



The Sizewell C Project

6.14 Environmental Statement Addendum Volume 1: Environmental Statement Addendum Chapters Chapter 9 Rail

Revision: 1.0
Applicable Regulation: Regulation 5(2)(a)
PINS Reference Number: EN010012

January 2021

Planning Act 2008
Infrastructure Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009



CONTENTS

9	RAIL	1
9.1	Introduction	1
9.2	Update to the description of development.....	2
9.3	Noise and vibration	5
9.4	Air quality	31
9.5	Terrestrial ecology and ornithology	37
9.6	Terrestrial historic environment.....	39
	REFERENCES.....	40

TABLES

Table 9.1: Summary of internal criteria for combined groundborne and low frequency airborne railway noise (medium sensitivity receptors)	13
Table 9.2 [extracted from Table 1.1 of Volume 9, Appendix 4B of the ES (Doc Ref. 6.10) [APP-546]]: Predicted construction train numbers	24

PLATES

None provided.

FIGURES

None provided.

APPENDICES

Appendix 9.2.A	Track changed version of Volume 9, Chapter 2 of the ES (Doc Ref. 6.10) [APP-541]
Appendix 9.3.A	August 2020 Rail Noise and Vibration Survey
Appendix 9.3.B	Woodbridge Survey Results
Appendix 9.3.C	Update of Volume 9 Appendix 4B of the ES
Appendix 9.3.D	Sleep Disturbance Assessment
Appendix 9.3.E	Draft Rail Noise Mitigation Strategy
Appendix 9.4.A	Rail Air Quality Baseline
Appendix 9.4.B	Receptors With A Change In Magnitude Of Change Descriptors

Appendix 9.5.A	Baseline Ecology Survey Report 2020
Appendix 9.6.A	Green Rail Route Archaeological Evaluation Report

9 RAIL

9.1 Introduction

9.1.1 This chapter of the **ES Addendum** provides an update to **Volume 9** of the **ES** (Doc Ref. 6.10) [APP-538 to APP-571], which presented details of the rail proposals for the Sizewell C Project outside of the main development site.

9.1.2 The proposals detailed in **Volume 9** of the **ES** (Doc Ref. 6.10) [APP-538 to APP-571] included:

- The part of the green rail route comprising a temporary rail extension of approximately 1.8 kilometres (km) from the existing Saxmundham to Leiston branch line to the proposed B1122 (Abbey Road) level crossing inclusive (referred to as the 'proposed rail extension route'); and
- Saxmundham to Leiston branch line upgrades (including track replacement and level crossing upgrades) (henceforth referred to as the 'proposed rail improvement works').

9.1.3 This chapter presents the Additional Information prepared and the proposed changes to the proposed rail extension route and the proposed rail improvement works since the submission of the Application in May 2020.

9.1.4 The proposed green rail route in its entirety comprises of a temporary rail extension of approximately 4.5km from the existing Saxmundham to Leiston branch line to a terminal within the main development site. The part of the green rail route between the proposed B1122 (Abbey Road) level crossing and the terminal within the main development site is detailed in **Volume 2** of the **ES** (Doc Ref. 6.3) [APP-184 to APP-186] and **Chapter 2** of this **ES Addendum**.

9.1.5 The Additional Information of relevance to **Volume 9** of the **ES** (Doc Ref. 6.10) [APP-538 to APP-571] includes:

- Further baseline noise and vibration and assessment work undertaken since the submission of the Application;
- The draft Rail Noise Mitigation Strategy;
- Refinements to air quality modelling to account for new information published by Defra and updated traffic estimates from the refined strategic traffic model (refer to the **Transport Assessment Addendum** (Doc Ref. 8.5(A) Ad) for further information);

- Updated ecological baseline information; and
- An updated archaeological evaluation report.

9.1.6 The proposed changes of relevance to **Volume 9** of the **ES** (Doc Ref. 6.10) [APP-538 to APP-571] comprise the potential change to the number of train movements (**Change 1**), which is explained in the updated **Freight Management Strategy** (Doc Ref. 8.18).

9.1.7 Furthermore, the revised assessment for air quality has considered the reduction in the Heavy Goods Vehicles (HGV) movements, associated with **Change 1** as well as **Change 2** (an enhancement of the permanent beach landing facility and construction of a new, temporary beach landing facility) described further in **Chapter 2** of this **ES Addendum**. The revised transport and noise and vibration assessments on HGV movements on the roads are presented in **Chapter 2** of this **ES Addendum**, in line with the structure of the ES.

9.1.8 A review of any Additional Information and the proposed changes has been undertaken by EIA specialists across all technical assessments presented in **Volume 9** of the **ES** (Doc Ref. 6.10) [APP-545 to APP-571].

9.1.9 Updates to the assessments of noise and vibration, air quality, terrestrial ecology and ornithology and terrestrial historic environment present in **Chapter 4 Noise and Vibration** [APP-545 to APP-547], **Chapter 5 Air Quality** [APP-548 to APP-550], **Chapter 7 Terrestrial Ecology and Ornithology** [APP-555 to APP-557], and **Chapter 9 Terrestrial Historic Environment** [APP-528 to APP-530] of **Volume 9** of the **ES** (Doc Ref. 6.10) are considered within **sections 9.3 to 9.6** of this chapter.

9.1.10 The review concluded that these updates do not affect the following technical assessments presented within: **Chapter 6 Landscape and Visual** [APP-552 to 554], **Chapter 8 Amenity and Recreation** [APP-558 to APP-559], **Chapter 10 Soils and Agriculture** [APP-563 to APP-565], **Chapter 11 Geology and Land Quality** [APP-566 to APP-569] and **Chapter 12 Groundwater and Surface Water** [APP-570 to APP-571] of **Volume 9** of the **ES** (Doc Ref. 6.10).

9.2 Update to the description of development

9.2.1 This section presents details on the proposed changes to the proposed development of the proposed rail extension route and the proposed rail improvement works, since the preparation of **Chapter 2** of **Volume 9** of the **ES** (Doc Ref. 6.10) [APP-541 to APP-543]. An updated version of **Chapter 2** in tracked changes, to include these changes, is provided within **Volume 3, Appendix 9.2.A** of this **ES Addendum**.

- 9.2.2 The potential change to rail movements on the East Suffolk line, the Saxmundham to Leiston branch line and proposed rail extension route arises from the potential to increase the frequency of freight train movements to facilitate bulk material imports by rail (**Change 1**).

a) Proposed development in the Application

- 9.2.3 In the early years, rail operations would consist of up to two freight trains in and two trains out (four movements) at night on the East Suffolk line between 23:00 to 06:00. Trains would travel from the East Suffolk Line along the upgraded Saxmundham to Leiston branch line to newly constructed sidings in the land east of Eastlands Industrial Estate (LEEIE). It is anticipated that the trains would arrive on the branch line at night and be held there overnight, proceeding to LEEIE after 7am in the morning. No trains would travel through Leiston at night. Once unloaded, the trains would leave LEEIE in the evening, be held again on the branch line and then return to the main East Suffolk Line at night. No change is proposed to these early years rail operations.
- 9.2.4 The rail extension route is expected to be constructed and operational within the first two years of the Sizewell C Project construction programme and would provide a direct rail route from the Saxmundham to Leiston branch line into the temporary construction area on the main development site. Once operational, trains would no longer need to be held on the branch line and could proceed directly to new rail sidings constructed within the temporary construction area.
- 9.2.5 The Application assumes up to three train deliveries (six movements) to the main development site after the early years, five days per week. Five of these rail movements (three inbound and two outbound) are assumed to happen at night (defined as between 23:00 and 07:00) and one during the day (i.e. after 07:00).

b) Description of the proposed change

- 9.2.6 SZC Co. has continued to engage in detailed discussions with Network Rail and with freight operating companies to investigate the full potential capacity for rail freight transport. This work is continuing but it has identified the following potential to increase the volume of material moved by rail:
- The potential to run four trains overnight, rather than three;
 - The potential to run trains up to six days a week; and
 - In addition, SZC Co. is investigating whether a fifth daily train may be possible for a limited period during the peak of construction.

- 9.2.7 Further work is underway to assess the ability of the mainline timetable to accommodate additional train movements, whilst joint working with Network Rail is continuing in order to establish the capacity of the East Suffolk Line. It is possible that this work could conclude that the additional train capacity cannot be delivered.
- 9.2.8 However, for the purposes of assessment, a total of four train deliveries (eight train movements) per day is assumed for the majority of the construction phase. The main exceptions to this are during the early years (as set out above) whilst the rail extension route is under construction, and towards the end of construction phase whilst the rail extension route is being decommissioned.
- 9.2.9 For a period of approximately two years during the construction phase when demand for bulk material imports is at its highest, a fifth train delivery (10 train movements in total) per day is assumed for the purposes of assessment.
- 9.2.10 As with the submitted Application, train movements are likely to operate predominantly at night, after 23:00. For the purposes of assessment, the reasonable worst case scenario relevant to each environmental topic has been assumed. These comprise variously:
- 8 train movements take place overnight and 2 during the day; or
 - 7 train movements take place overnight, with up to three daytime movements per day.
- 9.2.11 For assessment purposes, it is also assumed that trains would run six days per week, including Sunday night / Monday morning.
- 9.2.12 Each train is assumed to include up to 20 wagons and be capable of carrying up to approximately 1,250 tonnes of construction material.
- c) **Why is this change proposed?**
- 9.2.13 To deliver Sizewell C, construction material and equipment would need to be transported during the construction phase. In developing and designing the freight management strategy proposals, SZC Co. has sought opportunities to limit the impact of construction of Sizewell C on the local highway network wherever possible and to move materials by more sustainable modes (by rail and sea), where practical. Further details on proposed changes to marine infrastructure are set out in **Chapter 2** of this **ES Addendum**.

- 9.2.14 Through pre-application consultations and engagement with stakeholders and the public, SZC Co. has worked to find the most sustainable freight management strategy and consulted widely on options to minimise the impacts on local communities.
- 9.2.15 Since the submission of the Application, a number of stakeholders have urged that every effort should be made to maximise the use of rail and sea transport and, thereby, reduce HGV movements. At the same time SZC Co.'s project and contractor teams have continued to investigate ways to enhance the capacity for sustainable freight transport.
- 9.2.16 Additionally, detailed site investigation work has continued to finalise materials volumes, including the extent to which excavated material can be reused for infill or site landscaping. Further details on the updated materials management strategy are set out in **Chapter 2** of this **ES Addendum**.
- 9.2.17 As part of this work, contractors and transport logistics experts have been developing the procurement strategy for the Sizewell C Project's construction materials. That work has highlighted the ability to source aggregates and other materials from sources which are rail connected or which could (in some cases) potentially allow shipment by sea.
- 9.2.18 SZC Co. shares the objectives of stakeholders and the local community that goods should be moved sustainably, wherever possible, and that HGV numbers should be limited to those necessary for goods which cannot be moved by rail or sea. SZC Co.'s contractors also strongly favour the use of rail and sea because it can be highly efficient, reliable and cost-effective. Implementing these changes to the freight management strategy would likely result in approximately 60% of the construction materials (by volume) being moved by rail or sea, compared with approximately 40% estimated in the Application. Further detail is provided in the updated **Freight Management Strategy** (Doc Ref. 8.18).

9.3 Noise and vibration

a) Introduction

- 9.3.1 This section provides an addendum to the noise and vibration assessment at receptors affected by Sizewell C related rail movements. with reference to the following documents submitted with the Application:
- **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [[APP-545](#)];
 - **Volume 9, Appendix 4B** of the **ES** (Doc Ref 6.10) [[APP-546](#)];

- **Volume 9, Chapter 4** Noise and Vibration **Figures 4.1 - 4.4** of the **ES** (Doc Ref. 6.10) [[APP-547](#)];
- **Volume 1, Appendix 6G** of the **ES** (Doc Ref 6.2) [[APP-171](#)]; and
- **Volume 2, Appendix 11H** of the **ES** (Doc Ref 6.3) [[APP-210](#)].

9.3.2 This section presents Additional Information that has been gathered since the Application was made, and an assessment of the potential noise and vibration effects from the potential increase in rail movements during construction of Sizewell C (**Change 1**).

9.3.3 The noise and vibration assessment presented within this section only considers the operational use of construction trains as part of the construction of the Sizewell C Project; the potential effects associated with the construction of the rail infrastructure have not changed, and remain as described in **Volume 9, Chapter 4** of the **ES** (Doc Ref 6.10) [APP-545].

9.3.4 This section is supported by five appendices which are provided in **Volume 3** of this **ES Addendum**:

- **Appendix 9.3.A**, which presents a summary of the August 2020 noise and vibration survey work, and the implications of that work for the assessment of railway noise and vibration;
- **Appendix 9.3.B**, which presents a summary of the long-term monitoring of existing noise and vibration levels in Woodbridge, as correct to 1st November 2020;
- **Appendix 9.3.C**, which presents an update of the airborne noise modelling, as originally set out in **Volume 9, Appendix 4B** of the **ES** (Doc Ref. 6.10) [APP-546];
- **Appendix 9.3.D**, which sets out a summary of research on sleep disturbance, and how that research informed both the noise assessment in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545], and this current assessment update; and
- **Appendix 9.3.E**, which is the draft 'Rail Noise Mitigation Strategy' as was anticipated in paragraphs 4.7.10 and 4.7.22 in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545]. This contains the proposed mitigation to reduce railway noise and vibration, in a form that can be delivered by SZC Co.

9.3.5 To be clear about which trains are being considered, those trains proposed by SZC Co. for the transportation of construction materials are described in this chapter as ‘construction trains’. This enables the SZC Co. trains to be distinguished from existing passenger or freight services, and engineering trains.

b) Relevant Additional Information

9.3.6 Since submission of the Application, engagement with stakeholders has been ongoing, notably East Suffolk Council, Suffolk County Council, and Network Rail, and this has informed the work undertaken since the Application was made. This includes further baseline work undertaken to increase SZC Co.’s understanding of how much noise and vibration the construction trains are likely to generate, and how that noise and vibration propagates away from the relevant railway line. For groundborne noise and vibration, work has been undertaken to understand how railway noise and vibration interact with buildings along the line.

9.3.7 Relevant Additional Information for the assessment of noise and vibration effects from rail movements includes the following new baseline survey reports:

- Results of airborne noise, and groundborne noise and vibration measurements undertaken in August 2020 using a test train commissioned by SZC Co. along the Saxmundham to Leiston branch line and East Suffolk line in Woodbridge (refer to **Volume 3, Appendix 9.3.A** of this **ES Addendum**); and
- Results of noise and vibration measurements of existing railway noise and vibration measurements at Woodbridge, which have been carried out between March 2020 and 1st November 2020, and remain ongoing (refer to **Volume 3, Appendix 9.3.B** of this **ES Addendum**).

9.3.8 The additional surveys have been undertaken to provide the following Additional Information:

- The airborne noise, and groundborne noise and vibration measurements undertaken as part of the August 2020 surveys, which provided:
 - additional source information for Class 66 locomotives and new source information for Class 68 locomotives¹; and
 - local, site-specific information on the propagation of groundborne noise and vibration.

¹ Class 66 and Class 68 locomotives are two common types of railway freight engine.

- The ongoing noise and vibration surveys at Woodbridge have provided a large amount of information on noise and vibration levels generated by existing trains using the East Suffolk line.

9.3.9 The additional surveys and assessment have informed the draft 'Rail Noise Mitigation Strategy' (**Appendix 9.3.E**) which contains the proposed mitigation to reduce railway noise and vibration.

c) Relevant changes

9.3.10 Relevant changes for the assessment of noise and vibration include the potential for additional construction train movements (**Change 1**) to facilitate a reduction in the number of HGV movements on the road network, as described within **Chapter 2** of the **ES Addendum**.

9.3.11 The noise and vibration assessment presented in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] was based on two construction trains per day in the 'early years' before the proposed rail extension route is constructed, and three construction trains per day in the 'later years' of construction once the proposed rail extension route is in place.

9.3.12 It was expected that all four movements in the 'early years', these being the two construction trains operating once in each direction, would occur at night, albeit with daytime only operations through Leiston. In the 'later years', it was expected that five of the six movements, would be at night, with the sixth taking place during the daytime.

9.3.13 The update to the **Freight Management Strategy** (Doc Ref. 8.18) explains that it is proposed to change the Application by recognising the potential for four construction trains per day in the 'later years' once the proposed rail extension route is in place, with the potential for a fifth construction train, if timetabling permits.

9.3.14 The construction train studies undertaken by SZC Co. suggest that the seventh and eighth movements associated with the fourth construction train would both be at night. There is also the possibility that the single daytime movement previously assessed may also occur at night. So that there is flexibility in the timetabling for the fourth train, both seven and eight night-time construction train movements are considered in this section.

9.3.15 If a fifth construction train is possible, it is anticipated that both movements would be during the daytime.

d) Updated assessment – Additional Information

- 9.3.16 As a result of the additional baseline work, it has been possible to increase SZC Co.'s understanding of the likely airborne noise emissions from different freight locomotives, and to amend the approach to the assessment of groundborne noise in recognition of the particular circumstances that apply for the Application.

d) i) Baseline

- 9.3.17 The baseline environment, in terms of the existing noise and vibration environment at and around sensitive receptors close to the railway, has not altered since the Application was submitted.
- 9.3.18 Further work has been undertaken to increase SZC Co.'s understanding of how noise and vibration could be generated by the construction trains, and how that noise and vibration will propagate away from the track towards nearby sensitive receptors.
- 9.3.19 The full detail from the surveys is provided in **Volume 3 Appendix 9.3.A** and **Volume 3, Appendix 9.3.B** of this **ES Addendum**.
- 9.3.20 Measurements were undertaken in August 2020 of a test train commissioned by SZC Co. operating in both directions along the Saxmundham to Leiston branch line over three days. The running of the test train permitted numerous airborne noise and groundborne noise and vibration measurements to be taken in a variety of locations, including within residential properties along the Saxmundham to Leiston branch line.
- 9.3.21 Measurements were also undertaken of the test train along the East Suffolk line in Woodbridge as the train passed at the start and end of the day.
- 9.3.22 The full detail of the August 2020 surveys is contained in **Volume 3, Appendix 9.3.A** of this **ES Addendum**.
- 9.3.23 The longer-term measurements in Woodbridge have captured noise and vibration levels from existing trains on the East Suffolk line over a period of months. The full detail of the Woodbridge survey is contained in **Volume 3, Appendix 9.3.B** of this **ES Addendum**.
- 9.3.24 The Additional Information provided by these surveys, has resulted in the following outcomes:
- For the assessment of airborne sound:

- the L_{AFmax} source terms adopted in **Volume 9, Appendix 4B** of the **ES** (Doc Ref. 6.10) [APP-546] for the proposed construction trains were an over-estimate of the likely levels for Class 66 locomotives;
- the L_{AFmax} source terms adopted in **Volume 9, Appendix 4B** of the **ES** (Doc Ref. 6.10) [APP-546] can be considered to represent Class 68 locomotives, providing confidence that the assessed outcomes will translate between locomotive types;
- For the assessment of groundborne noise:
 - the combination of groundborne noise and low frequency airborne sound is an important consideration that should be taken into account in the assessment, rather than groundborne noise in isolation.. This is explained further below;
 - consideration should be given to daytime effects of groundborne noise, which had previously been concluded to give rise to **no significant effects** in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].

d) i) a) Airborne Noise

- 9.3.25 For airborne noise, only a minor change is proposed to the assessment as a result of the Additional Information (i.e. the additional surveys).
- 9.3.26 The L_{AFmax} source terms as described in **Volume 9, Appendix 4B** of the **ES** (Doc Ref. 6.10) [APP-546], have been retained despite them being higher than they are required to be, which will lead to a robust assessment of noise from passing construction trains.
- 9.3.27 The calculation of the average daytime and night-time sound levels in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] was based on the methods set out in the ‘Calculation of Railway Noise’ (Ref. 1), and this remains the case; the Additional Information from the surveys does not affect this.
- 9.3.28 As a result of the Additional Information, the way in which the locomotives are modelled on the Saxmundham to Leiston branch line in the later years has been altered so that they are assumed to run under ‘normal power’ rather than ‘full power’ when travelling east, as was previously assumed in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].

d) i) b) Groundborne Noise and Vibration

- 9.3.29 For groundborne noise, the Additional Information has led to a review and change in assessment method that better accounts for the circumstances that apply to the Application. The circumstances are that groundborne noise from trains will be heard in combination with low frequency airborne noise entering the dwellings primarily through the windows, the trains are to be introduced to an existing line, and those trains are different to the majority of the existing regular services.
- 9.3.30 As far as SZC Co. is aware, no project since the publication of the 'Noise Policy Statement for England' (Ref. 2) has been required to address the in-combination effects of groundborne and airborne noise, as a result of which there are no precedents for criteria to adopt. There have been studies on the effect of noise and tactile vibration experienced in combination, but no studies on the effect of airborne and groundborne noise experienced in combination.
- 9.3.31 The occupants of a building typically have more options for controlling airborne noise than they do for groundborne noise; airborne noise can generally be reduced by closing the windows, or if required, by utilising windows with a better acoustic performance. However, there are no equivalent options for groundborne noise; typically, this cannot be reduced and is often present in rooms not facing the railway.
- 9.3.32 There is also a difference in how the peaks of airborne and groundborne noise are generated. For low speed freight trains, airborne L_{Amax} values are likely to be caused by locomotive engines and exhausts, whereas groundborne noise is generated by wheel/rail-excited rolling noise particularly where wheels pass over track joints.
- 9.3.33 The assessment of development projects nearly always involves assessing new railway lines, which give rise to groundborne noise in locations where there is no significant baseline. There may be exceptions where proposed new and existing lines cross or converge, but in those cases established practice in London, where there are significant underground railways and where groundborne noise is commonly assessed, is to assess groundborne noise from the new line only. It is expected that future improvements to the existing infrastructure will bring about reductions in the pre-existing groundborne noise levels. The need to assess the introduction of new, and significantly different, trains operating at different speeds on the same track along with pre-existing trains has not arisen.

- 9.3.34 Where there is intensification of an existing railway line, as opposed to a new line, L_{Amax} is not a full indicator of the effect of adding a proposed new service to the baseline service. The L_{Aeq} index is considered the logical approach.
- 9.3.35 Historically there has been no requirement to set different groundborne noise thresholds for times other than night, as it is generally accepted that noise sensitivity at night is greater than at other times, and it follows that if an acceptable level of groundborne noise is achieved for trains operating at night, then the situation in the day and evening will also be acceptable. In principle, this seems a sensible approach and it may explain why there are no established thresholds for daytime groundborne noise.
- 9.3.36 This link between daytime and night-time outcomes is underpinned by the use of the L_{Amax} metric, which is not affected by the number of trains, and by the similarity in operational characteristics between the daytime and night-time, i.e. the railway operates in a similar manner during the daytime and night-time, other than the number of trains, which is typically the case.
- 9.3.37 There is also no definitive information on which to set a threshold based on L_{Amax} for periods other than night.
- 9.3.38 As described in **Appendix B of Volume 3, Appendix 9.3.A** of this **ES Addendum**, an L_{Aeq} -based approach is recommended for the daytime to better reflect the effect of adding new and different types of train to the existing services along the East Suffolk line.
- 9.3.39 The following LOAEL and SOAEL thresholds have been defined for groundborne noise for the daytime period in terms of the L_{Aeq} index:
- LOAEL: 25dB $L_{Aeq,16hrs}$
 - SOAEL: 40dB $L_{Aeq,16hrs}$
- 9.3.40 These L_{Aeq} thresholds are internal levels and should be assessed on the basis of closed windows, as is the case for the night-time L_{ASmax} thresholds.
- 9.3.41 This L_{Aeq} -based approach is not as well suited to the Saxmundham to Leiston branch line, where there are no regular existing services; the Sizewell C construction trains will be a new service, not an additional service. For the Saxmundham to Leiston branch line, it is recommended that the night-time L_{ASmax} thresholds are applied, although treating day and night-time in the same way can be considered a conservative approach. The same reasoning also applies to the proposed rail extension route, although there are no receptors close enough to the proposed rail extension route for groundborne noise to be a material issue.

9.3.42 **Table 9.1** summarises the groundborne noise thresholds now proposed for the project.

Table 9.1: Summary of internal criteria for combined groundborne and low frequency airborne railway noise (medium sensitivity receptors)

Period	LOAEL	SOAEL
Night-time (all locations)	35dB L _{ASmax}	50dB L _{ASmax}
Daytime (East Suffolk line only)	25dB L _{Aeq,16hrs}	40dB L _{Aeq,16hrs}
Daytime (Saxmundham to Leiston branch line and proposed rail extension route only)	35dB L _{ASmax}	50dB L _{ASmax}

9.3.43 Given these circumstances, the following approach to assessing groundborne and low frequency airborne noise in combination has now been adopted:

- airborne noise is assessed in isolation against the criteria set out in **Tables 4.7 and 4.16** in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] and against the criteria in the ‘Noise Mitigation Scheme’ (**Volume 2, Appendix 11H** of the **ES** (Doc Ref. 6.3) [APP-210]);
- groundborne noise, where it is present in combination with airborne noise from the same source, is assessed by considering the decibel sum of both the internal groundborne noise and the internal airborne noise in the octave bands up to and including 125Hz using ‘Slow’ time-weighting rather than ‘Fast’, assuming windows are fully closed;
- the combined groundborne and airborne noise levels, determined as above, are then assessed against the following LOAEL and SOAEL values in **Table 9.1**:
 - East Suffolk line during the daytime: L_{Aeq16hrs} thresholds;
 - East Suffolk line during the night: L_{ASmax} thresholds; and
 - Saxmundham to Leiston branch line and proposed rail extension route at any time: L_{ASmax} thresholds.

9.3.44 This combined approach is different to that set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545], but has been informed by the Additional Information.

- 9.3.45 This revised approach results in a more stringent test of groundborne noise, since the same assessment thresholds are applied to the combined night-time groundborne noise and low frequency airborne noise, not just to groundborne noise in isolation, as was the case in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545], and the daytime period is now fully assessed.
- 9.3.46 It is also noted that where references are made to minimum separation distances between receptors and ‘welded joints’ or ‘rail joints’, it is fish-plate joints or aluminothermic joints that are intended, since flash-butt or arc welded joints are considered to be the same as continuous rail, in terms of groundborne noise or vibration.
- 9.3.47 Switches and crossings are a special case insofar as they contain track elements that introduce a discontinuity into the track running surface. Where reference is made to minimum separation distances between receptors and ‘welded joints’ or ‘rail joints’, these apply to switches and crossings as well.

d) ii) **Environmental Design and Mitigation**

- 9.3.48 The mitigation measures set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545], have been refined, informed by the Additional Information. It is now possible to confirm further details of the mitigation, both in terms of specification and performance. **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] stated that a ‘Rail Noise Mitigation Strategy’ would be submitted, containing further detail of the proposed measures to control airborne and groundborne railway noise and vibration. A draft of this document is provided in **Volume 3, Appendix 9.3.E** of this **ES Addendum**. The document is in draft pending further engagement with Network Rail and freight operating companies, as well as further measurements of groundborne and airborne noise during the ‘early years’ of the project after the Saxmundham to Leiston branch line has been upgraded and all physical mitigation installed.
- 9.3.49 The mitigation that is contained in the draft ‘Rail Noise Mitigation Strategy’ includes:
- Installation of a crossover north of Saxmundham station and upgrades to the signalling system to permit trains to join or leave the Saxmundham to Leiston branch line without stopping, known as the ‘change arrangements at Saxmundham’.

- The Saxmundham to Leiston branch line will be upgraded with a refurbished trackbed, concrete or steel sleepers, and welded rails to provide a consistent rail cross-section consistent gauge, and smooth running surface.
- The proposed rail extension route will be constructed using the same approach as the upgraded Saxmundham to Leiston branch line.
- Under ballast mats will be installed where the Saxmundham to Leiston branch line or proposed rail extension route pass within 15 metres of a residential receptor, and will be installed for a minimum of 10 metres either side of the property. An alternative design may be substituted, if its effectiveness is equal and approved.
- Night-time speed limits of 10 mph will apply at three locations along the East Suffolk line: Woodbridge/Melton, Campsea Ashe, and Saxmundham. The locations are shown in **Figures 4.2 to 4.4** in **Volume 9** of the **ES** (Doc Ref. 6.10) [APP-547].
- Speed on the Saxmundham to Leiston branch line will be limited to 10mph during the early years.
- Pending the results of further assessment of the upgraded and mitigated Saxmundham to Leiston branch line during the early years operation, the speed limit on Saxmundham to Leiston branch line may be increased to 20mph. This further assessment work is described later in this section.
- The speed limit on the proposed rail extension route will match that applied to the Saxmundham to Leiston branch line. This enables constant train speeds to be maintained, thereby avoiding accelerating locomotive noise close to the north-western corner of Leiston.
- Class 66 locomotives will be used in preference to Class 68 locomotives, where there is equivalent choice.
- Night-time construction trains will not travel into or out of Leiston, instead being held on the Saxmundham to Leiston branch line to the west of the Saxmundham Road level crossing, at defined locations.
- Construction trains stabled overnight on the branch line will not be permitted to keep their engines idling.

9.3.50 It should be noted that the assessment that followed the August 2020 survey work, as set out in **Volume 3, Appendix 9.3.A** of this **ES Addendum** considered the potential for ‘coasting’ of engines in specific locations, to reduce groundborne and low frequency airborne noise levels. This is achieved by reducing the locomotive power to an idling setting, while not significantly reducing overall train speed.

9.3.51 This may have permitted higher speeds without increasing groundborne and low frequency airborne noise levels, thereby providing greater resilience to the train timetable. However, it has been found that while an effective measure in noise terms, it could not yet be delivered in a way that would be repeatable and enforceable. It has therefore not been included as a measure and the assessment presented in this section does not rely on ‘coasting’ as a mitigation.

d) iii) Assessment of Effects

d) iii) a) Construction

9.3.52 There are no changes to the assessment of construction noise and vibration contained in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] as a result of the Additional Information.

d) iii) b) Operation – Airborne Noise

9.3.53 There is a small change to the assessment of airborne sound as a result of the Additional Information. In general, the outcomes remain as set out in **Volume 9, Chapter 4** and **Volume 9, Appendix 4B** of the **ES** (Doc Ref. 6.10) [APP-545 and APP-546], other than where the original values are corrected, as described in **Appendix 9.3.C** of this **ES Addendum**. The corrections take account of minor errors in the noise model and do not change the conclusions of the assessment and identified effects, as set out in in **Volume 9, Chapter 4** and **Volume 9, Appendix 4B** of the **ES** (Doc Ref. 6.10) [APP-545 and APP-546].

9.3.54 As a result of the Additional Information, the way in which the locomotives are modelled on the Saxmundham to Leiston branch line in the later years has been altered so that they are assumed to run under ‘normal power’ rather than ‘full power’ when travelling east, as was previously assumed in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545]. This is considered an appropriate change as the measurements carried out in August 2020 suggested that ‘full power’ was not required to overcome the shallow gradient on the Sizewell to Leiston branch line. This Additional Information results in a reduction in the L_{AFmax} levels at three properties, those properties being Crossing Cottages, Crossing East and Kelsale Covert.

- 9.3.55 For Crossing East, the previously predicted major adverse effect becomes a moderate adverse effect, which remains **significant**, and for Crossing Cottages, the previously-predicted moderate adverse effect becomes a minor adverse effect, changing from a **significant** effect to a **not significant** effect. For Kelsale Covert, the previously predicted major adverse effect will remain a major adverse effect, with **no change** in significance.
- 9.3.56 These outcomes represent a small improvement in the outcomes in the later years relative to those set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545]. In summary, as a result of the additional work, the outcomes in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] for the Saxmundham to Leiston branch line would now be:
- Major adverse effects at two properties in the early years (Kelsale Covert and Westhouse Crossing Cottage), with a similar effect at the same two properties during the later years (Kelsale Covert and Westhouse Crossing Cottage) plus a moderate adverse effect at Crossing East.
 - For those properties expected to have a major adverse effect, it is expected that enhanced sound insulation would be available under the 'Noise Mitigation Scheme' (**Volume 2, Appendix 11H** of the **ES** (Doc Ref. 6.3) [APP-210]) so that the internal levels are reduced.
- 9.3.57 Properties predicted to be subject to a major adverse effect are also expected to exceed the SOAEL, and will benefit from enhanced sound insulation under the 'Noise Mitigation Scheme' (**Volume 2, Appendix 11H** of the **ES** (Doc Ref. 6.3) [APP-210]). The consequent reduction in the internal sound level is expected to avoid exceeding SOAEL.
- 9.3.58 Avoiding the SOAEL in this way, i.e. within the affected property, is an appropriate response and directly accords with the approach taken in the noise Planning Practice Guidance (Ref. 3), which recognises the use of noise insulation to avoid the SOAEL. The use of insulation as a mitigation is also identified in paragraph 5.11.13 of the NPS EN-1 (Ref. 4) as a valid response in comparable situations.
- 9.3.59 Whilst the SOAEL is an external level, the effect that is to be avoided is an internal consideration, i.e. sleep disturbance. The conclusions set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] related solely to the external levels, so while the improved sound insulation available under the 'Noise Mitigation Scheme' (**Volume 2, Appendix 11H** of the **ES** (Doc Ref. 6.3) [APP-210]) was set out as relevant and appropriate secondary mitigation, the effect magnitudes were not amended as a result. The mitigation would address the effect internally, at the location where the effect is relevant, but as the mitigation would not change the

external noise levels, the magnitude of the effect is not reduced in the terms set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].

- 9.3.60 It is important to recognise the true benefit of the enhanced sound insulation available under the ‘Noise Mitigation Scheme’ as a direct method of reducing the adverse effect. The internal noise levels for the properties listed above are expected to be reduced to below 65dB L_{AFmax} in all cases once the enhanced glazing available under the ‘Noise Mitigation Scheme’ is taken into account.
- 9.3.61 The 65dB L_{AFmax} value was the internal root of the SOAEL, derived from research by Basner et al (Ref. 5 and Ref. 6), as applied in the case of HS2. Detail of the derivation of the SOAEL and its internal equivalent value is set out in **Volume 1, Appendix 6G** of the **ES** (Doc Ref. 6.2) [APP-171] and in **Volume 3, Appendix 9.3.D** of this **ES Addendum**.
- 9.3.62 All of the properties identified as being adversely affected were former crossing cottages, as their names suggest, and are properties that were previously tied to the railway. As a result of their previous railway function, they are all very close to the railway line, generally within 5 metre of the nearest rail. While significant adverse effects are considered and dealt with in accordance with the planning policy and guidance in the assessment, their proximity to the railway line as a result of their former function is a material consideration.
- 9.3.63 On this basis, it is considered that the requirements of planning policy are met for the Saxmundham to Leiston branch line.
- 9.3.64 The outcomes for the East Suffolk line remain as described in **Volume 9, Chapter 4** of the **ES** (Doc Ref 6.10) [APP-545]. Subject to the imposition of night-time 10mph speed limits in Woodbridge/Melton, Campsea Ashe and Saxmundham, the outcomes are expected to be as follows:
- Prior to the consideration of secondary mitigation in the form of the change arrangements at Saxmundham junction, 40 to 50 properties are expected to be subject to major adverse effects with sound levels above 77dB L_{AFmax} . This will reduce to between 5 and 10 properties once the change arrangements at Saxmundham junction are implemented.
 - Properties subject to railway noise of more than 77dB L_{AFmax} (free-field) would be above SOAEL and eligible for sound insulation under the ‘Noise Mitigation Scheme’ (**Volume 2, Appendix 11H** of the **ES** (Doc Ref. 6.3) [APP-210]) and the internal sound levels will be reduced in the same manner as described for the Saxmundham to

Leiston branch line. The policy requirement to avoid exceeding the SOAEL will therefore be met.

- Without implementing the change arrangements at Saxmundham junction, 150 to 160 properties are expected to be subject to moderate adverse effects with sound levels between 70 and 77dB L_{AFmax} . This reduces to between 100 and 110 properties when the change arrangements at Saxmundham junction are implemented. The application of speed restrictions and the change arrangements at Saxmundham junction meet the policy requirements to mitigate and minimise adverse impacts, i.e. those that fall above the LOAEL, but below the SOAEL. Further mitigation in the form of the highway improvements proposed in the Application and Change 2 (enhanced BLF capacity) are proposed, which create the opportunity to limit train movements.
- A further 390 to 410 properties are predicted to be subject to sound levels of 60 to 70dB L_{AFmax} , which would be classed as minor adverse effects and are **not significant** in EIA terms. The number of properties predicted to be subject to minor adverse effects with sound levels of 60 to 70dB L_{AFmax} reduces to between 320 and 350 once the change arrangements at Saxmundham junction are implemented.

d) iii) c) Operation – Groundborne Noise and Vibration

- 9.3.65 The Additional Information on groundborne noise and vibration has facilitated an update to the assessment set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].
- 9.3.66 The Additional Information suggests that the groundborne noise outcomes and effects along the Saxmundham to Leiston branch line were over-estimated in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545]. There is a high level of confidence in the Additional Information as it is based on site-specific measurements, which account for the particular ground and building conditions encountered during the measurements.
- 9.3.67 The assessment of combined groundborne and low frequency airborne noise, which is now proposed, shows the following outcomes along the Saxmundham to Leiston branch line, where there are no welded joints within 25 metres of a receptor:
- Groundborne noise and low frequency airborne noise is assessed against the same L_{ASmax} thresholds for both daytime and night-time.
 - With a construction train speed limit of 10mph, the SOAEL of 50dB L_{ASmax} will not be exceeded at any property along the branch line,

where the track is upgraded with long welded rail and concrete or steel sleepers.

- Irrespective of the construction train speed, it will be necessary to use under ballast mats where there is a receptor within 15 metres of the line to maintain a similar relationship between the track and surrounding ground as was encountered during the August 2020 survey. In broad terms, laying new track and ballast may stiffen the connection between the track and the ground, and under ballast mats will neutralise this effect.
- Alternatives to under ballast mats may be acceptable, where the same effect is achieved.

9.3.68 In terms of groundborne noise alone, the assessment for the Saxmundham to Leiston branch line shows that, where there are no welded joints within 25 metres of a receptor:

- Groundborne noise is assessed against the same L_{ASmax} thresholds for both daytime and night-time.
- With a construction train speed limit of 10mph, the L_{ASmax} levels inside all of the properties along the Saxmundham to Leiston branch line will be no higher than 40dB L_{ASmax} where the track is upgraded with long welded rail and concrete or steel sleepers. This is below 45dB L_{ASmax} , thereby meeting the objective in **paragraph 4.7.19 in Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] to achieve an internal groundborne noise level of no more than 45dB L_{ASmax} .

9.3.69 Once the Saxmundham to Leiston branch line has been upgraded and all required mitigation installed, further measurements and assessment will be undertaken to determine the effect of the in-situ track to determine whether speeds higher than 10mph are possible without reducing the protection to the receptors.

9.3.70 While the groundborne noise measurements undertaken in August 2020 provide excellent site-specific information on the generation and propagation of groundborne noise, the effect of the proposed mitigation is based on its likely minimum benefit. Once installed, the proposed mitigation may be more effective than has been assumed in this assessment and therefore speeds higher than 10mph on the Saxmundham to Leiston branch line may be possible in the later years, once the proposed rail extension route is complete.

- 9.3.71 It is recommended that the 10mph speed limit on the Saxmundham to Leiston branch line be imposed in the early years, during which further measurements and assessment will be undertaken to determine if a speed limit of 20mph is possible without reducing the protection to the receptors.
- 9.3.72 With the removal of rail joints in close proximity to receptors, the significant effect threshold for tactile vibration, as quantified using the VDV scale, will not be exceeded along the Saxmundham to Leiston branch line.
- 9.3.73 For the East Suffolk line, the Additional Information suggests that the outcomes and effects were over-estimated in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545]. Again, there is a high level of confidence in the Additional Information as it is based on site-specific measurements, which account for the particular ground and building conditions encountered during the measurements.
- 9.3.74 Assessing groundborne noise and low frequency airborne noise against the $L_{Aeq,16hrs}$ thresholds for the daytime, and against the L_{ASmax} thresholds for the night-time, as now proposed, the Additional Information suggests that the following outcomes will occur along the East Suffolk line, where the trains are travelling at 20mph, i.e. outside the three speed limit zones in Woodbridge/Melton, Campsea Ashe and Saxmundham:
- Providing there are no rail joints, the night-time SOAEL of 50dB L_{ASmax} will not be exceeded at any properties 7 metres or more from the centreline of the track. Where there are rail joints, this distance will be greater, so that the night-time SOAEL of 50dB L_{ASmax} will not be exceeded at any properties 10 metres or more from the centreline of the track .
 - The night-time LOAEL of 35dB L_{ASmax} will not be exceeded at any property 25 metres or more from the centreline of the track.
 - The daytime internal SOAEL of 40dB $L_{Aeq,16hrs}$ will not be exceeded at any property along the East Suffolk line by the combination of existing passenger services and the additional construction trains, although this is subject to the proximity of rail joints.
- 9.3.75 The following outcomes will occur along the East Suffolk line, where the trains are travelling at 10mph, i.e. within the three speed limit zones in Woodbridge/Melton, Campsea Ashe and Saxmundham:
- The night-time SOAEL of 50dB L_{ASmax} will not be exceeded at any properties 3 metres or more from the centreline of track, providing there are no rail joints within 25 metres of the property.

- Where only aluminothermic joints are present, the night-time SOAEL of 50dB L_{ASmax} will not be exceeded at any properties that are 10 metres or more from a joint for a train speed of 10mph, subject to a minimum receptor-track separation distance of 3 metres to the track centreline.

- 9.3.76 Where 'rail joints' are relevant to the assessment outcomes, aluminothermic joints are generally intended. Flash-butt or arc welded joints are excluded since they are considered to be the same as no joints being present. Fish-plate joints or switches/crossings are a special case, and where they are present, the separation distance required to not exceed the night-time SOAEL of 50dB L_{ASmax} is 25 metres at speeds of up to 20mph.
- 9.3.77 The presence of welded rail joints along the East Suffolk line will not cause tactile vibration, as quantified using the VDV scale, to exceed significant effect thresholds.
- 9.3.78 The most significant outcome from the Additional Information is that the better, site-specific information gathered in August 2020 confirms that the SOAEL would not be exceeded within properties located 7 metres or more from the centreline of the track for a construction train speed of 20mph, or within properties located 3 metres or more from the centreline of the track for a construction train speed of 10mph, depending on the proximity of rail joints. The equivalent distances set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] were 10 metres from nearest rail for a construction train speed of 20mph and 5 metres from the nearest rail for construction trains at a speed of 10mph.
- 9.3.79 There are no properties along the East Suffolk line within 3 metres of the track centreline in locations where the construction trains will be travelling at 10mph at night. The closest property is 1 Albion Street in Saxmundham, which is just over 3.3 metres from the centreline of the track, so even at this location, the combined groundborne and low frequency airborne noise level is expected to be below the 50dB L_{ASmax} SOAEL at night, depending on the proximity of rail joints. It is also likely that the property will be eligible for enhanced glazing under the 'Noise Mitigation Scheme', and the ultimate level expected within the property will be considered under that scheme in due course.
- 9.3.80 During the daytime, **Volume 3, Appendix 9.3.A** of this **ES Addendum** confirms that the 40dB $L_{Aeq,16hrs}$ SOAEL will not be exceeded at 1 Albion Street, even if there were three daytime construction train movements, which is not proposed in the DCO but reinforces the robustness of the conclusion.

- 9.3.81 There are two properties within 7m of the centreline of the track along sections of the East Suffolk line where the construction trains are likely to be travelling at 20mph. Based on the ‘average’ sound reduction performance of the glazing present during the August 2020 survey, the night-time SOAEL may be exceeded at the following properties:
- Crossing Cottage, Kiln Lane South, Benhall, Saxmundham IP17 1HA, at a distance of 4.72 metres from the track centreline (4 metres from the nearest rail); and
 - Unnamed property, Blackstock Crossing Road, Campsea Ashe, Woodbridge IP13 0QL, at a distance of 5.42 metres from the track centreline (4.7 metres from the nearest rail).
- 9.3.82 These two properties are likely to be eligible for enhanced glazing under the ‘Noise Mitigation Scheme’, and therefore the airborne component of the internal sound level will reduce such that the SOAEL is not exceeded. While further analysis of these two properties will be undertaken as part of the implementation of the ‘Noise Mitigation Scheme’ to determine the detail of the mitigation, it is expected that a sufficient reduction in the low frequency airborne noise component can be achieved so that SOAEL is not exceeded.
- 9.3.83 In conclusion, the findings of the groundborne noise and vibration survey report suggest that, providing the recommendations for the Saxmundham to Leiston branch line are adopted, and subject to the detailed design of sound insulation at two properties, SOAEL will not be exceeded at any locations along the length of the East Suffolk line or the Saxmundham to Leiston branch line from Westerfield junction to the Sizewell C site.
- 9.3.84 This conclusion, which is an update on the position set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] as a result of the more accurate, site-specific detail available after the August 2020 survey, suggests fewer adverse effects than were anticipated in the **ES** included in the Application.
- e) Updated assessment - Potential to increase the frequency of freight train movements (Change 1)
- e) i) Baseline
- 9.3.85 No additional baseline information has been gathered to specifically consider the proposed additional construction trains potentially proposed in **Change 1**. The Additional Information already described has informed the assessment of the proposed change, i.e. the assessment of the change presented here takes account of both the change (i.e. potential

increase in rail movements (**Change 1**)) and the Additional Information set out in **section 9.3 d**)).

e) ii) **Environmental Design and Mitigation**

9.3.86 No specific additional mitigation has been proposed to address the potential effects of the proposed change.

e) iii) **Assessment of effects**

e) iii) a) **Construction**

9.3.87 There are no changes to the assessment of construction noise and vibration contained in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] as a result of the design change.

e) iii) b) **Operation - General**

9.3.88 To optimise the sustainable movement of materials, the updated '**Freight Management Strategy**' (Doc Ref. 8.18) summarised in **Chapter 2** of this **ES Addendum**, explains the proposal to enable additional construction train movements. The assessment of noise and vibration in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] was based on the construction train movements shown in **Table 9.2**.

Table 9.2 [extracted from Table 1.1 of Volume 9, Appendix 4B of the ES (Doc Ref. 6.10) [APP-546]]: Predicted construction train numbers

Period	Proposed construction train movements in "Early Years" – before GRR is operational (Total freight movements)	Proposed construction train movements in "Later Years" – when GRR is operational (Total freight movements)
Night-time (23:00 to 07:00)	4 movements (2 full construction trains arriving at the site and 2 empty construction trains leaving the site)	5 movements (2 full construction trains arriving at the site and 3 empty construction trains leaving the site)
Daytime (07:00 to 23:00)	0 movements	1 movement (1 full construction train arriving at the site)

9.3.89 In the Application it is assumed that there would be two train deliveries per day during the early years, giving rise to four movements, these would only travel through Leiston during the day and be held on the Saxmundham to Leiston branch line at night. Three construction trains per day were expected during later years of construction, giving rise to six

movements, five of which would occur during the night, and one of which would occur during the day.

- 9.3.90 The updated **Freight Management Strategy** (Doc Ref. 8.18) explains proposals for an extra construction train per day during the ‘later years’, after the proposed rail extension route is open (Change 1). The additional two movements associated with the extra construction train would both occur at night.
- 9.3.91 It is understood that it is possible that the daytime movement that was considered in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] may also occur during the night. Therefore the possibility of all eight movements occurring at night has been considered.
- 9.3.92 No change to the number of construction trains is proposed during the ‘early years’, before the proposed rail extension route is open.
- 9.3.93 The potential for a fifth construction train is considered in the **Freight Management Strategy** (Doc Ref. 8.18), and it is assumed that these extra two movements would occur during the daytime. Therefore the possibility of three movements occurring during the daytime has been considered.
- 9.3.94 **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] did not take account of the day of the week, nor of the number of days per week where trains were anticipated. The assessment criteria do not vary according to day of the week, and the effect is assessed within the timeframe of a single night. The effect does not worsen, in terms of the assessment criteria, if the construction trains run on consecutive nights.
- 9.3.95 The **Freight Management Strategy** (Doc Ref. 8.18) explains that Change 1 proposes that construction trains may run six days per week.
- 9.3.96 The key indicators of potential effect in this instance are linked to maximum sound levels, whether airborne noise or groundborne noise. These are instantaneous events and are judged on an individual night. Increasing the number of construction trains will increase the number of these events per night, but the findings set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545], and those in this chapter, will not materially change.
- 9.3.97 The number of times per night that those adverse outcomes occur will clearly be related to the number of trains per night. However, the maximum sound level assessment method adopted is independent of the number of occurrences; when a threshold is attained, the associated outcome is deemed to occur, irrespective if it occurs once, or more than once.

- 9.3.98 The guidance associated with the effect of maximum sound levels at night will typically identify the number of occurrences that are required to trigger the stated outcome. An example includes the World Health Organisation's 'Guidelines for Community Noise' (Ref. 7) which states on page 46:

'For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night'

- 9.3.99 The World Health Organisation guidelines informed both the adopted LOAEL and the threshold of significance, in EIA terms, in the assessment set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref 6.10) [APP-545].
- 9.3.100 Similarly, the research that informed the adopted SOAEL (Ref. 5 and Ref. 6)], identifies two separate levels at which significant sleep disturbance occurs, distinguished by the number of times that the level is exceeded. A threshold of 80dB L_{AFmax} is appropriate where there are more than 20 events per night, and a threshold of 85dB L_{AFmax} is appropriate where there are 20 or fewer events per night. HS2 has adopted both criteria as its SOAEL, including the reference to the number of events.
- 9.3.101 It could have been argued when assessing the four construction train movements per night in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545], or the up to eight construction train movements per night suggested in Change 1, that the number of movements is below the World Health Organisation threshold of 10 to 15 per night that is linked to sleep disturbance, and below the 20 events per night that would have permitted a higher basis for the night-time SOAEL.
- 9.3.102 By omitting consideration of the number of events per night from the adopted thresholds, a more robust position is achieved.
- 9.3.103 The results of the ongoing noise and vibration survey in Woodbridge, as set out in **Volume 3, Appendix 9.3.B** of this **ES Addendum** reflect the fact that there are existing freight and passenger movements along the East Suffolk line at present. On average, a freight train used the East Suffolk line between once every ten nights to just over once per night.
- 9.3.104 It is also known there are a considerable number of properties along the Ipswich to Felixstowe railway line that are passed by freight trains multiple times per night; it is not unusual for between 20 and 30 freight trains to use the Ipswich to Felixstowe railway line each night.
- 9.3.105 It is not SZC Co.'s position that the frequency of night-time freight movements on the Ipswich to Felixstowe railway line justifies a conclusion that the proposed night-time construction trains are acceptable without assessment, but it does suggest that multiple night-time train movements

are not, in and of themselves, unacceptable. A large number of people do co-exist with such activities.

- 9.3.106 A full explanation of how the research and guidance on sleep disturbance informed both the assessment criteria in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] and the ‘Noise Mitigation Scheme’ in **Volume 2, Appendix 11H** of the **ES** (Doc Ref. 6.3) [APP-210] is contained in **Appendix 6.3.D** of this **ES Addendum**. This document was shared with East Suffolk Council and Suffolk County Council at the end of November 2020, to assist with ongoing engagement.

e) iii) c) Operation – Airborne Noise

- 9.3.107 The night-time L_{Aeq} and L_{AFmax} noise levels have been recalculated on the basis of the proposed change.
- 9.3.108 The daytime noise contours are not changed by the proposed change from those contained in **Volume 9, Appendix 4B** of the **ES** (Doc Ref. 6.10) [APP-546]. Even for the proposed fourth construction train, no more than one construction train movement per day is likely to run during the daytime period.
- 9.3.109 In the event that it is possible to secure a timetable path for a fifth train, which would occur wholly during the daytime period, the noise contours shown in **Volume 9, Appendix 4B** of the **ES** (Doc Ref. 6.10) [APP-546] are unlikely to change by a material amount, since the additional three construction train movements would not generate as much airborne noise as the existing passenger services.
- 9.3.110 The night-time L_{Aeq} noise contours have been recalculated on the basis of either seven or eight train movements per night; these are shown in **Volume 3, Appendix 9.3.C** of this **ES Addendum**. The conclusions based on the night-time L_{Aeq} contours have not changed from those set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].
- 9.3.111 The only change in the L_{AFmax} contours in **Volume 3, Appendix 9.3.C** of this **ES Addendum** is that the speed now assumed along the Saxmundham to Leiston branch line and proposed rail extension route is 10 mph at night. The conclusions based on the updated L_{AFmax} contours have not changed from those set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].
- 9.3.112 The measures to reduce airborne noise, as set out in the draft ‘Rail Noise Mitigation Strategy’ in **Volume 3, Appendix 9.3.E** of this **ES Addendum** are as follows:

- Track and signalling upgrade allow the potential for construction trains to enter or leave the Saxmundham to Leiston branch line without stopping.
- Upgrade to the Saxmundham to Leiston branch line track to include continuous as-rolled rail with welded joints.
- Night-time 10mph speed limits for construction trains on the East Suffolk line in Woodbridge/Melton, Campsea Ashe and Saxmundham.
- No construction train movements through Leiston between 23:00 hours and 07:00 hours.
- Use of Class 66 locomotive, where there is equivalent choice.
- The speed limit on the proposed rail extension route will match that applied to the Saxmundham to Leiston branch line. This will enable constant train speeds to be maintained, thereby avoiding accelerating locomotive noise close to the north-western corner of Leiston

9.3.113 A 10mph speed limit will apply on the Saxmundham to Leiston branch line in the early years, which will reduce airborne noise levels, but is imposed to reduce groundborne noise levels.

9.3.114 The outcomes would be the same as described above in this chapter once the Additional Information is taken into account:

- Major adverse effects are predicted at night at two properties along the Saxmundham to Leiston branch line in the early years (Kelsale Covert and Westhouse Crossing Cottage), and at the same two properties during the later years (Kelsale Covert and Westhouse Crossing Cottage). This outcome is the same as set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545]. However, there would be an improvement at Crossing East during the later years with the significance of effect reducing from major to moderate adverse effect, although it is still considered to be a **significant** effect.
- Major adverse effects are predicted at night at between 5 and 10 properties along the East Suffolk line, once Saxmundham junction is upgraded, which will enable construction trains to join or leave the Saxmundham to Leiston branch line without stopping. This outcome is the same as was set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].
- Moderate adverse effects are predicted at night at between 100 and 110 properties along the East Suffolk line, once Saxmundham junction

is upgraded. This outcome is the same as was set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].

- Minor adverse effects are predicted at between 320 to 350 properties along the East Suffolk line, once Saxmundham junction is upgraded. This outcome is the same as was set out in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545].

9.3.115 As stated in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545], major and moderate adverse effects are considered significant, while minor adverse effects are not.

9.3.116 Properties subject to major adverse effects as a result of maximum railway noise levels of more than 77dB L_{AFmax} (free-field) would be eligible for sound insulation under the 'Noise Mitigation Scheme' (**Volume 2, Appendix 11H** of the **ES** (Doc Ref. 6.3) [APP-210]) and the internal sound levels for all properties will be reduced to below the SOAEL.

e) iii) d) Operation – Groundborne Noise

9.3.117 As the additional trains will run at night, the outcomes for groundborne noise will remain the same as those described earlier in this chapter. By the adoption of the recommendations for the Saxmundham to Leiston branch line, the night-time groundborne noise SOAEL will only potentially be exceeded at two locations along the length of the railway line from Westerfield junction to the Sizewell C main development site.

9.3.118 These two properties, Crossing Cottage on Kiln Lane South in Benhall and an unnamed property on Blackstock Crossing Road in Campsea Ashe are both close to the East Suffolk line.

9.3.119 These two properties are likely to be eligible for enhanced glazing under the 'Noise Mitigation Scheme' (**Volume 2, Appendix 11H** of the **ES** (Doc Ref. 6.3) [APP-210]). While further analysis of these two properties will be undertaken as part of the implementation of the 'Noise Mitigation Scheme' to determine the detail of the mitigation, it is expected that a sufficient reduction in the low frequency airborne noise component can be achieved so that SOAEL is not exceeded.

9.3.120 Should it be feasible to operate a fifth construction train, the extra two movements would occur during the daytime. Providing there are no rail joints or welds within 25 metres of a sensitive property, the daytime internal SOAEL of 40dB $L_{Aeq,16hrs}$ will not be exceeded by groundborne noise and low frequency airborne sound by the addition of three construction trains to the existing services on the East Suffolk line.

9.3.121 For the Saxmundham to Leiston branch line, the potential additional construction trains, irrespective of whether they run at night or during the day, are assessed against the same $L_{A\text{Smax}}$ thresholds. Where the track is upgraded with long welded rail and concrete or steel sleepers and a speed limit of 10mph is applied, the outcomes are expected to be:

- The SOAEL of 50dB $L_{A\text{Smax}}$ will not be exceeded at any property along the Saxmundham to Leiston branch line as a result of the combined groundborne noise and low frequency airborne noise.
- Groundborne noise alone will be no higher than 40dB $L_{A\text{Smax}}$, meeting the objective in **paragraph 4.7.19 in Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10)

f) Additional mitigation and residual effects

9.3.122 There are no changes to the residual effects identified in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] for airborne noise as a result of the Additional Information and the proposed change.

9.3.123 The residual groundborne noise effects are expected to improve as a result of the Additional Information, primarily the site-specific survey information gathered in August 2020. This is not altered by the proposed change.

9.3.124 No additional mitigation is proposed as a result of the Additional Information or the proposed change, but the mitigation that was proposed in **Volume 9, Chapter 4** of the **ES** (Doc Ref. 6.10) [APP-545] has been refined. The mitigation, which is captured in the draft 'Rail Noise Mitigation Strategy' (**Volume 3, Appendix 9.3.E** of this **ES Addendum**), is:

- Track and signalling upgrade allow the potential for construction trains to enter or leave the Saxmundham to Leiston branch line without stopping.
- Upgrade to the Saxmundham to Leiston branch line track to include continuous as-rolled rail with welded joints.
- Night-time 10mph speed limits for construction trains on the East Suffolk line in Woodbridge/Melton, Campsea Ashe and Saxmundham.
- A 10mph speed limit on the Saxmundham to Leiston branch line in the early years.
- Pending the results of further assessment of the upgraded and mitigated Saxmundham to Leiston branch line during the early years

operation, the speed limit on Saxmundham to Leiston branch line may be increased to 20mph.

- The speed limit on the proposed rail extension route will match that applied to the Saxmundham to Leiston branch line in the later years. This will enable constant train speeds to be maintained, thereby avoiding accelerating locomotive noise close to the north-western corner of Leiston.
- No construction train movements through Leiston between 23:00 hours and 07:00 hours.
- Use of Class 66 locomotive, where there is equivalent choice.

9.4 Air quality

a) Introduction

9.4.1 This section provides an addendum to the air quality assessment with reference to the following documents submitted with the Application:

- **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [[APP-548](#)]; and
- **Volume 9, Chapter 5** of the **ES** Air Quality **Figures 5.1 and 5.2** (Doc Ref. 6.10) [[APP-550](#)].

9.4.2 This section presents Additional Information that has been gathered since the Application was submitted, and an assessment of the potential air quality effects from the proposed changes, in particular the potential increase in rail movements during construction of Sizewell C (**Change 1**), as well as the reduction in HGV movements as a result of the proposed increase in rail movements (**Change 1**) and the additional temporary BLF (**Change 2**).

9.4.3 The air quality assessment presented within this section considers the air quality impacts from combined road and rail transport emissions (as assessed in the **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [[APP-548](#)]) assessed using the Additional Information presented below, and the air quality impacts associated with the relevant design changes.

9.4.4 This section is supported by the following appendices provided in **Volume 3** of this **ES Addendum**:

- **Volume 3, Appendix 9.4.A**, which presents the modelled air quality current and future year baselines in the air quality assessment;

- **Volume 3, Appendix 9.4.B**, which presents receptors with a change in magnitude of change descriptors in the air quality assessment; and
- **Volume 3, Appendix 2.7.C**, which presents the updated transport emissions assessment using the Additional Information and the assessment of transport emissions associated with the proposed design changes.

b) Relevant Additional Information

9.4.5 An assessment of the impacts on air quality arising from the construction and operation of the proposed rail extension route and the Saxmundham to Leiston branch line is presented in **Volume 9 Chapter 5** of the **Environmental Statement (ES)** (Doc Ref 6.10) [APP-548].

9.4.6 Additional Information is presented in this chapter on further air quality transport emissions modelling that has been undertaken to include the following:

- refined traffic representative of 24-hour Annual Average Daily Traffic (AADT) (refer to **Transport Assessment Addendum** (Doc Ref. 8.5(A) Ad) for further information);
- emissions Factors Toolkit (EFT) version 10.1 (Ref. 8);
- Defra's projected 2018-based Background Pollutant Concentration Maps (Ref. 9); and
- NO_x to NO₂ conversion tool v8.1 (Ref. 10).

c) Relevant changes

9.4.7 Relevant changes for the assessment of effects on air quality include the potential increase in rail movements during construction of Sizewell C (**Change 1**), as well as the reduction in HGV movements as a result of the potential increase in rail movements (**Change 1**) and the proposed additional temporary BLF (**Change 2**), as described within **Chapter 2** of the **ES Addendum**.

9.4.8 The assessment of air quality effects under this proposed strategy is presented in **Volume 2, Section 2.7** and **Volume 2, Appendix 2.7.C** of the **ES Addendum**.

d) Updated assessment – Additional Information

9.4.9 The traffic data for the Sizewell C Project has been updated with the refinements to the strategic traffic modelling as detailed in the Transport

Assessment (refer to the **Transport Assessment Addendum** (Doc Ref. 8.5(A) Ad)).

- 9.4.10 The refined traffic flows result in a change in modelled pollutant concentrations at receptors within the study area from the results presented in **Volume 9, Chapter 5** of the **ES** [APP-548]. Furthermore, Defra have since published the updated EFT version 10.1 (Ref. 8), updated background pollutant concentration maps (Ref. 9), and an updated version of the NO_x to NO₂ conversion tool v8.1 (Ref. 10). Therefore, a revised air quality assessment of traffic emissions has been undertaken with the full results presented within **Volume 3, Appendix 2.7.C** of this **ES Addendum**.
- 9.4.11 The Additional Information does not change the legislation, policy and guidance, the methodology or other assessments for air quality as described in **Volume 9, Chapter 5** of the **ES** [APP-548], with the exception of the updates made to the transport emissions modelling to take into account the latest Defra EFT version 10.1 and the NO_x to NO₂ conversion tool v8.1.
- d) i) **Baseline**
- 9.4.12 The refinements to the baseline traffic data and updates to Defra tools described in **section 9.4 b)** relevant Additional Information have resulted in changes to the current and future baseline. This section presents a description of the updated baseline environment characteristics within the site and the surrounding area.
- 9.4.13 The site and receptors in the study area are presented in **Figure 5.1** and **Figure 5.2** of **Volume 9** in the **ES** (Doc Ref. 6.10) [APP-550].
- d) i) a) **Current baseline**
- d) i) a) *Proposed rail extension route*
- 9.4.14 NO₂ and particulate matter (PM₁₀ and PM_{2.5}) 2018 background concentrations within the site are projected to be 7.1µg/m³ for NO₂, between 14.7 and 15.1µg/m³ for PM₁₀ and between 9.0 to 9.1µg/m³ for PM_{2.5} (Ref. 9). The backgrounds for the current baseline are broadly in line with the background values set out within **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548].
- 9.4.15 The overall predicted baseline concentrations, including nearby road traffic contributions, range from 6.9 to 9.2µg/m³ for NO₂, 14.3 to 15.3µg/m³ for PM₁₀, and 8.9 to 9.3µg/m³ for PM_{2.5} at sensitive receptors near the site. These values are broadly in line with the baseline assessment presented within **Volume 9, Chapter 5** of the **ES** (Doc Ref.

6.6) [APP-548], albeit the updated baseline NO₂ values are slightly reduced (by up to 1.6 µg/m³), PM₁₀ values are slightly increased (by up to 0.4 µg/m³), and PM_{2.5} are the same or slightly vary (by -0.2 to 0.1 µg/m³). Further details on the modelled 2018 baseline pollutant concentrations at receptors can be found in **Volume 3, Appendix 9.4.A** and **Volume 3, Appendix 2.7.C** of the **ES Addendum**.

d) i) a) b) Saxmundham to Leiston branch line upgrades

9.4.16 NO₂ and particulate matter (PM₁₀ and PM_{2.5}) 2018 background concentrations within the site are projected to be between 7.0 to 8.0 µg/m³ for NO₂, between 14.2 to 16.4 µg/m³ for PM₁₀, and between 9.0 to 9.4 µg/m³ for PM_{2.5} (Ref. 9). The backgrounds for the current baseline are broadly in line with the background values set out within **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548].

9.4.17 The overall predicted baseline concentrations, including nearby road traffic contributions, range from 7.1 to 17.4 µg/m³ for NO₂, 14.3 to 16.1 µg/m³ for PM₁₀ and 9.0 to 9.9 µg/m³ for PM_{2.5} at sensitive receptors near the site. These values are broadly in line with the baseline assessment presented within **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548], albeit the updated baseline NO₂ values are slightly reduced (by up to 2.6 µg/m³), PM₁₀ values are slightly increased (by up to 0.6 µg/m³), and PM_{2.5} are the same or slightly vary (by -0.3 to 0.2 µg/m³). Further details on the modelled 2018 baseline pollutant concentrations at receptors can be found in **Volume 3, Appendix 9.4.A** and **Volume 3, Appendix 2.7.C** of the **ES Addendum**.

d) i) b) Future Baseline

d) i) b) a) Proposed rail extension route

9.4.18 NO₂ and particulate matter (PM₁₀ and PM_{2.5}) 2023 background concentrations within the site are projected to be between 6.0 to 6.1 µg/m³ for NO₂, between 13.7 to 14.0 µg/m³ for PM₁₀ and between 8.2 to 8.3 µg/m³ for PM_{2.5}, a reduction in all three pollutants from the current baseline according to the recently published Defra Background Concentration Maps (Ref. 9).

9.4.19 NO₂ and particulate matter (PM₁₀ and PM_{2.5}) 2028 background concentrations within the site are projected to be 5.4 µg/m³ for NO₂, between 13.4 to 13.7 µg/m³ for PM₁₀ and between 7.9 to 8.0 µg/m³ for PM_{2.5}, a reduction in all three pollutants from the current baseline (Ref. 9).

9.4.20 The backgrounds for the future baselines are broadly in line with the background values set out within **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548].

9.4.21 The future baseline pollutant concentrations at nearby sensitive receptors for 2023 range from 5.9 to 7.5µg/m³ for NO₂, 13.3 to 14.3µg/m³ for PM₁₀ and 8.0 to 8.5µg/m³ for PM_{2.5}. The future baseline pollutant concentrations at nearby sensitive receptors for 2028 range from 5.2 to 6.3µg/m³ for NO₂, 13.0 to 13.9µg/m³ for PM₁₀ and 7.8 to 8.2µg/m³ for PM_{2.5}. These values are broadly in line with the baseline assessment presented within **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548], albeit the updated baseline NO₂ values are slightly reduced (by up to 1.4µg/m³ for 2023 and 1.3µg/m³ for 2028), PM₁₀ values are slightly increased (by up to 0.1 µg/m³), and PM_{2.5} are the same or slightly reduced (by up to -0.3 µg/m³). Further details of modelled pollutant concentrations for the years 2023 and 2028 can be found in **Volume 3, Appendix 9.4.A** and **Volume 3 Appendix 2.7.C** of the **ES Addendum**.

d) i) b) Saxmundham to Leiston branch line upgrades

9.4.22 NO₂ and particulate matter (PM₁₀ and PM_{2.5}) 2023 background concentrations within the site are projected to be between 6.0 to 6.8µg/m³ for NO₂, between 13.1 to 15.4µg/m³ for PM₁₀ and between 8.2 to 8.6µg/m³ for PM_{2.5}, a reduction in all three pollutants from the current baseline according to the recently published Defra Background Concentration Maps (Ref. 9).

9.4.23 NO₂ and particulate matter (PM₁₀ and PM_{2.5}) 2028 background concentrations within the site are projected to be between 5.4 to 6.1µg/m³ for NO₂, between 12.8 to 15.0µg/m³ for PM₁₀ and between 7.9 to 8.3µg/m³ for PM_{2.5}, a reduction in all three pollutants from the current baseline (Ref. 9).

9.4.24 The backgrounds for the future baselines are broadly in line with the background values set out within **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548].

9.4.25 The future baseline pollutant concentrations at nearby sensitive receptors for 2023 range from 6.0 to 14.3µg/m³ for NO₂, 13.2 to 15.0µg/m³ for PM₁₀ and 8.2 to 9.1µg/m³ for PM_{2.5}. The future baseline pollutant concentrations at nearby sensitive receptors for 2028 range from 5.3 to 10.8µg/m³ for NO₂, 12.8 to 14.7µg/m³ for PM₁₀ and 7.9 to 8.8µg/m³ for PM_{2.5}. These values are broadly in line with the baseline assessment presented within **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548], albeit the updated baseline NO₂ values are slightly reduced (by up to 3.1µg/m³ for 2023 and 3.0µg/m³ for 2028), PM₁₀ values are the same or slightly increased (by up to 0.5µg/m³ for 2023 and 0.4µg/m³ for 2028), and PM_{2.5} are the same or slightly reduced (by up to -0.5µg/m³). Further details of modelled pollutant concentrations for the years 2023 and 2028 can be found in **Volume 3, Appendix 9.4.A** and **Volume 3, Appendix 2.7.C** of the **ES Addendum**.

d) ii) Assessment

- 9.4.26 Details on modelled pollutant concentrations associated with transport emissions (including rail emissions in the 2028 peak year) for the year 2023 (assumed peak year of construction of the rail schemes), and 2028 (assumed peak year of operation of rail) can be found in **Volume 3, Appendix 2.7.C** of the **ES Addendum**. The update to the assessment using the Additional Information (detailed in **section 9.4 b)**) has resulted in changes to the magnitude of change descriptor at some receptors. There are no changes to the effect descriptors at any receptors in the study area from the effect descriptors reported in **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548]. The updated modelling does not change the overall effect of **not significant**, as described in **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548]. With no change to the conclusion of the assessment, no further mitigation is also required.
- 9.4.27 Receptors with a change in magnitude of change descriptors are presented in **Volume 3, Appendix 9.4.B**.
- e) Updated assessment – increase in rail movements (Change 1) and reduction in HGV movements (Changes 1 and 2)
- 9.4.28 The updated modelling of transport emissions with the reduced HGV movements and increased rail movements associated with the proposed changes to increase rail movements (**Change 1**) and the additional temporary BLF (**Change 2**) is presented in **Volume 3, Appendix 2.7.C** to this **ES Addendum**.
- 9.4.29 The proposed changes do not affect the existing and future air quality baseline, as described in **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548]. The magnitude of change in NO₂, PM₁₀ and PM_{2.5} concentrations during 2028 average day or busiest day would remain as described in **section 9.4 d)**) above, with the exception of LE36, LE37 and LE38 which would have an imperceptible magnitude of change under the proposed changes, and LE2, SX4 and SX16 which would have a very low magnitude of change and SX17 which would have a low magnitude of change. The proposed changes do not change the overall effect of **not significant**, as described in **Volume 9, Chapter 5** of the **ES** (Doc Ref. 6.10) [APP-548]. No further mitigation is required.

9.5 Terrestrial ecology and ornithology

a) Introduction

9.5.1 This section provides an addendum to the terrestrial ecology and ornithology assessment with reference to the following documents submitted with the Application:

- **Volume 9, Chapter 7** of the **ES** (Doc Ref. 6.10) [[APP-555](#)]; and
- **Volume 9, Appendix 7A** of the **ES** (Doc Ref. 6.10) [[APP-556](#)].

9.5.2 This section is supported by the following appendix provided in **Volume 3** of this **ES Addendum**:

- **Appendix 9.5.A** Ecology Survey Report.

b) Relevant Additional Information

9.5.3 Relevant Additional Information for the assessment of effects on terrestrial ecology and ornithology along proposed rail extension route, the section of the proposed rail extension route outside of the main development site, comprises the updated extended Phase 1 habitat survey (refer to **Volume 3, Appendix 9.5.A** of this **ES Addendum**).

9.5.4 An extended Phase 1 habitat survey and protected species surveys were undertaken between 2007 and 2016; the results of which were presented in **Volume 9, Chapter 7** and **Appendix 7A** of the **ES** (Doc Ref. 6.10) [APP-555 and APP-556 respectively].

9.5.5 The extended Phase 1 habitat survey, undertaken in October 2020, reviewed the habitat conditions present on the rail extension route site and identified whether the habitats present were suitable to support protected species and recorded any incidental field signs or observations.

c) Updated Assessment – Additional Information

9.5.6 The additional survey information has been reviewed against the baseline survey information as presented within **Volume 9, Chapter 7** and **Appendix 7A** of the **ES** (Doc Ref. 6.10) [APP-555 and APP-556 respectively] for the proposed rail extension route.

9.5.7 For the area relevant to the rail extension route section, the survey confirmed that the habitat types on site have not changed since the previous surveys. The main habitats continue to comprise predominantly large arable fields bound by a mixture of fences and hedgerows, of which three were species-rich. Other habitats recorded both within and adjacent

to the site continue to include three woodland blocks, comprising ancient broadleaved woodland, lowland mixed deciduous woodland, and improved grassland fields.

- 9.5.8 The 2020 survey identified the invasive species Himalayan Cotoneaster (*Cotoneaster simonsii*) which was not considered within **Volume 9, Appendix 7A** of the **ES** [APP-556]. Whilst this invasive species has not been previously recorded, it presents no material change to the baseline or the assessment presented within the ES. However, tertiary mitigation measures, as set out in the **Code of Construction Practice** (refer to Doc Ref 8.11 (A)), would be implemented to avoid the potential spread of non-native species during construction, and any invasive species will be removed and disposed of as required in accordance with relevant legislation and Defra and Environment Agency best practice guidance.
- 9.5.9 As the 2020 survey did not identify any new habitat types to those considered within **Volume 9, Chapter 7** of the **ES** (Doc Ref. 6.10) [APP-555], the assessment remains unchanged.

9.6 Terrestrial historic environment

a) Introduction

9.6.1 This section provides an addendum to terrestrial historic environment assessment for the proposed rail extension route with reference to the following documents submitted with the Application:

- **Volume 9, Chapter 9** of the **ES** (Doc Ref. 6.10) [[APP-560](#)].

9.6.2 This section presents an assessment of the Additional Information that has been prepared since the Application was submitted.

9.6.3 This section is supported by the following provided in **Volume 3** of this **ES Addendum**:

- **Appendix 9.6.A** Green Rail Route Archaeological Evaluation Report.

b) Relevant Additional Information

9.6.4 Relevant Additional Information for the assessment of effects on terrestrial historic environment for the proposed rail extension route comprises the Green Rail Route Archaeological Evaluation Report (refer to **Volume 3, Appendix 9.6.A** of this **ES Addendum**).

c) Updated assessment – Additional Information

9.6.5 The Archaeological Evaluation Report (refer to **Volume 3, Appendix 9.6.A** of this **ES Addendum**) provides more detail on the findings of the evaluation trenching investigations on the proposed rail extension route and supersedes the interim fieldwork summary provided in **Volume 9, Appendix 9D** of the **ES** (Doc Ref 6.10) [[APP-560](#)].

9.6.6 The Archaeological Evaluation Report did not identify any new constraints beyond those reported in the interim fieldwork summary provided in **Volume 9, Appendix 9D** of the **ES** (Doc Ref 6.10) [[APP-560](#)].

9.6.7 As such, no changes to the assessment presented within **Volume 9, Chapter 9** of the **ES** (Doc Ref 6.10) [[APP-560](#)] are required.

REFERENCES

1. Calculation of Railway Noise (CRN). Department of Transport (1995)
2. NPSE (2010) Noise Policy Statement for England
3. MHCLG (2019) Planning Practice Guidance
4. DECC (2011) Overarching National Policy Statement (NPS) for Energy (NPS EN-1)
5. Basner et al, Aircraft noise effects on sleep: Application of the results of a large polysomnographic field study, Journal of the Acoustical Society of America **119**, 2772 (2006)
6. Basner et al, Single and combined effect of air, road and rail traffic noise on sleep and recuperation, SLEEP 2011; 34(1):11-23 (2011)
7. World Health Organisation (1999) Guidelines for community noise
8. Department for Environment Food and Rural Affairs. (2020). Emissions Factors Toolkit (EFT) version 10.1. Available at: <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>. (Accessed November 2020).
9. Department for Environment Food and Rural Affairs. (2020). Background Pollutant Concentration Maps. Available at: <https://uk-air.defra.gov.uk/data/laqm-background-home>. (Accessed October 2020).
10. Department for Environment Food and Rural Affairs. (2020). NO_x to NO₂ Calculator version 8.1. Available at: <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>. (Accessed October 2020).