions and assessment assumptions to have been provided. I requested additional information with respect to the Create predictions from Mr Blacklock via email on the 19 June 2025 (see Appendix C (CD26-01-APP-W11-2)).
- 4.3.55 Based on the minimal information available the only differences evident between the predictions made by Create and those made by WSP are 2 dB in the assumed sound power level and a 1 m difference in the assumed separation distance between source and receptor (which together could account for a difference of just 3 dB).
- 4.3.56 In view of the above I do not understand how Create has predicted such a large difference in sound levels, but I am confident that the baseline and predictions used by WSP are adequate and appropriate.
- 4.3.57 Even if one applies the higher sound power level and smaller separation distance adopted by Create, the addition of +3 dB to the sound level predicted by WSP (resulting in a predicted sound level of 53 dB $L_{Aeq,T}$, compared with a baseline of 49 dB $L_{Aeq,T}$) would still only align with a minor (not significant) impact during the daytime. For that reason, it would not change the assessment outcome.
- 4.3.58 At paragraph 6.6 of CD23-17 Create states that both the ES (Table TR1-3-3 of CD1-11.01, page 10) and the DMRB (Table 3.54a of CD15-05, page 23) *'assess the difference in the 10th percentile sound levels (dB $L_{A10,T}$), over an 18 hour period'*. On that basis Create assert that CRTN (CD15-04) should not have been used as the numbers of buses will not meet the minimum threshold for CRTN calculations (50 vehicles per hour).
- 4.3.59 In fact, as stated at paragraph 5.4.32 of CD1-11.01, page 26 the WSP sound level predictions for the off-line sections of the busway (where the flows will fall below the CRTN threshold) were not based on CRTN or the $L_{A10,18h}$ metric. They were derived

using the calculation set out in paragraph 5.4.32 of CD1-11.01, page 26 (which is the same as equation 8 of CD15-11) which provides hourly average ambient sound levels ($L_{Aeq,1h}$). It was these values that were correlated with the ambient $L_{Aeq,1h}$ values that had been measured during the WSP survey.

- 4.3.60 Create appear to accept this approach as they acknowledge, at paragraph 6.7 of CD23-17, that *'it is a sensible conclusion that the change in ambient noise level can be assessed in a similar fashion'*.
- 4.3.61 At paragraph 6.8 of CD23-17, page 148 Create state that (based on its Table 6.1) noise from the busway would result in *'a significant adverse impact for the residents of Clare Hall and Brian Pippard'*. I do not agree with this statement, or the predictions Create has presented to support it.
- 4.3.62 Paragraphs 6.9 and 6.10 of CD23-17, page 148 highlight a single contextual factor – that the introduction of the busway will alter the acoustic character of the area. This is just one of several contextual factors which should properly be considered (see Table 3.60 of CD15-05, page 25) any one of which is capable of modifying the initial numbers-based outcome. Most of these would justify a reduction in the magnitude of any apparent impact, for example:
- The magnitude of change in the long-term would be assessed as negligible based on CD15-05 Table 3.54b. This can justify moderate or major changes predicted in the short-term as being considered not significant (CD15-05, page 26, Table 3.6, second row).
 - The predicted sound levels are significantly below the SOAEL and marginally below the LOAEL (and will be below both, subject to the controls suggested at paragraphs 3.6.15 to 3.6.18 above). See (CD15-05, page 26, Table 3.6, third row).
 - All habitable rooms would meet appropriate internal acoustic criteria (see Table 4, and Note 7 to that table, of CD15-08, page 12), even with windows open.
 - All external amenity areas would meet acceptable external criteria (see paragraph 7.7.32 of CD15-08).
- 4.3.63 Although it is not explicitly mentioned as a contextual factor in Table 3.6 of CD15-05, page 25, I consider it relevant that the majority of receptors are not conventional homes but are temporary accommodation linked to the Clare College. CD15-05 does differentiate between dwellings and 'other noise sensitive receptors' (which include educational uses) in its operational noise reporting tables (CD15-05, page 24, Table 3.55a and 3.55b). Residents who newly occupy the affected rooms at Clare Hall following the opening of the busway will not be aware of any change in sound levels/character (because they did not reside there prior to the busway becoming operational) which, in my opinion, reduces any possible long-term impact that could be based on those changes in sound level.
- 4.3.64 At paragraphs 6.11 to 6.13 of the Create TN (CD23-17, page 149), Create suggests that, based on its predictions, a significant adverse effect could also occur during the first hour of the night-time, even based on a reduced number of hourly bus

movements (eight per hour). I do not agree with this opinion and, as I explain at paragraph 3.6.15 above, based on my predictions, a similar reduction in the number of buses (nine per hour at Clare Hall), would reduce any potential noise impact so far as to be not only below the onset of significance but also below the night-time LOAEL (40 dB $L_{Aeq,8h}$).

- 4.3.65 At paragraph 6.13 of CD23-17, page 149 Create suggests that *'As the information is not currently available, then we would suggest that the effect cannot be simply downgraded without evidence to substantiate this statement'*. As I have explained in paragraph 3.6.17 above, the applicant is prepared to commit to a condition requiring reduced flows of Euro VI buses, or the use of electric buses, as necessary to ensure that significant adverse noise effects are avoided.
- 4.3.66 At paragraph 6.15 of CD23-17, page 149 Create states it *'predict the sound levels to range from 55 dB to 56 dB $L_{Aeq,T}$ for the amenity spaces directly overlooking Rifle Range Road'*. Create has stated, at paragraph 6.3 of CD23-17, page 148, that it predicts 56 dB $L_{Aeq,1h}$ at the facades of Clare Hall and the Brian Pippard Building which it says are approximately 7 m from the busway.
- 4.3.67 The Create sound level predictions are far higher than those predicted by WSP and, as I explain at paragraph 4.3.56 above, I do not understand how those predictions are supported. However, in my view the very narrow strip of land between the boundary fence adjacent to the proposed busway and those buildings does not comprise useable amenity space in any event. Furthermore, the more open garden areas associated with the Clare Hall buildings to the west (9 & 9a Herschel Road and Gillan Beer House, for example) are substantial and, even based on the Create predictions, will generally meet the external amenity criteria.
- 4.3.68 I acknowledge that there are some small areas of balcony on the south elevation of the Brian Pippard Building which will overlook the busway but, based on the WSP predictions, these will only be exposed to 50 dB $L_{Aeq,16h}$, which is compliant with the most stringent applicable criterion (CD15-08 paragraph 7.7.3.2).
- 4.3.69 To summarise on operational noise, I disagree with the Create assertion that noise from busway would amount to a significant adverse impact. In-fact, based on the additional mitigation measures to which the applicant is prepared to commit (the reduction in bus numbers or use of electric buses during the night-time hours I describe in paragraph 3.6.17 above), I would conclude that there will be no adverse impact, in planning terms, from operational noise.

7) Operational Vibration

- 4.3.70 At paragraph 7.1 of CD23-17, page 150 Create acknowledges that the WSP ES did not assess potential impacts from operational vibration (as it was formally scoped out of the ES) and agrees that operational vibration is unlikely to be an issue.

8) Conclusions

- 4.3.71 The Create TN (CD23-17) presents its conclusions presented at section 8.0 of CD23-17, page 151. The conclusions include the following key points:

- 1) Create believe that construction noise could result in a significant adverse impact at Clare Hall. I do not agree and am confident that the draft CoCP (CD1.26) and the LEMP that will be developed in due course will ensure that appropriate management controls and mitigation measures are in place to avoid significant adverse effects or impacts occurring.
- 2) Create believe that construction noise will result in a significant adverse impact at Clare Hall. I do not agree. WSP has predicted that a significant adverse impact could be avoided by the selection and use of appropriate plant. I am confident that the draft CoCP (CD1.26) and the LEMP that will be developed in due course will be capable of ensuring that significant adverse effects from construction vibration can be avoided.
- 3) Create has predicted that operational noise from the guided busway would result in a significant adverse impact. I do not agree. Whilst I recognise that significant noise impacts could occur during the first hour of the night-time (23:00-00:00), this can be avoided by limited the numbers, or types, of buses using the busway at that time. This was acknowledged in the ES (paragraph 5.4.77 of CD1-11.01, page 30) and I have explained, in paragraphs 3.6.15 to 3.18 above, the applicant's willingness to commit to bus numbers/types that will avoid significant adverse impact from occurring.

4.4 **Representation** CD2-OBJ-252 Nigel Maquire (PX Farms)

- 4.4.1 This objection suggests that *'there is not adequate provision in place to reduce the visual and noise intrusion of the scheme'*, primarily in the context of the proposed travel hub.
- 4.4.2 With respect to noise, I do not agree with the cited part of the objection. A LEMP will be adopted to minimise noise and vibration from the construction phase as far as practicable, based on the draft CoCP (CD1-26).
- 4.4.3 Substantial, landscaped and planted buffers are proposed between the internal roads of the travel hub and the residential receptors to the north and west. No significant noise effects are anticipated from the operation of the travel hub (CD1-11.01, page 25 paragraph 5.4.28) or the roads in proximity to it (CD1-11.01 paragraph 5.4.13).

4.5 **Representation** CD2-OBJ-290 P Godfrey Deere

- 4.5.1 This objection suggests that *'The construction impacts, such as pollution, noise, landscape scars are environmentally damaging'*.
- 4.5.2 I recognise that there will be noise impacts from the construction phase. Some adverse noise impacts are unavoidable, but they will be temporary and appropriately minimised via the adoption of a LEMP.

4.6 **Representation** CD2-OBJ-311 A Gannon

- 4.6.1 This objection suggests *'The busway will not improve air quality, instead it will add to light and noise pollution'*.
- 4.6.2 With respect to noise, 'pollution' will be very limited in extent, duration and degree and subject to implementation of the mitigation options presented at paragraph

3.6.17 above. There should be no significant adverse effects from the operation of the proposed busway.

5. CONCLUSIONS

- 5.1 I have concluded that the assessment of the potential noise and vibration impacts from the scheme have been adequately assessed in in Section 7.3 of the ES Main Report (CD1-10.01) and the Technical Report 1: Acoustics (CD1-11.01).
- 5.2 These reports acknowledge that significant adverse noise impacts could occur from the construction of the scheme if sufficient mitigation measures are not employed.
- 5.3 Receptors in proximity to the proposed Travel Hub, the proposed retaining walls north of St Neots Road (Childerley Gate) and Bin Brook Bridge (Newnham) will be most vulnerable to noise impacts during the construction phase.
- 5.4 Noise mitigation incorporating suitable plant/equipment, operating practices, working hours and potential restrictions to durations of particular stages are outlined in the draft CoCP (CD1.26) will be incorporated in an approved LEMP in due course to ensure that adverse noise impacts are minimised as far as is practicable. Adherence to the CoCP (once approved by the local planning authority) and the approved LEMP are required by proposed conditions 8 and 9 (CD1-14). The contractor will therefore be obliged to adhere to the mitigation measures agreed therein.
- 5.5 Subject to the controls referred to in the paragraph above, vibration from the construction phase should not cause any significant adverse impacts at residential receptors, although liaison with the operators of vibration-sensitive facilities in proximity to the scheme will take place at the appropriate time to ensure that the LEMP minimises potential conflicts with them.
- 5.6 Noise from the operation of the scheme is predicted to not cause any significant adverse noise impacts during the daytime. It is acknowledged at paragraphs 5.4.40 and 5.4.77 of CD1-11.01, page 27 that, based on the precautionary assessment inputs adopted at the application stage, significant adverse noise impacts could occur at receptors in proximity to the offline sections at either end of the scheme during the night-time. However, as I explain in paragraph 3.6.16 above, these adverse impacts will not in-fact occur due to the commitments the applicant has made which could be incorporated into a condition such as the one I have suggested at paragraph 3.6.17.

6. STATEMENT OF TRUTH

The evidence which I have prepared and provide in this Proof of Evidence is true and is given in accordance with the guidance of my professional institution. I confirm that the opinions expressed are my true and professional opinions.