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TECHNICAL MEMORANDUM

Project	Sizewell C DCO – Main Development Site Noise & Vibration Review		
Date	10 March 2021	**Memo No**	M002
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Filename	12804 M002		

SIZEWELL C DCO APPLICATION WITH CHANGES PROPOSED JANUARY 2021

MAIN DEVELOPMENT SITE NOISE AND VIBRATION REVIEW

This document sets out the combined comments of ESC and AJA on the Applicant's assessment of noise and vibration from the Main Development Site under the following headings:

1. Construction Noise
2. Construction Vibration
3. Operational Noise

The effects of rail and road traffic noise and vibration are considered in a separate technical memorandum M003 [redacted].

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1 MAIN DEVELOPMENT SITE CONSTRUCTION NOISE

1.1 Introduction

It is recognised that the proposed Sizewell C development would require a significant construction program in terms of both its geographical scale, and overall duration of the works. The construction program would have a duration of up to 12 years, including a number of broad overlapping phases. It is recognised that these broad phases would differ in terms of duration and activity types, and therefore potential noise impacts on noise sensitive receptors would vary through the duration of the construction program.

The construction phases described in the noise assessment documents are as follows:

- Phase 1 – Site established and preparation for earthworks (Years 1 and 2);
- Phase 2 – Main earthworks (Years 1 to 4);
- Phase 3 – Main civils (Years 3 to 9);
- Phase 4 – Mechanical and Engineering (M&E) fit-out, instrumentation and commissioning (Years 4 to 11);
- Phase 5 – Removal of temporary facilities and restoration of the land (Years 10 to 12).

As consultants to East Suffolk Council, in this document we set out our initial comments on the Applicant's construction noise assessment. Given the large quantity of information and the limited amount of time to review this we have not scrutinised every detail of the information supplied at this stage.

Although technically part of the construction noise assessment, noise from rail and road movements outside the Main Development Site are addressed in a separate technical memorandum M003.

1.2 Working hours

Construction is proposed to take place 24 hours a day, with the full range of construction actives described in the noise assessment taking place between 07:00 and 23:00. Night-time construction activity (between 23:00 and 0700) is proposed to be limited to maintenance and logistics support activities, including unloading and storing of marine, rail, and Heavy Goods Vehicle (HGV) delivered freight, essential plant refuelling, repositioning of scaffolding, maintenance and repair, and dewatering activities. This includes a period of 8.5 years where the green rail route into site is operational and night-time noise levels are dominated by freight being unloaded.

This level of continuous construction activity is inherently out of character with the existing environment around the assessment locations and will provide the residents of the affected will no respite from the noise. We understand that East Suffolk Council has already expressed concerns about the increased impact of construction noise due to the extended working hours and long duration of the project. While this level of intense construction activity may well be essential for the successfully delivery of a highly complex engineering project on this scale, it will be for the Applicant to demonstrate this to the Examining Authority.

Should the project go ahead it is vitally important that the assessment criteria are set appropriately to allow the Examining Authority understand the true impact of noise from continuous construction activity for a prolonged period on the surrounding receptors.

1.3 Methodology

1.3.1 Construction activity on Main Development Site

The construction noise assessment describes the typical construction activities and noise sources expected to be associated with each phase of the development. It uses noise data from *BS 5228-1:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise"* and the consultant's own library used to model the resulting noise levels at a number of receptors.

We understand that input data has been chosen on the basis of outline information on construction equipment and processes supplied by the developer.

Without specialist knowledge of the construction processes entailed we are unable to comment on the choice of the source data, on time corrections and distribution of sources used in the model. However, this overall approach is generally accepted as standard industry practice, and is accepted as an appropriate methodology albeit subject to inherent uncertainty due to changes in the proposed construction process as the COCP is developed.

Request for information 1 - An unusual aspect of this construction site will be the use of the Beach Landing Facility. It is not clear to us whether the noise sources associated with this have been included within the noise models. We would seek clarification on this point. This is particularly important with the proposed changes to increase the deliveries to site via this method.

1.3.2 Noise modelling methodology

Predictions of environmental noise propagation to receptors during the operational phase were completed using a proprietary noise modelling package (SoundPLAN). This implements the calculation methodology set out in ISO 9613-2:1996 *'Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation'*.

Given the large number of noise sources and receptors, the scale of the site and the varying topography and ground conditions it is expected and understandable that noise modelling would be used. ESC and AJA have considered the methodological description provided by the applicant (Volume 2, Chapter 11, Appendix 11C) and are satisfied that the applicant's consultants appear to have appropriately considered ground and air absorption, topography and screening, and to have validated the model (i.e. undertaken a quality control/checking exercise given the complexity of the model) in respect of predicted $L_{Aeq,T}$ values.

Request for information 2 - Could the Applicant please clarify how night-time L_{AFmax} levels have been modelled.

1.3.3 Receptors

We understand that ESC has previously agreed with the Applicant the number and locations of noise sensitive receptors in the study area.

1.4 Assessment criteria

1.4.1 Residential receptors

It is accepted that there are no fixed criteria for assessing the potential significance of noise from construction activity as this is depends on the existing noise climate in the study area, the operating hours of the construction works and the duration of the works amongst other contextual factors. However, Section 3 of Annex E of BS 5228-1:2009+A1:2014 provides two example methods to determine whether construction noise levels could be significant.

- E.3.2 Example method 1 – The ABC method
- E.3.3 Example method 2 – 5 dB(A) change

The existing quiet conditions at the various receptors mean that both methods would initially produce the following thresholds for significant effects:

- Daytime - 65 dB $L_{Aeq,T}$
- Evening- 55 dB $L_{Aeq,T}$
- Night-time - 45 dB $L_{Aeq,T}$

The standard states that *"The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect"*.

In this case we would expect the existing quiet rural noise climate, the proposed 24-hour operations and extended duration of the construction works to mean that noise from construction activity will be significant at lower levels than those identified above. This is reflected in the following draft assessment criteria for construction noise which we understand were previously proposed by the Applicant following early consultation with East Suffolk Council.

Sensitivity	Period	LOAEL	SOAEL	Parameter
Medium	Any day 07:00 to 23:00	50	60	$L_{Aeq,T}$, dB, free field
	Night 2300 to 0700	40	50	
	Night 2300 to 0700	60	70	L_{Amax}, dB, façade
High	Any day 07:00 to 23:00	50	60	$L_{Aeq,T}$, dB, free field
	Night 2300 to 0700	40	45	
	Night 2300 to 0700	60	65	L_{Amax}, dB, façade

Time period T in this table refers to the period in question: day (16 hours), evening (4 hours) or night (8 hours).

Table 1 - Draft construction noise criteria agreed during consultation with ESC

In Table 1, for the *"medium"* sensitivity receptors (e.g. residences) the proposed SOAEL threshold for the hours of 07:00 to 23:00 are 5 dB below the significance thresholds proposed in Annex E3 of BS5228 for *"Daytime"* (07:00 to 19.00) and *"Night-time"* (23:00 to 07:00) but 5 dB above the threshold for *"Evenings and weekends"*.

However, Chapter 11 of the Environmental Statement sets out in Tables 11.2 and 11.11 the following proposed criteria as assessing the impact of noise from construction on the Main Development Site.

Table 11.2: Values to be used to assess the magnitude of impact for construction noise and other sources (other than mechanical services) at the main development site during construction (all values are free field)

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium	Day	Below baseline noise levels	Baseline noise levels	60	70	$L_{Aeq,\ 16h}$, dB,
	Night			45	55	$L_{Aeq,\ 8h}$, dB,
		<60	60	65	70	L_{Amax}, dB,
Low	Day	Below baseline noise levels	Baseline noise levels	60	70	$L_{Aeq,\ 16h}$, dB,
	Night			45	55	$L_{Aeq,\ 8h}$, dB,
Very low	Any	No assessment normally required				

Table 11.11: SOAEL values from noise from all construction work (all values are façade levels).

Day	Time (hours)	Averaging Period T	Significant Observed Adverse Effect Level[1] $L_{Aeq,T}$ (dB)
Mondays to Fridays	0700 – 0800	1 hour	70
	0800 – 1800	10 hours	75
	1800 – 1900	1 hour	70
	1900 – 2300	4 hours	65
Saturdays	0700 – 0800	1 hour	70
	0800 – 1300	5 hours	75
	1300 – 1400	1 hour	70
	1400 - 2300	1 hour	65
Sundays & Public Holiday	0700 – 2300	1 hour	65
Any night	2300 – 0700	1 hour	55

Note: (1) Duration of exceedance must occur for 10 or more days or nights in any 15 consecutive days or nights; or for a total number of days exceeding 40 days or nights in any 6 consecutive months.

It is not clear how the numbers in Table 11.2 and 11.11 relate to one another or to the criteria previously agreed with ESC, or how these figures would be interpreted to determine significance of the impact of construction noise at a given level.

We understand that the reasoning behind the revised criteria in Table 11.11 relates to the 2019 revision of Design Manual for Roads and Bridges which aligns SOAEL thresholds for road traffic noise with the with the threshold for noise insulation, or a grant for insulation, as set out in the Noise Insulation Regulations 1975 (as amended 1988). This approach has been used for construction noise assessments in urban settings. However, ESC and AJA consider that this is not applicable in a quiet rural environment, and that given the duration of the works, construction noise levels well below the SOAELs proposed in Table 11.11 would cause significant impacts.

Application Noise Exposure Hierarchy (Planning Practice Guidance for Noise) using the Applicant's proposed criteria at a receptor with low ambient noise levels (e.g. 40 dB L_{AeqT}) would permit levels 35 L_{AeqT} above the prevailing noise climate before a significant adverse effect is identified.

To comply with NPPG the threshold values used for SOAEL should reflect the reality of the level at which noise is expected to have a significant impact taking account of the duration of the works and the nature of the existing noise climate. We consider any other approach to be contrary to the guidance in the NPSE.

We also note that the threshold values in Table 11.11 do not align with the results of the construction noise models in terms of assessment periods or quantifiers (the model predicts free-field noise levels whereas the figures in Table 11.11 are façade levels). It is therefore not clear how the results of the modelling have been compared against the criteria for the purposes of the assessment.

1.4.2 Non-residential receptors

BS5228-1 states in Section E.3.3 that *"For public open space, the impact might be deemed to cause significant effects if the total noise exceeds the ambient noise ($L_{Aeq,T}$) by 5 dB or more for a period of one month or more"*. However, this methodology does not adequately assess the impact in quiet areas prized for their tranquillity where noise levels are likely to be well below the lower cut off values set out in BS5228-1.

The assessment of noise impact in tranquil areas is a complex subject with no formally adopted assessment methodology. The applicant has submitted an assessment using The Natural Tranquillity Method, a methodology that aims to quantify the impact of new sources using the following four key aspects:

- The overall level of sound (how loud or quiet it is);
- The relative levels of man-made and natural sounds;
- The proportion of the time during which only natural sounds are present; and
- The amount of transportation noise

The consideration of the impact of construction noise to areas of tranquillity is welcomed. Given the short timescale available for this document we have not yet had the opportunity to review this and we propose to do this in a separate report.

1.5 Assessment outcomes

1.5.1 Residential receptors

In summary, the report predicts construction noise levels of up to 70 dB $L_{Aeq,16hr}$ at the residential receptors during the 0700-2300 daytime/evening working period. Construction noise levels are generally highest during Phase 1a, when the site strip out works are underway and during Phase 5 during restoration works. The report predicts noise levels of up to 52 dB $L_{Aeq,8hr}$ and 67 dB L_{Afmax} at night. These are expected to last throughout the period when the Green Rail route is operational (potentially for up to 8.5 years).

The report concludes that noise from construction activity will at times have a significant impact at a number of locations but that the predicted noise levels are below the proposed SOAEL thresholds at all receptors.

AJA and ESC disagree with this conclusion and with the principle that the sum of the significant individual noise impacts can be considered to be cumulatively below the threshold of significance. We assert that lower SOAEL threshold levels should be adopted. This would result in the Applicants having to take additional mitigation actions such as temporary relocation of residents from affected properties during the noisiest construction periods.

The Applicants may argue that these options and other mitigation measures are being considered in any case, irrespective of the chosen SOAEL. However, as proposed the SOAEL thresholds would permit significantly higher noise levels than currently predicted to occur continuously throughout the 12 year construction period and leave the local authority with little recourse should the construction noise levels be higher than expected but below the SOAEL threshold proposed by the applicant.

Request for Information 3 - Furthermore, we note that the predicted noise levels at a number of receptors appear to fall into the *"high impact"* category from Table 11.2 but are listed as *"medium impact"*. We would request clarification on this from the Applicant.

Beyond quantitative discussion of the impact of the predicted noise levels there is very little discussion of qualitative effect of the proposed construction noise sources in an otherwise quiet and exclusively rural noise climate. In many cases the predicted noise levels are well above the prevailing ambient noise levels and will dominate the noise climate at the receptor locations, 24 hours a day for many years.

1.5.2 Non-residential receptors

The qualitative summaries in the report identify a number of locations around the study area where construction noise is expected to have significant effects in a currently tranquil environment. We will consider those and the assessment methodology used in a separate document. At this stage, however, it is clear that the introduction of a large scale, long term engineering project will fundamentally change the existing rural noise climate in the areas surrounding the study site.

1.6 Other comments

1.6.1 Uncertainty

The calculation of construction noise is inherently based on assumptions about the processes and equipment which will be used to undertake the work and is the predicted levels therefore carry a degree of uncertainty. This is acknowledged by the Applicant's consultants in Appendix 11B which states at Paragraph 1.3.1.2 *"The proposals do enable a robust assessment of the likely effects, although the absence of final, confirmed construction details creates some challenges for noise prediction".* In the following paragraph of the assessment it continues "*Final construction proposals would not ultimately be confirmed until post-DCO once relevant main and sub-contractors are appointed and develop their own proposals*". Clearly therefore these assessments will have to be revisited and refined throughout the process to more accurately assess impacts and inform the mitigation strategy.

We recommend that the Applicant should keep the noise assessments updated as the COCP develops, and should undertake noise monitoring throughout the construction period to validate the construction noise models, identify variations from the modelled noise levels and take pro-active actions to address any issues identified, including mitigation required at noise levels agreed in advance.

Request for information 4 - The Applicant is asked to confirm how the works on the similar project at Hinkley Point C and the results of the construction noise monitoring undertaken there have fed into the validation of the construction noise modelling at Sizewell C to reduce uncertainty in this assessment.

1.6.2 Mitigation

The construction noise assessment discusses how the noise model was used to identify areas where barriers or screens could be effective in reducing noise levels at the receptor locations. While the use of barriers and screens to reduce the noise impact at the surrounding receptors is welcomed, we note that in some cases the predicted noise levels with screens are still well over the SOAEL thresholds previously agreed with ESC and the recommended significant thresholds set out in Sections E.3.2 and E.3.3 of BS5228. The predicted levels are therefore not considered acceptable without further mitigation.

The proposed thresholds at which noise mitigation measures would be offered are set out in Appendix 11H *"Noise mitigation scheme"*. These are based on the SOAEL thresholds set out in in Table 11.11 rather than those previously agreed with ESC. We would recommend that ESC seek lower mitigation threshold levels for the reasons discussed above.

1.7 Conclusions

ESC and AJA recognise that the scale of the proposed development will inherently entail intensive construction activity over a long period of time. However, our opinion is that this increases, rather than diminishes the need for an appropriate assessment of the true impact of noise from construction sources on to the study area.

The calculation methodology and receptor locations have been previously agreed with ESC and we understand these are accepted, other than for the areas of tranquillity which we have not yet reviewed.

The Applicant's proposed assessment criteria are significantly less onerous than those previously agreed with ESC and are not accepted. Given the duration of the construction, the extended night-time work and the low existing ambient noise levels, we consider that the proposed thresholds for significant effects and for mitigation would permit unacceptable levels of construction noise which could cause very significant adverse impact over many years without any option for recourse.

2 MAIN DEVELOPMENT SITE CONSTRUCTION VIBRATION

2.1 Assessment criteria

The assessment of magnitude of construction vibration uses the criteria in Table 11.4, and the proposed LOAEL and SOAEL values for construction vibration are set out in Table 11.12.

Table 11.4: Values to assess the magnitude of vibration impact from all construction sources (day or night)

Sensitivity of receptor	Magnitude of impact				Parameter
	Very low	Low	Medium	High	
High	Bespoke assessment method to be used				
Medium and low	<0.3	0.3	1	>10	PPV mm/s
Very low	No assessment normally required				

Table 11.12: LOAEL and SOAEL values for construction vibration

LOAEL	SOAEL	Parameter
0.3	10.0	PPV mm/s

Section 11.3.37 states

> *"Construction vibration will be considered significant if the magnitude of impact is medium or high at a low or medium sensitive receptor, and occurs for a duration exceeding:*
>
> *• 10 or more days or nights in any 15 consecutive days or nights; or*
>
> *• a total number of days or nights exceeding 40 in any 6 consecutive months."*

The LOAEL and SOAEL levels above are consistent with the PPV criteria stated in BS 5228-2:2009+A1:2014 "*Code of practice for noise and vibration control on construction and open sites : Vibration*".

- 0.3 mms^{-1} – Vibration might just be perceptible in residential environments.
- 10.0 mms^{-1} – Vibration is likely to be intolerable for any more than very brief period of exposure to this level.

However, we note that these criteria are less stringent that those previously proposed by the Applicant following early consultation with ESC, which were as follows:

Period	LOAEL	SOAEL	Parameter
Day	0.3	3.0	PPV, $mm.s^{-1}$
Night	0.15	1.0	PPV, $mm.s^{-1}$

2.2 Assessment methodology and outcomes

Chapter 11 identifies the primary sources of construction vibration on site as sheet piling, vibratory roller/compaction plant, surface breaking and bulldozer movements and states that receptors in close proximity to proposed workings could potentially experience some vibration. We would not normally expect this type of work to be permitted outside normal working hours, and we consider that it would be reasonable to prohibit this type of work except during the daytime on weekdays.

The Applicant reports in Table 11.25 activities which have the potential to result in vibration levels at or above a *"Low"* magnitude along with the closest distances to sensitive receptors and the predicted vibration level. The predicted vibration levels are all well below the SOAEL currently proposed by the Applicant and also the more onerous SOAEL value previous agreed with during early consultation with ESC.

Table 11.25: Predicted vibration levels and impact magnitudes from vibration producing activities which have the potential to produce adverse effects.

Receptor	Activity	Distance between source and receptor (m)	Predicted level, mm/s, PPV	Magnitude
Keepers Cottage	Liner compaction of detention basin using large vibratory roller	70	0.5	Low
Crown Lodge	Base compaction of LEEIE compound / parking areas using large vibratory roller	80	0.3	Low
Eastlands Industrial Estate buildings		70	0.5	Low
King George's Avenue		80	0.3	Low
Abbey Cottage	Compaction of entrance road and plaza using large vibratory roller	60	0.7	Low
Roundhouse	Large vibratory roller on borrow pits and possible compaction of stockpile / storage using large vibratory roller	80	0.3	Low
Plantation Cottages	Compaction of basin for WMZ5 using large vibratory roller	80	0.3	Low
Ash Wood Cottages	Base compaction of compound and haul road using large vibratory roller	60	0.7	Low

The methodology used to estimate the construction vibration levels is described in Volume 1, Appendix 6G, Annex 6G.2, but we have not yet had the opportunity to review this document. We propose to issue a separate report when we have reviewed this.

3 MAIN DEVELOPMENT SITE OPERATIONAL NOISE

3.1 Introduction

The operational phase of the proposed Sizewell C twin reactor nuclear power station development is expected to start in approximately 2034 and to last 60 years.

The operational station would comprise a large site with a wide variety of buildings and sound sources associated with the generation of electricity from nuclear fuel sources. Sound sources would include plant and equipment in buildings, on roofs, extract/intake vents to buildings, chimneys/flues, substation(s), and back-up generators.

Prior to operation, commissioning tests would be undertaken to demonstrate that the Sizewell C nuclear power station is capable of performing in accordance with its design specification and safety and environmental requirements (Volume 2, Chapter 4).

Commissioning testing of reactors and back-up generators would be a one-off process, but is predicted to take approximately three years for each UK EPRTM reactor unit and approximately five years in total (due to overlapping commissioning periods). This is a relatively long duration but potential noise impacts during the commissioning period appear to have been discounted from the need for assessment by the applicant.

In some parts of the study area, the sound climate during the operational phase of SZC will include sounds associated with the operation of the Sizewell B (SZB) power station. East Suffolk Council (ESC) have concerns that SZC would be a double reactor station, and its proposed location north of the single-reactor SZB would therefore extend the area over which power station operational noise may be detectable during the life span.

In general, ESC is concerned that continuous operational power station noise levels may be increased at receptors where they already may experience sound from SZB. Other noise-sensitive receptors (including both residential and amenity & recreation receptors in the AONB) could also now be exposed to continuous plant noise for 60 years (the operational life of SZC), where they experienced no such sound before.

ESC is concerned that the predicted daytime and night-time sound rating levels at noise sensitive receptors could result in potential long-term adverse noise impacts.

The proposals would introduce continuous plant noise which may have tonal or other characteristics that would change the sound climate and character of some areas on a semi-permanent basis. People would be exposed to this noise in their homes and gardens, and on public rights of way in recreation and amenity areas (in the AONB).

3.2 Baseline survey data

ESC acknowledges that extensive baseline survey work has been undertaken by the applicant over a relatively long period (Volume 2, Chapter 11, Appendix 11A). It is noted that much of this took place in the years 2014 and 2015, with some additional surveys undertaken in 2019 in the form of relatively short *'validation'* measurements.

Existing baseline sound levels and sound characteristics at receptor locations are particularly important to the operational noise assessment. This is because the adopted methodology from BS 4142:2014+A1:2019 *'Methods for rating and assessing industrial and commercial sound'* compares predicted sound levels with existing background sound levels to indicate the extent of noise impacts (considering context).

3.3 Source data

In terms of noise source data, the applicant refers to a station of a similar design in France. Neither ESC nor AJA are familiar with this and we therefore cannot currently comment on the validity of the source data. ESC does have concern about the source data adopted as these are the fundamental basis of the noise modelling predictions, which in turn form the basis of the subsequent operational phase noise assessments. Any uncertainty in the source data casts doubt on the assessments. This is particularly true for receptors predicted to be close to significance thresholds for operational noise.

We therefore consider that it would be helpful to understand from the applicant how the source data being adopted in the predictive noise model for the operational station has been measured. Understanding the source data, and in particular the similarities between the reference power station and the proposed SZC power station, would allow ESC to have greater confidence in the predictions and to be reassured that any related areas of uncertainty would not affect the assessment outcomes presented in the DCO.

3.4 Prediction methodology

Predictions of environmental noise propagation to receptors during the operational phase were completed using a noise modelling package (SoundPLAN) that implements the noise propagation methods in ISO 9613-2:1996 *'Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation'*.

Given the variety of sources, topography, ground conditions etc., it is expected and understandable that noise modelling would be utilised. Having considered the applicant's description of the methodology (Volume 2, Chapter 11, Appendix 11C), ESC and AJA are both satisfied that the applicant's consultants appear to have appropriately considered ground and air absorption, topography and screening, and to have validated the model (i.e. undertaken a quality control/checking exercise given complexity of the model).

3.5 Assessment methodology and criteria

3.5.1 Scope and extent of study

The SZC operational phase noise assessment is based around two scenarios:

1. Operational power station (typical)
2. Operational power station (typical) and testing of the back-up diesel generators at the end of an outage

ESC is satisfied with the extent of the *'study area'* and the residential receptors that are included in the assessment. Some individual receptors actually represent multiple dwellings, an example being the receptor referred to in the application as *'Sandy Lane'*.

3.5.2 Derivation of magnitudes of impact

ESC is also satisfied that the BS4142:2014+A1:2019 methodology is appropriate for assessing operational noise from SZC. However, the derivation of the magnitudes of impact (Table 4.1 of Volume 2, Chapter 11, Appendix 11C) is currently unclear. The applicant indicates (Paragraph 11.3.55, Volume 2, Chapter 11) that these were derived in accordance with BS 4142:2014+A1:2019 guidance, but it is unclear how.

Request for information 5 - ESC therefore requests further explanation and/or clarification from the applicant to better understand how these magnitudes of impact categories were derived.

3.5.3 Low, medium and high sensitivity receptors

As *"a precautionary measure"*, the same assessment criteria were adopted for low sensitivity receptors as for medium sensitivity receptors. High sensitivity receptors were assessed using a bespoke method for each receptor. ESC supports this approach. ESC and AJA also agree that operational noise is unlikely to have any adverse effects on *"very low"* sensitivity receptors, and that *"no assessment is normally required"*.

3.5.4 Low background and rating sound levels

The BS 4142 methodology involves a quantitative assessment where rating levels (considering distinctive characteristics) are compared with background sound levels, and an assessment of these results is considered in context at each relevant receptor.

The applicant states that *"background and ambient noise levels in the vicinity of the Main Development Site are low"* (Paragraph 11.3.60, Volume 2, Chapter 11). ESC and AJA broadly agree with this statement, although ambient and background noise levels do vary significantly between some receptors (Volume 2, Chapter 11, Appendix 11A).

In relation to *"low"* background sound levels, Section 11 of BS 4142 states that:

> *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

According to the Associated of Noise Consultants (ANC) Technical Note on BS 4142 (published March 2020):

> *"BS 4142 does not define 'low' in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90}, and low rating levels as being less than about 35 dB $L_{Ar,Tr}$."*

ESC and AJA therefore consider that the BS 4142 guidance that absolute levels might be as, or more, relevant than the comparative assessment should normally only apply where background sound levels ***and*** rating levels are below these thresholds.

The applicant, however, suggests that where the background sound levels are below or equal to 30 dB L_{A90}, adverse effects should not be expected below an absolute threshold that represents the onset of adverse impact. ESC and AJA do not consider this to be unreasonable based on the guidance, although it ignores that BS 4142 states that the absolute levels might be more relevant if background ***and*** rating levels are low. In short, the applicant's approach does not precisely reflect the guidance in BS 4142.

On this basis, the applicant suggests that, where background sound levels are at or below 30 dB L_{AF90}, *"it is appropriate to select a level below which there is little likelihood of sleep disturbance at night"* (Paragraph 11.3.61, Volume 2, Chapter 11), and refers to the World Health Organisation (WHO) *'Night noise guidelines for Europe'* (2009), the Executive Summary of which states that there is *"no sufficient evidence that the biological effects observed at the level below 40dB $L_{night,outside}$ are harmful to health"*.

40 dB L_{night} has subsequently been adopted as the threshold below which an adverse effect would not occur *"in locations with low background sound levels at night"* (Paragraph 11.3.62, Volume 2, Chapter 11). It is later suggested there is *"no prospect"* of adverse impact below 40 dB L_{night} (Paragraph 11.5.15, Volume 2, Chapter 11).

ESC and AJA consider that this is unreasonably dismissive of potential impacts below this threshold, particularly given that the approach does not strictly adhere to BS 4142. For example, there are receptors where the predicted rating level would exceed 35 dB L_{Ar} (and would not be considered low according to the current ANC guidance) but where the typical background sound level is equal to or lower than 30 dB L_{AF90}. Potential impacts at these receptors are ultimately assessed against the absolute limit of 40 dB L_{night}, which ESC consider could underestimate potential adverse impacts.

Moreover, ESC and AJA are concerned that the WHO *'Night noise guidelines'* are not an appropriate reference for assessing continuous operational noise from SZC as the research on which the guidance is based is primarily focused on the health effects of transportation noise and thus does not consider potentially distinctive characteristics, such as tonality and impulsivity, which are relatively common in relation to noise from fixed mechanical plant. This is discussed further below.

3.5.5 Rating levels, tonality, intermittency and impulsivity

Derivation of rating levels in accordance with BS 4142 requires consideration of characteristics (e.g. tonality, intermittence, impulsivity) which could make the noise more distinctive. The alternative threshold of 40 dB L_{night} does not consider such characteristics, and we are concerned that the Applicant would consider operational noise levels up to 40 dB L_{night} to be acceptable even where the noise has characteristics which it make it more distinctive.

The applicant has adopted correction factors to account for expected tonality, also referred to as power station *"hum"* (Paragraph 11.5.15, Volume 2, Chapter 11). It is suggested that neither operational scenario would result in noise emissions which could be perceived as intermittent or impulsive. ESC have no reason to doubt this.

The applicant has applied what is referred to as a *"precautionary"* + 4 dB correction for all receptors, assuming clear perceptibility. ESC agrees with applying a correction for potential tonality to all receptors to ensure a robust assessment. It is, however, unclear why this was determined by applying *'subjective method'* described in BS 4142 with observations of similar characteristics exhibited by the operational Sizewell B power station. ESC and AJA are unclear why either the *'objective'* and/or *'reference'* method from BS 4142 could not have been applied to the same operational noise from SZB.

For all scenarios where a medium or high magnitude impact is identified in accordance with BS 4142, the overall effect is considered *'not significant'* because the predicted L_{night} would be below 40 dB. If the rating levels for the same receptors were assessed against a comparable absolute limit of 40 dB L_{Ar} (including character corrections) then the limit would be exceeded at some of those receptors. ESC and AJA consider that this could underestimate potential impacts, indicating the unsuitability of 40 dB L_{night} as the threshold for significant effects.

It is the view of ESC and AJA that an absolute operational noise limit of 40 dB L_{night} should only be adopted where both background sound ***and*** rating levels are *"low"* (in accordance with BS 4142 and the accompanying ANC guidance), and furthermore that even in these cases there should be consideration of how distinctive characteristics might affect the suitability of the assessment, rather than simply dismissing them.

3.5.6 *Consideration in context – LOAEL and SOAEL values*

As explained above, ESC and AJA are not currently satisfied with either the derivation of the magnitude of impact categories, nor the application of context in relation to assessment outcomes.

In particular, BS 4142 states that the results of any assessment carried out using that methodology should be considered in context. ESC do not consider that the applicant has adequately considered the context in which SZC operational noise would exist, particularly in terms of the change in sound climate that would result in some locations.

Section 11 of BS 4124:2014+A1:2019 states that the initial estimate of impact should be modified, where appropriate, depending on the context. This should consider:

> *(2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. (see studies referred to in further reading list).*

The Applicant's nominated LOAEL and SOAEL values for noise from the operational power station and other mechanical services are presented in Table 11.14 of Volume 2, Chapter 11. ESC and AJA agree with the basic principle of the LOAEL being equal to or lower than the background sound level, because this is consistent with BS 4142 which suggests that rating levels below background indicate a low impact, depending on the context. However, for the night-time an alternative criterion of 40 dB L_{night} is then proposed as an additional LOAEL, with a caveat that the higher of the two would apply by default.

ESC agree that absolute criteria are appropriate in some specific situations, but the either/or approach does not seem sufficiently robust as it means that the more stringent of the two LOAEL criteria would be disregarded provided the less stringent were met.

A similar approach is followed with the LOAEL values, where two criteria are proposed. Firstly, the rating level not exceeding background + 10 dB, which is a logical SOAEL value because it is the threshold of significant adverse impact, according to BS 4142. However, alternative absolute noise criteria are also introduced between 55 dB L_{night} (for the night) and 60-65 dB $L_{Aeq,16hour}$ for low- and medium-sensitivity daytime receptors. The same *"whichever is highest"* caveat is given again. Having reviewed Appendix 6G of Volume 1 it is still unclear where these absolute limits were derived from or why the approach seems to be to adopt whichever of the LOAEL values is the least stringent.

It is the view of ESC and AJA that there are certain situations where absolute limits might be more appropriate, as discussed above. However, we are concerned that the nominated LOAEL and SOAEL values deviate too far from BS 4142 methodology and apply absolute criteria for operational noise where they might not be appropriate.

3.6 Assessment of impacts

3.6.1 Typical daytime power station operation

Rating levels for typical daytime power station operation are presented in Table 11.27 of Volume 2, Chapter 11. This presents predicted rating levels between 16 dB below and 3 dB above background. These rating levels are assessed as representing low to very low magnitudes of impact. This seems a reasonable conclusion considering the guidance in BS 4142, although there appears to be no consideration of context.

3.6.2 Typical night-time power station operation

Rating levels for typical night-time operation are presented in Table 11.28. This shows rating levels between 4 dB below and 11 dB above background. There are nine receptors where the rating level would exceed background by more than +5 dB, representing medium to high impacts. However, at all of these receptors the typical background sound level is no higher than 30 dB and the alternative 40 dB L_{night} criterion is subsequently applied to determine the significance of the impact. 40 dB L_{night} would apparently not be exceeded at any of these receptors and on this basis it is concluded that there would be significant adverse noise effects, considering the local context.

As discussed in Section 1.1, ESC and AJA have doubts regarding the suitability of the WHO Night Noise Guidelines for assessing operational power station and continuous plant noise. ESC and AJA also consider that the BS 4142 guidance that absolute levels might be as, or more, relevant than the comparative assessment should normally only apply where background sound levels ***and*** rating levels are below these thresholds. Rating levels at four of these nine receptors would be higher than 35 dB L_{Ar}, and would therefore not be considered *"low"* according to the ANC guidance on BS 4142. ESC do not agree with the widespread adoption of the alternative 40 dB L_{night} criterion and consider it likely to underestimate potential night-time operational noise impacts.

3.6.3 Typical station operation plus routine testing of backup generators post-outage

Rating levels for daytime operation plus routine testing are presented in Table 11.29. This shows three receptors where predicted rating levels would be between 5 dB and 10 dB above background, with a low impact predicted at all other receptors. BS 4142 requires consideration of context, and this is reflected in paragraph 11.6.141 of Volume 2 Chapter 11. ESC and AJA agree that the relatively limited duration of routine testing (assumed to be approximately sixty hours and/or five days per year) is likely to reduce potential noise impacts. ESC also agree with the other contextual considerations put forward, including the use of worst-case assumptions in the prediction process.

Given that the BS 4142-derived SOAEL value of 10 dB above background would not be exceeded during routine testing, and considering context, ESC consider the overall daytime conclusion to be reasonable; i.e. non-significant, minor adverse effects at worst-case receptors for relatively short durations when routine testing is undertaken.

However, ESC do have some concerns regarding the assessment of night-time effects from typical power station operation plus routine testing. Rating levels for this scenario are presented in Table 11.30, and indicate that background would be exceeded by more than 5 dB at fourteen receptors and would exceed background by more than 10 dB at three of these. It is then concluded that the overall effect at night would be *'not significant'* because the alternative 40 dB L_{night} criterion would not be exceeded.

As described in Section 1.1, ESC and AJA have doubts regarding the suitability of the WHO Night Noise Guidelines for assessing operational power station and continuous plant noise. ESC and AJA also consider that the BS 4142 guidance that absolute levels might be as, or more, relevant than the comparative assessment should normally only apply where background sound levels *and* rating levels are below these thresholds.

Rating levels at eight of these fourteen receptors would be higher than 35 dB L_{Ar}, and would therefore not be considered *"low"* according to the latest ANC guidance on BS 4142. Of the three receptors where 10 dB above background is predicted, rating levels at all three are higher than 35 dB L_{Ar}. ESC do not agree with the widespread adoption of the alternative 40 dB L_{night} criterion and consider it likely to underestimate potential night-time operational noise impacts, particularly where this justifies rating levels in excess of 35 dB L_{Ar} which would be more than 10 dB higher than the background level.

3.7 Other sound sources during operational phase

3.7.1 Electrical substation

Paragraph 11.5.16 of Volume 2 Chapter 11 addresses the noise impact of the electrical substation. The design is to be confirmed but would apparently ensure that operational noise does not exceed 35 dB $L_{Ar,15minute}$ (free-field) outside the nearest residence. This criterion seems to be derived in some way from BS 4142, but the derivation is not clear.

Request for information 6 - ESC would therefore request that the applicant provide explanation of the derivation of this noise criterion. ESC sees no reason why the same operational noise criteria should not apply to the substation as to other operational plant, as summarised in Table 11.7 and Table 11.14. ESC agrees (as indicated in paragraph 11.5.15 of Volume 2 Chapter 11) that this is likely to be a more robust target than the 40 dB L_{night} threshold that is applied to other parts of the operational assessment. However, this does not explain why the same BS 4142-derived criteria are not applied to the substation as to other operational plant.

It is also widely acknowledged that electrical substations often produce relatively high levels of low-frequency noise in comparison to other types of mechanical plant. It is good practice to assess low-frequency noise from substations alongside the overall A-weighted noise levels (A-weighting often underestimates low frequency noise impacts). There is no established guidance specifically intended for assessing low-frequency noise from substations. However, it is widely acknowledged that this is an important consideration and for this purpose reference is often made to guidance note NANR 45.

Guidance note NANR 45: *'Proposed criteria for the assessment of low frequency noise disturbance'* was produced in 2005 by the University of Salford and was mainly devised to assist in investigating complaints of low-frequency noise (LFN) from substations and to provide appropriate technical methodology and criteria for doing so. However, NANR 45 provides a reference criterion curve for use in assessing LFN and this is often used to identify where such noise exists that could result in complaints, particularly where an existing substation is located close to proposed residential use.

Request for information 7 - ESC and AJA therefore consider that further explanation is required regarding the derivation of the A-weighted noise limit for the substation, and ESC also consider that the design of the substation should consider the potential low-frequency noise (LFN) impacts and believe that NANR 45 should be used as the basis for determining this.

3.7.2 Off-site impacts

Use of the expanded sports facilities at the Alde Valley School during the operational phase could result in noise impacts and this is addressed in Volume 2, Chapter 11.

LOAEL and SOAEL values for operational use of the sports facilities are presented in Table 11.15 of Volume 2, Chapter 11. Paragraph 11.6.177 of Volume 2, Chapter 11 states that these were derived from the Sport England design guidance note *'Artificial grass pitches acoustics planning implications guide'* (2015). However, the daytime LOAEL of 50 dB $L_{Aeq,16hour}$ (free-field) is not consistent with the Sport England guidance, which suggests a one-hour criterion of 50 dB $L_{Aeq,1hour}$ *"to avoid moderate annoyance"*.

The Sport England guidance goes on to state that *"a 16 hour assessment period may not truly reflect the noise impact as it takes into account times of use and non-use. It is suggested an appropriate assessment time period is for one hour,* $L_{Aeq(1\ hour)}$ as this is typically the time period for a community sports session". ESC and AJA therefore consider that the adopted criteria are likely to underestimate potential noise impacts.

Request for information 8 - ESC therefore request that additional information is provided to clarify how the results of the assessment would be affected if the appropriate time interval were adopted.

3.8 Character and tranquillity

ESC consider that some receptor areas (dwellings and amenity & recreation areas) are characterised by low background sound levels, and relatively few commercial or industrial sounds. Indeed, the low background sound levels are acknowledged in the assessment. In those areas, changing the sound climate from mostly natural sounds to a climate that could permanently feature a low frequency *'hum'* or tone, would have a detrimental impact on that amenity area or receptor. It is considered that this sound climate change has not been adequately assessed in the DCO application documents.

3.9 Amenity and recreation impacts

In terms of amenity and recreation areas in particular, Volume 2, Chapter 15 of the ES does include some assessment of how noise might affect tranquillity and the general character at locations within the AONB. Appendix 15E does include an assessment of predicted noise-related changes to tranquillity, but the scope of this is limited to the construction phase only, when it is the view of ESC and AJA that potential long-term tranquillity changes might affect the character of valued amenity and recreation areas.

3.10 Conclusions

ESC and AJA recognise the inherent challenges in predicting and assessing operational power station noise. Much of the methodology and results are expected and reasonable, particularly in terms of baseline data and prediction methodology.

However, there are several areas of potential concern for which ESC and AJA would request additional information and/or clarification. These are as follows:

- There is inherent uncertainty in terms of the noise source data that has been used as the basis for predictions. It would be helpful to understand from the applicant how this source data has been collected. Understanding the similarities between the reference power station in France and the proposed SZC power station, in particular, would allow ESC to have greater confidence in the predictions and be reassured that any related areas of uncertainty would not affect the assessment outcomes presented in the DCO.
- Volume 2, Chapter 11 states that the magnitudes of impact (Table 4.1) were derived in accordance with BS 4142:2014. However, ESC considers this to be unclear and requests further explanation and/or clarification from the applicant to better understand how these magnitude of impact categories were derived.
- ESC are particularly concerned regarding the application of BS 4142 and/or the use of alternative criteria based on the WHO Night Noise Guidelines (2009). ESC and AJA consider that the BS 4142 guidance regarding *"low"* background sound levels has been slightly misinterpreted and, more worryingly, has been used to justify a significantly less onerous approach (i.e. *"whichever is higher"*). ESC request that further explanation and assurance is provide on this matter.
- It is also unclear how the criteria for noise from the operational substation were derived. ESC accepts that the design is yet to be finalised at this stage, but it is unclear why the same criteria were not adopted as all other mechanical plant. The adopted limit of 35 dB L_{Ar} seems to be BS 4142-derived but this is unclear. ESC request that further explanation and assurance is provide on this matter, and on the absence of low-frequency substation noise criteria and assessment.
- ESC considers that the criteria adopted for operational noise from the expanded sports facilities at Alde Valley School do not accurately reflect Sport England guidance and are likely to underestimate impacts, as reflected in the guidance. ESC request that further explanation and assurance is provide on this matter.

Report Status

Revision	Date	Prepared by	Checked by
-	10 March 2021	Joe Bear MIOA Gary Percival MIOA	Adrian James FIOA

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TECHNICAL MEMORANDUM

Project	Sizewell C DCO – Rail / Road Traffic Noise and Vibration Review		
Date	10 March 2021	**Memo No**	M003
Written by	Gary Percival MIOA	**Checked by**	Adrian James FIOA
Filename	12804 M003		

SIZEWELL C DCO APPLICATION WITH CHANGES PROPOSED JANUARY 2021

RAIL / ROAD TRAFFIC NOISE AND VIBRATION REVIEW

1 INTRODUCTION

It is estimated that the construction of the proposed Sizewell C twin reactor nuclear power station development will take around twelve years. It is inevitable that such a large construction project will require and be served by very large volumes of freight, particularly during Phases 1 and 2 when most of the earthworks would be completed.

1.1 Original DCO application

The original DCO application was based on a hybrid strategy of road and rail freight. The main components of the originally proposed freight management strategy are:

- Road freight utilising;
  - The existing road network and;
  - New roads to be constructed as part of the development construction, most notably the Sizewell Link Road and Two Village Bypass.
- Rail freight utilising;
  - The existing East Suffolk Line (between Ipswich and Saxmundham);
  - The Saxmundham to Leiston Branch Line (which would be upgraded as part of the proposals); and
  - A new railway line known as the Green Rail Route, constructed during years 1-2 of construction to provide a dedicated rail link between the Saxmundham to Leiston line and the Main Development Site (MDS). The Green Rail Route would be removed once construction is complete.

The potential noise and vibration impacts associated with construction and operation of the proposed development were assessed in the Environmental Statement (ES).

1.2 Proposed changes to DCO application

In January 2021, the applicant submitted a request to The Planning Inspectorate to change the previously submitted DCO application. Fifteen changes were proposed. Many would not affect the existing road and railway noise and vibration assessments, but the following changes to the Freight Management Strategy were assessed as having the potential to change the significance of effects presented in the DCO:

1. Potential to increase the frequency of freight train movements to facilitate bulk material imports by rail; and
2. An enhancement of the permanent beach landing facility and construction of a new, temporary beach landing facility.

Changes 1 and 2 would reduce HGV movements on roads, which would be achieved by introducing more freight train movements (at night) and upgrading the proposals for the beach landing facility to enable more significant volumes of seaborne freight.

The applicant stated that it is in discussions with Network Rail to establish whether :

- There is potential to run four trains overnight, rather than three;
- There is potential to run trains up to six days a week; and
- A fifth daily train might be possible for a limited period at peak construction.

The applicant acknowledges that the additional train capacity may not be deliverable, depending on Network Rail. However, the assessment has been updated to assume four trains (eight one-directional movements) for most of the construction phase. The main exceptions to this would be at the start and end of the construction, when a fifth train (ten movements per day) has been assumed to account for additional demand. Train movements are likely to be mostly at night, i.e. after 23:00hrs.

The updated rail noise and vibration assessment has subsequently been based on a "reasonable worst-case scenario" of up to eight train movements on a typical night, assuming trains would run 6 days per week, including Sunday night/Monday morning.

Based on the submitted change proposals ESC agree that Changes 1 and 2 are most likely to significantly alter existing rail and road traffic noise and vibration assessments, and that all other changes are unlikely to be significant in terms of noise and vibration.

1.3 Initial ESC comment on proposed changes to DCO application

ESC have significant concerns regarding the noise and vibration impacts associated with the freight management strategy, particularly in terms of night-time rail freight. ESC consider that the rail mitigation strategy would not adequately protect residents, and that the strategy does not achieve the policy requirement that adverse effects are *"mitigated and reduced to a minimum*" so that significant adverse effects are avoided.

The change proposal seeks to reduce the number of HGV movements and puts significant emphasis on the importance of rail and marine solutions to ease the burden on freight management. Whilst in broad terms this aspiration is supported, there has to be a balance of impacts and a reduction in impacts due to road traffic must not be at the expense of a disproportionate number of impacts due to rail traffic noise.

In terms of environmental protection, ESC currently consider that they are unable to support the proposed freight management strategy unless residents are adequately protected from noise and vibration impacts in line with current policy and legislation.

2 LEGISLATION, PLANNING POLICY AND GUIDANCE

2.1 Introduction

Before commenting on the specifics of road and rail noise and vibration assessments, ESC consider it important to set out the relevant planning policies and accompanying guidance which underpins the way in which noise and vibration impacts are assessed.

The noise and vibration legislation, planning policy and guidance which underpin both assessment and mitigation are set out in Volume 1, Chapter 6, Appendix 6G of the ES.

2.2 International legislation/policy

Appendix 6G states that there is no international legislation or policies which have any relevance to the proposed development, but that the proposed development is subject to relevant national legislation and planning policy. ESC consider this to be correct.

2.3 National Legislation

The Control of Pollution Act 1974, the Environmental Protection Act 1990, and the Environmental Permitting Regulations 2016 are all relevant, as stated in Appendix 6G.

Appendix 6G also references the Noise Insulation Regulations 1975 (amended 1988) and the Noise Insulation Regulations (Railways and Other Guided Transport Systems) Regulations 1996, which set out provisions for mitigation in relation to new road or rail.

2.4 National Planning Policy and National Policy Statements

The National Planning Policy Framework (NPPF) sets out the Government's planning policy at a national level for England, though it does not contain specific policies for nationally significant infrastructure projects (NSIPs). The NPPF's stipulations on noise and vibration are well-established and do not require further explanation here.

The National Policy Statement for Energy (NPS EN-1) set out the overarching policies specifically in relation to Nationally Significant Infrastructure Projects (NISPs) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) sets out the Government's policies which apply specifically to new nuclear power developments.

The NPSs set out the Government's energy policy and guidance for determining an application for a DCO, and set out specific criteria and issues that should be covered by applicants' assessments, providing guidance on how the decision maker should consider these impacts. These matters are summarised in Table 1.1 of Appendix 6G.

In addition to the requirements summarised in Table 1.1 of Appendix 6G, NPS EN-1 also clearly states (in paragraph 5.11.9) that:

> *"The IPC should not grant development consent unless it is satisfied that that the proposals will meet the following aims:*
>
> - *Avoid significant adverse impacts on health and quality of life from noise;*
> - *Mitigate and minimise other adverse impacts on health and quality of life from noise; and*
> - *Where possible, contribute to improvements on health and quality of life through the effective management and control of noise."*

These aims are consistent with the three main Noise Policy Aims set out in Section 1.7 of the Noise Policy Statement for England 2010 (NPSE), as reproduced below.

Noise Policy Aims

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- **avoid significant adverse impacts on health and quality of life;**
- **mitigate and minimise adverse impacts on health and quality of life; and**
- **where possible, contribute to the improvement of health and quality of life.**

Figure 1 – National Noise Policy Aims as set out in the NPSE

The National Policy Aims of the NPSE are also set out in paragraph 1.2.14 of Appendix 6G. This shows a clear correlation between the aims of NPS EN-1 and the NPSE. Paragraph 1.8 of Appendix 6G refers to these two sets of aims as *"similarly-worded"* but clearly the two sets of aims are identical and are presumably intentionally aligned.

Paragraph 1.2.15 of Appendix 6G correctly identifies that, together, the first two aims of the NPSE require that significant adverse impacts should be avoided and, where noise levels fall between the lowest observed adverse effect level (LOAEL) and a level which represents a significant observed adverse effect (SOAEL), *"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life"*.

The guidance in the NPSE could therefore be summarised as follows:

- Noise levels below the LOAEL – no action required.
- Noise levels between LOAEL and SOAEL – take all reasonable steps to mitigate and minimise adverse impacts.
- Noise levels exceeding the SOAEL should be avoided.

In summary, the Noise Policy Aims of the NPSE are consistent with the stated aims of NPS EN-1 and the NPSE provides very clear guidance on what action should be taken in response to potential adverse impacts (between LOAEL and SOAEL) and significant adverse impacts (exceeding the SOAEL). These aims and actions are well established.

However, paragraph 1.2.17 of Appendix 6G contradicts this by claiming that *"the concept of the SOAEL is different from the declaration of significant adverse effects in an Environmental Statement"*. No further explanation is offered and ESC disagree that there is inconsistency between the two, but would welcome clarification on this point.

More specifically, paragraph 1.2.22 of Appendix 6G states that:

> *"Depending upon the classifications of effect adopted for the Environmental Statement, it is possible that likely significant negative or adverse effects may be declared, whilst noise levels remain below the SOAEL."*

It is claimed that this has been established through the examination of other NSIPs which apparently also demonstrated that the first aim of the NPSE / NPS EN-1 can be met even if significant adverse effects are identified, as long as the SOAEL is avoided. However, neither of the two cases which are referenced (Thames Tideway and the Cranford Agreement Appeal for Heathrow Airport) are energy projects, so the policy aims of EN-1 would not have applied in those cases. This casts doubt on this claim.

Paragraph 1.2.23 of Appendix 6G references terminological inconsistencies between The Infrastructure Planning (EIA) Regulations 2017 and the NPS EN-1 policy aims. This is valid but does not alter the aim of overarching NPS EN-1 (in line with the NPSE) to *"avoid significant adverse impacts on health and quality of life from noise"* and *"mitigate and minimise other adverse impacts on health and quality of life from noise"*.

Appendix 6G later states that the approach for both road and rail noise and vibration assessment is based on that in the *Design Manual for Roads and Bridges, LA111 Noise and vibration*, *2019* (DMRB) in which the SOAEL for road traffic noise is aligned with the threshold for noise insulation, per the *Noise Insulation Regulations 1975*. It is stated that the DMRB distinguishes between the SOAEL as an identifiable noise level and the significance of effects which are separately aligned to changes in noise level.

However, neither the DMRB or the *Noise Insulation Regulations 1975* are intended as a basis for general or rail-specific noise and vibration assessment, so it is not clear to ESC why this approach was adopted throughout. Clarification is welcome on this point.

These points, whether unintentionally or intentionally, conflict with the clear policy aims of overarching NPS EN-1 and the NPSE, and therefore the clearly defined actions which are required to be taken when either the LOAEL or SOAEL values are exceeded.

2.5 Planning Practice Guidance

The applicant appropriately identified the Planning Practice Guidance on Noise (PPG) as reinforcing the policy discussion and aims of the NPPF, NPSE and NPSs, while also defining human perception at different effect levels using LOAEL and SOAEL values.

PPG also differentiates the NOEL (No Observed Effect Level) from LOAEL in that at the NOEL *"noise can be heard, but does not cause any change in behaviour, attitude or other physiological response"* where at the LOAEL *"noise can be heard and causes small changes in behaviour and attitude"*. This is an important distinction because it underpins the reasons why action to *"mitigate and minimise"* is required at the LOAEL.

To reiterate, the actions recommended in the PPG in relation to the LOAEL and SOAEL are consistent with those in the NPSE/NPS EN-1, i.e. to mitigate and reduce noise to a minimum above the LOAEL, and to avoid levels at or exceeding the SOAEL.

PPG also refers to UAEL (Unacceptable Adverse Effect Level). UAEL is not referenced in planning policy (NPSE or NPS) and is accordingly not adopted in the assessment.

Appendix 6G also summarises other technical guidance which has been referenced in the noise and vibration assessment, including World Health Organisation publications, British Standards, and other guidance. ESC consider this approach to be appropriate.

2.6 Conclusions on applicable planning policies and guidance

In summary, the policy aims of NPS EN-1 and NPSE (and associated policy guidance) are necessarily clear in terms of the need to avoid significant adverse impacts/effects and to mitigate and reduce to a minimum any other adverse effects/impacts.

The Applicant suggests that terminological inconsistencies between the Infrastructure Planning (EIA) Regulations and the NPS EN-1 policy aims requires a hybrid approach, but ESC consider the overarching aims of NPS EN-1 (in line with the NPSE) to supersede this, and would welcome further discussion and clarification with the Applicant on this point.

3 ROAD TRAFFIC NOISE

3.1 Introduction

The construction of Sizewell C would require relatively large volumes of road freight. ESC consider this an inevitable consequence of the development, because an entirely rail and seaborne freight strategy would be insufficient.

The construction would involve HGVs using existing and new roads and associated infrastructure. The most significant proposals for new roads and infrastructure include:

- Sizewell Link Road;
- Two Village Bypass;
- Northern Park and Ride;
- Southern Park and Ride ; and
- Various junction changes and improvements.

Construction works involved in the above will inevitably produce noise and vibration. However, in comparison to construction works on the Main Development Site (MDS) these works will be of relatively limited duration and ESC are less concerned about this than about the operation of these new roads, which would occur for a longer period.

Considering the proposed changes to the DCO (which would take HGVs off the road by introducing additional rail freight), ESC are particularly interested in how this affects the balance of road traffic and rail noise impacts during construction of Sizewell C.

3.2 Assessment methodology and criteria

3.2.1 Road traffic noise on existing roads

The impact of road traffic noise on new roads due to construction of Sizewell C is based on two representative construction years and an operational year as follows:

- Early years of construction (2023)
- Peak year of construction (2028)
- Operational year (2034)

For the peak year of construction two scenarios representing a typical and busiest day were assessed because the number of HGV deliveries on some days during this period would be higher than on a typical day. ESC consider this sensible and pragmatic.

The assessment of impacts from traffic noise on existing roads during construction of Sizewell C is based on the magnitude of change categories presented in Table 11.5 of Volume 2, Chapter 11 of the ES. These are consistent with the IEMA Guidelines for Environmental Noise Impact Assessment (2014) and are considered to be appropriate.

Table 11.6 presents the criteria for assessing longer-term road traffic noise impacts associated with the proposed development of Sizewell C. Again, these are presented as magnitude of change categories based on the same IEMA guidelines. ESC consider this to the be the appropriate methodology for assessing changes in road traffic noise.

LOAEL and SOAEL values for project-related road traffic noise are presented in Table 11.13 of ES Volume 2, Chapter 11. These are derived from the Highways England *'Design Manual for Roads and Bridges'* (LA111 Noise and Vibration) which *"sets out*

the requirements for assessing and reporting the effects of highways noise". ESC consider this to be appropriate and applicable guidance for this type of assessment.

Paragraph 11.3.73 of Volume 2, Chapter 11 states that the LOAEL and SOAEL values have been applied to the assessment of road traffic noise on existing roads, but that to test whether the proposed development is a substantial cause of the exceedance, a change of at least +1 dB must occur as a result of the development-generated traffic.

The assessment was completed *"using road traffic flow data for links identified as having the potential to result in an adverse effect"*. It is not clear how potential effects were established and this requires clarification. Traffic flow data was used to calculate future *"baseline"* and *"with development"* noise levels for the three identified scenarios.

Daytime road traffic noise levels were calculated using the calculation method in CRTN (Ref. 11.17). Night time levels were calculated using Method 1 (the "preferred method") from TRL Report PR/SE/451/02 (TRL for DEFRA) (Ref. 11.24). It is not currently clear why two different methods were adopted, and ESC would request that this is clarified.

3.2.2 Road traffic noise on new roads

The assessment methodology and criteria for road traffic noise associated with new roads/infrastructure are set out in the relevant chapters. In particular, the methodology for the Two Village Bypass and Sizewell Link Road (which ESC consider to have the greatest potential for adverse effects in the context of new, proposed road schemes) are presented in Volume 5, Chapter 4 and Volume 6, Chapter 4 of the ES, respectively. Methodology and criteria for new roads are generally the same as for existing roads.

Noise and vibration assessment criteria for road construction are set out in Tables 4.3 and 4.4 of both chapters. Road construction noise criteria are based on *BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites: Noise'* (BS 5228). Construction vibration criteria are based on Part 2 of BS 5228.

Assessment criteria for road traffic noise on new roads during and after construction are consistent with those described in Section 3.2.1 of this note, in accordance with IEMA guidance (for magnitude of change effects) and LA111 (for LOAEL and SOAEL).

ESC consider the methodology and criteria for new roads suitable and appropriate.

3.3 Mitigation

3.3.1 Project-wide mitigation

Paragraph 11.5.17 of Volume 2, Chapter 11 presents the following project-wide design measures as providing mitigation to *"result in an overall reduction in noise exposure"*:

- Two off-site park and ride facilities to reduce construction worker traffic to site;
- A park and ride facility on the land east of Eastlands Industrial Estate (LEEIE);
- An accommodation campus and caravan park to further reduce travel to site;
- Reduced car parking and public rights of way improvements;
- An off-site freight management facility;
- Minimising freight movements on roads through:

- The provision of the beach landing facility;
- Saxmundham to Leiston branch line upgrades;
- Rail siding at LEEIE; and
- The Green Rail Route (once constructed).

While a balanced transportation strategy (such as is proposed) is probably necessary to manage noise and vibration impacts, ESC consider that the design measures above do not represent mitigation for reducing road traffic noise at source. Such measures might include quiet road surfaces and roadside noise barriers. It is currently unclear whether such measures are proposed as primary, secondary or tertiary mitigation.

3.3.2 Noise Mitigation Scheme

A Noise Mitigation Scheme is proposed as part of the DCO Section 106 obligations, so that noise insulation or temporary rehousing may be offered where specified criteria are exceeded. Details of the Noise Mitigation Scheme are provided in Appendix 11H.

In terms of road traffic noise, the criteria for eligibility for the Noise Mitigation Scheme are presented in Table 1.1 of Appendix 11H of Volume 2, Chapter 11. These criteria are apparently consistent with the four tests of The Noise Insulation Regulations 1975 (amended 1988) which apply to properties within 300m of a *"new or altered highway"*.

While ESC are generally supportive of this approach, that last caveat should be noted. The Noise Insulation Regulations strictly only apply in relation to *"new or altered"* roads. It could be argued that the same criteria should not be applied in response to potential road traffic noise increases on existing roads. However, ESC are generally supportive of the proposed Noise Mitigation Scheme as a means of avoiding the worst impacts.

However, it should also be noted (per paragraph 11.5.24 of Volume 2, Chapter 11) that NPS EN-1 clearly states that *"it may be appropriate for the Planning Inspectorate to consider requiring noise mitigation through improved sound insulation to dwellings"* but only in situations *"when all other forms of noise mitigation have been exhausted"*. This is an important distinction because it suggests that offering improved sound insulation to affected properties should be the last resort once other options are exhausted.

The applicant acknowledges this and paragraph 11.5.25 states that the PPG (for noise) also reflects this position, stating that there are four broad types of noise mitigation:

1. Engineering (reducing the noise at source)
2. Layout (using distance and good design to reduce the noise impact)
3. Planning conditions/obligations (e.g. restricting activity at certain times)
4. Mitigation through noise insulation when the impact is on a building.

This suggests that noise insulation mitigation should normally be the last resort for noise mitigation (being options one to three), which is consistent with NPS EN-1.

ESC request clarification from the applicant of how the policy requirement to exhaust all other forms of mitigation has been met for development-related road traffic noise, particularly in terms of option 1 above (reducing road traffic noise emissions at source).

3.4 Impacts relating to existing roads

The full tables of results of each scenario for each of the 134 links scoped into the assessment are presented in Appendix 11G of Volume 2, Chapter 11. Some of the changes reported are negative (i.e. reductions), indicating a predicted beneficial effect.

Locations where a medium magnitude impact are predicted are reported in Table 11.26 of Volume 2, Chapter 11. For medium sensitivity (residential) receptors this would give rise to a moderate adverse effect. Adjacent road links are grouped together, as follows:

- 2023 – moderate adverse effects at:
    - Lovers Lane
    - B1122 between Yoxford junction and B1125 junction
- 2028 – moderate adverse effects at:
    - B1122 between eastern junction of Sizewell Links Road and Sizewell C Site Access Road
    - A12 slip road, west of Wickham Market Park and Ride
    - Kings Road, Leiston
- 2028 (busiest period) – moderate adverse effects at:
    - B1122 between eastern junction of Sizewell Links Road and Sizewell C Site Access Road
    - A12 slip road, west of Wickham Market Park and Ride
    - Kings Road, Leiston

According to the change proposals, proposed reductions in road freight would change moderate adverse effects on Kings Road, Leiston in the 2028 typical and 2028 busiest scenarios (which are significant) to minor adverse effects (which are not significant).

As stated in paragraph 11.6.93 of Volume 2, Chapter 11 and in accordance with LA111, significant effects may occur within 50m of roads affected by construction traffic. Based on Table 11.26, significant adverse effects are currently predicted for occupiers of:

- Properties within 50m of the kerb on B1122 between Yoxford and the B1125 junction in 2023;
- Properties within 50m of the kerb on Lovers Lane in Leiston in 2023; and
- Properties within 50m of the kerb on Kings Road in Leiston in 2028.

No other properties are within 50m where significant level increases are predicted.

The following properties are then identified as being potentially exposed to noise levels above the SOAEL for roads where a significant road traffic noise increase is predicted:

- 1 property along Lovers Lane during the daytime; and
- 11 properties along the B1122 between Yoxford junction and B1125 junction during the daytime.

The applicant states that this assessment will be updated when a detailed construction programme is known, in order to identify where exceedances of the SOAEL are likely to necessitate implementation of the Noise Mitigation Scheme.

Given the scale of the proposed construction project and the volume of HGV traffic which is proposed, ESC consider that some significant adverse effects at properties

on existing roads near to the MDS (as the above properties all are) are inevitable, and offering enhanced sound insulation to these properties is a relatively robust approach, particularly given that the assessment method for road schemes set out in LA111 is not clear whether road traffic SOAEL and LOAEL should be applied to existing roads.

The updated assessment included in the change proposals also includes sensitivity testing for a scenario where 100% of HGVs would arrive from the south. The results of this assessment indicate in 2023, and 2028 for the busiest days, the greatest predicted increase in road traffic noise is +0.2 dB, on the A12 south or west of Saxmundham. This would not change the significance of any effects already identified in the ES.

Conversely, some decreases in road traffic noise on existing roads are predicted from routing 100% of HGVs from the south. Decreases up to 1 dB are predicted for 2023, as well as the 2028 typical and busiest days. These changes are predicted on two parts of the A12 north of Saxmundham and one part of the B1122 near Yoxford. Again, the effect categories are not likely to change and all remain as minor adverse effects.

Changes to HGV routing would result in no changes to predicted night-time effects.

ESC consider that the change proposals would only result in relatively minor changes to the previously identified effects in relation to road traffic noise on existing roads.

3.5 Impacts relating to new roads

3.5.1 Construction noise and vibration

The assessments for the Two Village Bypass and Sizewell Link Road identify a number of significant moderate and (to a lesser extent) major adverse noise effects during the construction of these roads, more so for the main construction than preparatory works.

Despite this, the nominated construction SOAEL for the weekday daytime period of 08:00-18:00hrs is only predicted to be exceeded at two receptors across both routes; Annesons Cottages and Coronation Cottages; both relating to the Sizewell Link Road.

In terms of construction vibration, the use of a large vibratory roller during base works for the temporary contractors compound (for both new road schemes) is predicted to result in medium magnitude impacts at a total of six receptors across both schemes. In addition, the use of a large vibratory roller during construction of the Sizewell Link Road would result in additional low magnitude impacts at two receptors/properties.

Potential adverse construction vibration effects are not considered significant due to the relatively limited duration of works, and the levels would not exceed the nominated SOAEL for construction vibration. Exceedances of the LOAEL would be minimised through measures which be secured through the Code of Construction Practice.

ESC acknowledge that these roads are an important part of the hybrid freight management proposals, and that construction of these roads (which will also provide longer-term beneficial effects by relieving the existing local road network) will inevitably produce noise and vibration which could, at certain times and locations, be disturbing.

ESC agree that these effects will be partly offset by their relatively limited duration, and also that the implementation of an appropriate Code of Construction Practice (CoCP) will be vital in ensuring that construction works are programmed and carried out so that potential noise and vibration impacts are minimised as far as practicable.

The proposed changes to the DCO would not affect construction of these new roads, so the existing assessments are not expected to be affected by the change proposals.

3.5.2 *Road traffic noise*

Predicted road traffic noise effects for the Two Village Bypass and Sizewell Link Road cover a relatively large number of individual receptors, with a range of predicted effects identified, which range from negligible and/or major beneficial to major adverse.

In the peak construction year (2028) some properties close to the new roads would be subject to significant adverse effects. The applicant describes these as *"short-term"* but it should be acknowledged that while the effects might be short-term in the context of the overall construction period and operational life of the power station, it is not clear how long these effects might last. This could potentially be years rather than months.

ESC would welcome clarification on this in the context of balancing road/rail impacts.

When construction traffic is no longer present (2034), there would be either a negligible effect or a beneficial effect as a result of the new road for the majority of receptors, although long-term significant adverse effects would remain at a total of ten receptors. This is also an important consideration in terms of balancing road and rail impacts.

For those receptors where the SOAEL is predicted to be exceeded, the change has been assessed to determine if the development is the main cause. Across both new roads, the applicant identifies a total of four receptors where this would be the case:

- Pond Barn Cottages (all three scenarios);
- A12 Yoxford Centre (2028 typical day only);
- B1122 Rail Crossing (both 2028 scenarios); and
- Laurel Farm (both 2028 scenarios).

Aside from Pond Barn Cottage, where long-term road traffic noise increases would exceed the SOAEL as a result of the Two Village Bypass, all other exceedances of the SOAEL would occur only during peak construction. Again, it is not clear how long these *"peak construction"* effects might last and ESC would welcome clarification on this.

ESC and AJA have reviewed the predicted changes to these assessments which the applicant has identified as a result of the January 2021 change proposals. In summary, where changes occur the majority appear to be beneficial, and detrimental changes do not generally result in a change of significance. There are a limited number of receptors where a non-significant detrimental change becomes significant (moderate adverse), and a number of other receptors where a significant beneficial effect is precited to result from the changes where the beneficial effect was previously not significant.

In summary, the changes would result in a mixture of outcomes, with some receptors predicted to be subject to higher road traffic noise levels, and some subject to lower. On the whole ESC consider that the changes would result in an overall improvement in terms of road traffic noise impacts, but that the improvements would not significantly change the overall conclusion of these assessments in terms of worst-case impacts.

ESC understand that the updated assessments also consider the effects of an expected reduction in peak construction HGV traffic of 150 per day (300 movements).

The assessment will be repeated as part of the Noise Mitigation Scheme, which forms part of the Section 106 agreement. ESC understand that this means that properties where the SOAEL would be exceeded would be considered for enhanced sound insulation (according to the stipulations of the scheme). ESC consider this to be an appropriate and proportional response given the relatively limited number of receptors affected, although it will be important to consider the likely duration of exceedances of

the SOAEL during construction and offer mitigation accordingly, in order to ensure that the policy requirements of NPS EN-1 to *"avoid"* significant adverse impacts are met.

ESC accept that beneficiaries of this scheme will not ultimately be confirmed until an updated assessment can be carried out with more accurate transportation predictions.

4 RAIL NOISE AND VIBRATION

4.1 Introduction

As summarised in Section 1.1 of this memo, the components of the rail freight strategy (including the proposed January 2021 changes) involve freight trains using:

- The existing East Suffolk Line (between Ipswich and Saxmundham);
- The Saxmundham to Leiston Branch Line (which would be upgraded as part of the proposals); and
- A new line known as the Green Rail Route, constructed during years 1-2 of construction to provide a dedicated rail link between the Saxmundham to Leiston line and the Main Development Site (MDS). The Green Rail Route would be removed once the construction programme is complete.

ESC and AJA have reviewed all the relevant DCO and change proposal documentation relating to potential rail noise and vibration impacts and present our comments below.

4.2 Assessment methodology and criteria

The assessment criteria and adopted LOAEL and SOAEL values for the rail noise and vibration assessment are explained in Appendix 6G and summarised in Section 4.3 of Volume 9, Chapter 4 of the ES. Additional information regarding the derivation of LOAEL and SOAEL values for night-time rail noise in relation to sleep disturbance was provided in advance of and together with the DCO change proposals in January 2021.

The assessment criteria can be separated and discussed in terms of:

1. Rail construction noise and vibration
2. Rail operation vibration (including ground-borne noise)
3. Rail operation noise

These are discussed in turn below.

For clarity, *'operation'* in terms of rail noise/vibration refers in this case to the period during construction of the power station when the additional rail activity is proposed.

4.2.1 Rail construction noise and vibration

Rail construction noise is assessed in accordance with *BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise'*. Ground-borne construction vibration is assessed with BS 5228-2:2009+A1:2014 *'Code of practice for noise and vibration control on construction and open sites. Vibration'*.

BS 5228 is considered by ESC to provide the appropriate methodology and criteria.

4.2.2 *Rail operation vibration (including ground-borne noise)*

Ground-borne vibration during operation (i.e. rail movements on the East Suffolk Line, Saxmundham-Leiston branch line and green rail route during construction) is assessed in accordance with BS 6472-1:2008 *'Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting'*. This is appropriate and ESC consider the criteria adopted (including LOAEL and SOAEL values) appropriate.

Similarly, potential ground-borne vibration impacts on buildings (rather than humans) are assessed in accordance with BS 6472-2:2008 *'Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration'* which is also appropriate.

The adopted LOAEL / SOAEL values for ground-borne noise on the East Suffolk Line have been modified as part of the DCO change proposals following a review of the Additional Information. ESC and AJA consider the derivation of and justification for the new criteria to be valid. The applicant suggests that L_{Aeq} rather than L_{Amax} is most appropriate to assess the effect of adding new and different types of train to the existing rail services along the East Suffolk line. ESC accept the reasoning for this change.

Updated LOAEL and SOAEL values for combined ground-borne and low-frequency airborne railway noise at residential receptors are subsequently presented in Table 9.1 of Volume 1, Chapter 9 of the ES Addendum, including L_{ASmax} values for the night-time (at all locations) and for daytime trains on the branch line, and L_{Aeq}-based values for daytime trains on the East Suffolk Line only. The derivation of these includes guidance in the Association of Noise Consultants (ANC) guidance *'Measurement & Assessment of Groundborne Noise & Vibration'* (2012) which ESC and AJA consider appropriate.

4.2.3 *Rail operation noise*

The criteria (including adopted LOAEL and SOAEL values) for operational rail noise consider both average ($L_{Aeq,T}$ day/night) and maximum (L_{AFmax}, night only) noise levels.

The derivation of the LOAEL and SOAEL values for average rail noise levels is set out in Annex 6G. The LOAEL value was set in accordance with the WHO 1999 *'Guidelines for Community Noise'* and the SOAEL value was set at the thresholds at which the *Noise Insulation (Railways and Other Guided Transport Systems) Regulations* (1996) would require sound insulation mitigation, noting that this requires consideration of the magnitude of change and the contribution of noise from the new or altered railway.

We broadly agree with the assessment criteria adopted for average noise levels from operational rail noise and the LOAEL and SOAEL values are considered appropriate. However, it should also be noted that some of the rail proposals do not constitute a new or altered railway, particularly on the East Suffolk Line. Instead, new freight train movements would be introduced to an existing line where they do not currently exist.

Annex 6G makes the point that the railway line operator is permitted to introduce freight trains onto this line without having to assess the environmental impact. However, in our view the rights of the line operator are not particularly relevant to the assessment, as the particular rail movements being assessed would not happen were it not for SZC.

The assessment criteria (including the LOAEL and SOAEL) which have been adopted for night-time maximum noise levels from operational rail are of particular concern to ESC because of the risks of sleep disturbance due to freight train passes.

The LOAEL value of 60 dB L_{AFmax} adopted for night-time maximum noise levels from rail movements is primarily based on the 1999 WHO guidance which states that maximum noise levels should not normally exceed 45 dB L_{AFmax} to protect sleep. This

level was combined with an assumed sound reduction of 15 dB across a partially open window (in accordance with BS 8233) resulting in an external LOAEL of 60 dB L_{AFmax}.

The reasoning for this is further explained in the supplementary documents submitted ahead of and with the change proposals. These refer to Appendix A of the planning practice guidance document *ProPG: Planning & Noise* (2017), which provides details of the research on which the 45 dB L_{AFmax} value was derived and what this represents. Specifically, paragraph A.15 of ProPG states that:

> *"At relatively low levels e.g. around 45 dB $L_{Amax,F}$ when sufficient number of such events take place during the night the adverse effects of individual noise events are likely to be limited to sleep disturbance in the form of changes in sleep state or perhaps some EEG awakenings."*

ESC agree that this is a reasonable threshold for the onset of adverse effects (LOAEL).

Annex 6G also identifies that when windows are closed the sound reduction is likely to increase by at least 10 dB, meaning that when windows are closed the external level should not exceed 70 dB L_{AFmax} to meet the 45 dB L_{AFmax} internal criterion. Annex 6G claims that this would represent a moderate adverse (and therefore significant) effect.

This appears to be making a distinction between the level at which an adverse effect becomes significant and the SOAEL. However, the justification for this distinction is not clear to ESC and it could just as easily be argued that an external level of 70 dB L_{AFmax} could be an appropriate SOAEL, in that if sleep disturbance occurs when windows are closed then this would result in a significant adverse effect and should be avoided.

Instead, the external SOAEL value adopted for operational rail noise is 80 dB L_{AFmax}. This has been justified in the *Draft Supplementary Submission – Sleep Disturbance* (November 2020), primarily on the basis of the guidance in Appendix A of ProPG:

> *"It normally requires noise levels higher than 45 dB $L_{Amax,F}$ before significant adverse effects such as behavioural awakenings, difficulty getting to sleep, premature awakening or difficulty getting back to sleep generally occur (and the latest field research on rail and aircraft noise suggest that it requires internal L_{Amax} noise levels of around 65 dB before noise induced awakenings become distinguishable from spontaneous awakenings)."*

In summary, the applicant suggests that a significant adverse effect would not occur until maximum noise levels lead to noise-induced and/or behavioural awakenings, which the guidance in ProPG indicates is as high as 65dB L_{AFmax}. This is the basis for the adopted external SOAEL of 80 dB L_{AFmax} (including 15 dB across an open window).

ESC consider this reasonable, and while there is a legitimate concern that significant adverse effects could occur at a lower level (e.g. 70 dB L_{AFmax} for the reasons described above). Some night-time noise and/or vibration effects from rail freight are considered inevitable, but the acceptability of impacts will ultimately depend on suitable mitigation.

The proposed mitigation measures, and the triggers for them are discussed below.

4.3 Mitigation

4.3.1 Operational rail ground-borne noise mitigation

Current proposals for primary and tertiary operational rail mitigation are set out in the *'Draft Rail Noise Mitigation Strategy'* submitted with the change proposals, and include:

- A new crossover and signalling system to allow trains to join branch line without stopping;
- Saxmundham to Leiston branch line to be refurbished in multiple material ways;
- The Green Rail Route extension to be construction using the same approach;
- Under ballast mats to be installed where branch line/extension pass within 15m of a receptor;
- Night-time speed limits of 10 mph at three locations on the East Suffolk Line (through Woodbridge, Campsea Ashe, and Saxmundham);
- Freight train speed on branch line to be limited to 10 mph during the early years of construction;
- The speed limit on the Saxmundham to Leiston branch line may be increased pending assessment of upgrades/mitigation;
- The speed limit on the Green Rail Route extension will match that on the branch line to maintain train speeds;
- Class 66 locomotives will be preferred to Class 68 where there is a choice (because recent supplementary research by the applicant indicates that this will reduce noise and vibration impacts, particularly through built-up areas);
- Construction freight trains will not travel through Leiston during the night-time (between 23:00-07:00hrs), and will be held on the branch line overnight; and
- Trains stabled overnight on the branch line will be made to shut down engines.

Secondary mitigation is also proposed either to avoid significant adverse effects and/or mitigate and minimise adverse effects. These include using vibration-isolating supports on the branch line (to achieve an L_{ASmax} level below 45 dB in any adjacent property), a commitment to further assessment for the East Suffolk line where this is appropriate, and the commitment to finalise the Rail Noise Mitigation Strategy in consultation with Network Rail and the freight operator, to be informed by the more detailed assessment.

It is practically very difficult to control ground-borne noise beyond vibration isolation at source (particularly where it affects existing buildings) and the measures proposed do probably represent best practical means in terms of the available mitigation options.

However, ESC consider that the same is not true for airborne operational rail noise.

4.3.2 Operational rail airborne noise mitigation

Primary and tertiary mitigation for operational rail are as set out in Section 4.3.1 above.

Secondary mitigation for airborne operational rail noise includes the same commitment to finalise the Rail Noise Mitigation Strategy in consultation with Network Rail and the freight operator, and a comment that it might be possible to use quieter locomotives (i.e. that Class 66 locomotives will be preferred to Class 68 where there is a choice).

Some mitigation of noise levels may also be possible at Saxmundham by making the transition from the East Suffolk Line to the branch line more efficient. This would be expected to result in lower noise levels in Saxmundham, and this seems reasonable.

The applicant also proposes that any properties where operational rail noise levels would exceed the SOAEL will fall under the provisions of the Noise Mitigation Scheme, *"to avoid exceeding the SOAEL"*.

Under the terms of the proposed Noise Mitigation Scheme, ESC understand that no properties would be eligible for noise insulation mitigation against night-time noise effects from operational rail unless the SOAEL of 80 dB L_{AFmax} is exceeded by 3 dB.

Again, the justification for triggering the NMS at this threshold is *"to avoid exceeding the SOAEL"*. However, it could be argued that upgraded noise insulation should be used to *'mitigate and minimise'* other adverse effects between the LOAEL and SOAEL, particularly at or above an external level of 70 dB L_{AFmax} where the applicant acknowledges that a moderate adverse (and therefore significant) effect could occur. An external level of 70 dB L_{AFmax} is the level at which an internal level of 45 dB L_{AFmax} would normally be exceeded when windows are closed. Above this level, the LOAEL would be exceeded even when windows are closed, and in our view this could equally be seen as a reasonable threshold at which upgraded noise insulation should be considered, in order to *'mitigate and minimise'* adverse effects which would occur above this level.

NPS EN-1 and the PPG both state that insulation is a valid mitigation measure, but NPS EN-1 also states that *"In certain situations, and only when all other forms of noise mitigation have been exhausted, it may be appropriate for the IPC to consider requiring noise mitigation through improved sound insulation to dwellings."*. It could certainly be argued that all other forms of mitigation have not been exhausted in the proposals in order to 'mitigate and minimise' any adverse effects between the LOAEL and SOAEL. Indeed, paragraph 4.5.9 of Volume 9, Chapter 4 of the ES states that the PPG (Noise) also reflects this position, stating that there are four broad types of noise mitigation:

1. Engineering (reducing the noise at source)
2. Layout (using distance and good design to reduce the noise impact)
3. Planning conditions/obligations (e.g. restricting activity at certain times)
4. Mitigation through noise insulation when the impact is on a building.

This reflects what is generally considered to be the appropriate order of priority when mitigating noise and/or vibration effects, i.e. to mitigate at source as far as practicable, then to use layout and/or screening to reduce the noise, then using planning controls and/or management controls, then finally to provide noise insulation to affected areas.

In this case, it could be concluded that the mitigation proposals completely ignore the transmission path between source and receiver. In particular, acoustic screening is not explored although this would be a legitimate alternative mitigation option and could be particularly effective at reducing noise levels affecting large numbers of properties.

In summary, the secondary mitigation measures proposed to address airborne noise impacts from operational rail are based entirely on a noise insulation scheme and do not exhaust all other available options, which ESC consider contradicts the PPG.

Furthermore, the threshold for secondary mitigation (per the NMS) is in excess of the SOAEL when it could be argued that noise insulation (or other options for mitigation including acoustic screening) should be considered between the LOAEL and SOAEL, i.e. to *'mitigate and minimise'* adverse impacts, either at 60 dB or 70 dB L_{AFmax}.

In the absence of further mitigation along the transmission path (e.g. noise screening), ESC consider that a lower threshold for the Noise Mitigation Scheme might be a valid way of protecting more residents from night-time rail noise than is currently proposed.

ESC would welcome further discussion with the applicant on this matter.

4.4 Assessment of impacts

4.4.1 Rail construction noise and vibration

Table 4.23 of Volume 9, Chapter 4 of the ES presents a summary of the predicted effects of airborne noise from construction of the Green Rail Route. All of these effects are predicted to be either minor adverse or negligible and therefore *"not significant"*. The nominated SOAEL values for rail construction noise would not be exceeded. LOAEL values would be exceeded at all receptors for *"at least some of the time"* during construction. ESC consider that such effects are likely to be relatively short-lived and accept that these should be mitigated and minimised through adoption of the CoCP.

Table 4.26 of the same chapter presents predicted impact magnitudes for construction noise produced by the upgrades to the Saxmundham to Leiston branch line. These range from *"Very Low"* magnitude impacts to *"High"* magnitude impacts. The branch line upgrade works would take around nine months to complete and the applicant predicts that noise-producing works would last no longer than a month at each site, while there would also be no working on Sundays. Taking account of the relatively short duration of these crucial works, the noise impact of construction works during the branch line upgrades are assessed as *"not significant"*. ESC consider this reasonable.

The track installation phase for the Green Rail Route and branch line upgrades, tamping and stabilisation works would involve *"short duration periods"* of vibratory compaction. The applicant states that it is possible that there would moderate or major adverse effects at some residential receptors (within 25m and 25-50m respectively). The applicant assesses these effects as *"not significant"* on the basis that they be of relatively short duration, lasting no more than one to two days (paragraph 4.6.64 of Volume 9, Chapter 4 of the ES). ESC generally consider this to be reasonable, though if the effects would occur for longer once construction proposals are fully developed then ESC consider that the applicant should revisit this assessment of effects.

Receptors would need to be within 5m of the works for a high magnitude construction vibration impact to occur (paragraph 4.6.63 of Volume 9, Chapter 4 of the ES). It is also stated that should this be the case, the provisions in the Noise Mitigation Scheme will be applied to avoid the exceedance. It is unclear to ESC exactly how the scheme could mitigate construction vibration and would welcome clarification on this point.

4.4.2 Rail operation ground-borne noise and vibration

Considering the Additional Information submitted with the change proposals, it was concluded (in paragraph 9.6.68, Volume 1, Chapter 9 of the ES Addendum) that with a construction train speed limit of 10mph on the Saxmundham to Leiston branch line and where the track is upgraded with long welded rail and concrete or steel sleepers, ground-borne noise at all properties on the branch line would not exceed 40 dB L_{ASmax}. This would achieve the stated objective in paragraph 4.7.19 in Volume 9, Chapter 4 of the ES to achieve an internal ground-borne noise level of no more than 45dB L_{ASmax}.

Once the branch line has been upgraded and all required mitigation installed, further measurements and assessment would be undertaken by the applicant to determine

the in-situ effects and confirm whether speeds higher than 10mph are possible without reducing the protection to the receptors. ESC consider this reasonable and pragmatic.

In relation to ground-borne vibration from operational rail on the branch line, paragraph 9.3.72, Volume 1, Chapter 9 of the ES Addendum states that, *"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… branch line"*. ESC broadly accept this conclusion based on the submitted information, although this is of course dependent on the removal of rail joints where this is required near to receptors.

The applicant states (in paragraph 9.3.73, Volume 1, Chapter 9 of the ES Addendum) that the outcomes and effects for ground-borne noise along the East Suffolk Line were over-estimated, based on Additional Information submitted with the change proposals. Having reviewed the Additional Information, ESC agree that this is probably true.

It is reported (in paragraph 9.3.78, Volume 1, Chapter 9 of the ES Addendum) that the SOAEL for ground-borne noise along the East Suffolk Line would not be exceeded inside properties more than 7m from the centre of the track for trains travelling at 20mph, or within 3m for trains travelling at 10mph, depending on proximity of rail joints.

There are no properties within 3m of the centre of the track where trains would travel at 10mph at night. The closest is 1 Albion Street in Saxmundham which is 3.3m away. The applicant therefore states that combined ground-borne and low-frequency noise would be below the 50dB L_{ASmax} SOAEL at night, depending on proximity of rail joints. ESC understands this property would also probably be eligible for enhanced glazing under the Noise Mitigation Scheme, although ESC note that this would only be effective in reducing airborne low-frequency noise, and not ground-borne/re-radiated noise.

During the daytime, the 40dB $L_{Aeq,16hrs}$ ground-borne noise SOAEL would apparently not be exceeded at 1 Albion Street, even if the number of daytime construction trains exceeded those that are actually proposed. ESC agree that this is a robust conclusion.

According to paragraph 9.3.78, Volume 1, Chapter 9 of the ES Addendum, there are two properties along the East Suffolk Line where construction trains are likely to travel at 20mph and where the night-time SOAEL might be exceeded. These properties are:

- Crossing Cottage, Kiln Lane South, Benhall, Saxmundham IP17 1HA
- Unnamed property, Blackstock Crossing Road, Campsea Ashe IP13 0QL

These two properties are also likely to be eligible for the Noise Mitigation Scheme. The applicant states that sufficient reductions in airborne low-frequency noise are expected such that the combined SOAEL value is not exceeded. ESC suggest that this should be the absolute minimum aim, because NPS EN-1 states that adverse effects should be *'mitigated and minimised'* as well as significant adverse effects being avoided.

In terms of ground-borne vibration, the applicant reports that the use of welded rail joints along the East Suffolk line will mean tactile vibration, as quantified using the VDV scale, would not exceed significant effect thresholds. ESC agree with this conclusion.

In summary, ESC consider that the proposed engineering and other mitigation measures to probably represent best practical means in terms of reducing ground-borne noise and vibration from construction trains. However, it also appears that most, if not all of the proposed measures might be required to ensure that the minimum requirement of NPS EN-1 to *"avoid"* significant adverse effects and 'minimise and mitigate' other adverse effects is met. ESC consider it reasonable that the applicant would confirm which measures are required through a staged commissioning process. ESC broadly support this, though it will be important that this process is suitably robust.

4.4.3 Rail operation airborne noise

ESC understands that, while there is a small change to the assessment of airborne noise from rail freight due to the Additional Information submitted in January 2021, the overall assessment outcomes largely remain as per Volume 9, Chapter 4 of the ES. Corrections to the reported predicted airborne rail noise levels account for minor errors in the noise model and do not ultimately change the conclusions of the assessment.

In terms of noise from trains on the branch line, the updated assessment indicates that; two receptors would be subject to *"low magnitude"* impacts between 60-70 dB L_{AFmax}; one receptor would experience *"medium magnitude"* impacts between 70-77 dB L_{AFmax}; and three receptors would be subject to *"high magnitude impacts"* where maximum noise levels at night would exceed 77 dB L_{AFmax}. Significant moderate or major adverse effects are subsequently reported at a total of four receptors on the branch line.

As a result, the SOAEL for night-time maximum noise levels from trains is predicted to be exceeded at three locations. The applicant states (in paragraph 4.6.76 of Volume 1, Chapter 9 of the ES Addendum) that *"Where no other options are available to reduce these noise levels, the provisions set out in the Noise Mitigation Scheme (Volume 2 Appendix 11H) will be applied to avoid the exceedance"*. This seems to reflect NPS EN-1 which clearly states that noise insulation should only be considered where all other mitigation options have been exhausted. However, as per Section 4.3.2 of this memo, ESC do not consider that all possible engineering mitigation options for airborne noise have been considered. ESC therefore suggest that further options for trackside mitigation should be considered, or that then threshold for considering sound insulation mitigation is lowered such that more properties would benefit from the scheme to reduce impacts.

The predicted effects of airborne noise from trains on the East Suffolk Line are, however, much more widespread and do remain a major source of concern for ESC.

The applicant has not provided a detailed breakdown of noise levels for each premises at this stage since the total number of properties is very large. ESC consider this to be reasonable at this stage, although given the number of potentially affected properties ESC consider that it will be necessary to consider individual properties at a later date.

The outcomes for airborne train noise along the East Suffolk Line remain as originally described in Volume 9, Chapter 4 of the ES. Subject to 10mph night-time speed limits in Woodbridge/Melton, Campsea Ashe and Saxmundham, outcomes are as follows:

- 40-50 properties would be subject to major adverse effects where night-time maximum noise levels would exceed 77 dB L_{AFmax}. This would reduce to 5-10 properties once change arrangements at Saxmundham Junction have been implemented. Properties exceeding the SOAEL (77 dB L_{AFmax}) would be eligible for the Noise Mitigation Scheme. The applicant suggests that this would meet the policy requirement to avoid significant adverse effects. However, ESC and AJA consider that this is only true if all other mitigation options are exhausted, which is not the case because there seems to have been no consideration of trackside mitigation.
- Including the proposed improvements at the Saxmundham junction where the branch line splits from the East Suffolk Line, between 100-110 properties would be subject to 70-77 dB L_{AFmax}, representing moderate adverse effects. Were the improvements not to go ahead, this would increase to 150-160 properties. The applicant suggests that the proposed change arrangements the policy requirement to mitigate and minimise adverse effects. However, ESC consider that other options exist (e.g. trackside mitigation) that have not been explored.

- The LOAEL would also be exceeded (between 60-70 dB L_{AFmax}) at an additional 320-390 properties, including the predicted effects of proposed improvements at Saxmundham Junction. This would increase to 390-410 properties should these improvements not proceed. The applicant suggests that these effects will be *"mitigated and minimised"* through the use of the quietest trains available, strategic speed limits, changes to operational practices, and the additional engineering measures described in Section 0 of this memo. However, ESC consider that this does not meet the NPS EN-1 policy requirement to "*mitigate and minimise other adverse impacts on health and quality of life from noise"*, because other possible means of mitigation were not explored and exhausted.

In summary, the applicant acknowledges that potentially hundreds of local residents could be adversely affected by night-time noise from freight trains. ESC do not consider that the current mitigation proposals go far enough to protect residents, and that the proposed introduction of more freight trains at night will make the situation even worse.

The applicant suggests that the change proposals (i.e. further mitigation in the form of highway improvements and an expanded beach landing facility to facilitate sea freight) provide further mitigation, but given the number of properties which could experience adverse noise effects from rail freight, ESC consider that this is not a robust argument.

ESC and AJA acknowledge that the guidance in the WHO *'Guidelines for community noise'* (1999) and ProPG (from which the nominated LOAEL and SOAEL values are derived) is primarily based on no more than 10-15 trains per night exceeding 45 dB L_{AFmax}, whereas the external LOAEL and SOAEL values are based on a single event. By ignoring the number of movements, a more robust position is therefore achieved.

However, it is also the view of ESC that the benefits of this robust approach are offset by the current mitigation proposals, which are not considered to go far enough or meet the overarching policy requirements of NPS EN-1 to mitigate and minimise adverse effects and indeed to exhaust all other forms of mitigation before considering offers of noise insulation improvements as a means of avoiding significant adverse effects.

By way of context, the applicant also proposes (in paragraph 9.3.104 of Volume 1, Chapter 9 of the ES Addendum) that the presence of residential properties along the Ipswich to Felixstowe railway line (where 20-30 freight trains pass per night) suggests that *"multiple night-time train movements are not, in and of themselves, unacceptable"*, and that *"a large number of people do co-exist with such activities."* ESC consider this to be a tenuous argument on the basis that Felixstowe is the UK's busiest container port and has been served by regular freight trains for a long time. Residents along this line are likely to be accepting of the situation because of this context. ESC consider this to be an entirely different situation to that which is proposed, where multiple night-time freight trains with demonstratable adverse noise impacts would be introduced as a new noise source.

5 SUMMARY OF CONCLUSIONS

ESC consider that the acceptability of road and rail noise impacts associated with the proposed construction of Sizewell C nuclear power station must be balanced with their respective benefits, and similarly that all adverse noise and vibration effects associated with the proposals should be balanced against the need for new power generation.

However, ESC are not currently satisfied that the proposals go far enough to protect residents from adverse effects, particularly in terms of maximum noise levels from freight trains at night, where hundreds of properties would be exposed to levels representing an adverse impact but would benefit from no mitigation other than the primary and tertiary mitigation currently proposed in the form of improvements to tracks and junctions and operational mitigation such as speed limits through built-up areas.

ESC do not consider that the current proposals go far enough to protect residents from night-time airborne noise from rail freight, in particular. ESC also do not believe that the overarching policy requirement of NPS EN-1 to "*Mitigate and minimise other adverse impacts on health and quality of life from noise*" would currently be met, particularly considering that NPS EN-1 clearly states that noise insulation mitigation for properties may only be considered by The Planning Inspectorate *"when all other forms of noise mitigation have been exhausted"*. ESC do not consider that all other forms of possible noise mitigation have been exhausted in terms of mitigating adverse effects.

ESC therefore suggest that either options for trackside mitigation (e.g. noise screening) should be considered, or that the threshold for considering sound insulation mitigation is lowered such that more properties would benefit from the scheme to reduce impacts. ESC would welcome further discussion with the applicant on this specific matter.

It is also accepted and acknowledged that a construction project of this scale inevitably results in some noise and vibration effects. Typically, many of these effects are offset by the limited duration of construction works. However, in these cases the construction project would be ongoing for more than ten years, and hundreds of residents could experience adverse effects for a large proportion of the overall construction period.

The proposed changes to reduce HGVs on the roads is sensible in many ways, but can only be supported if this it does not result in a disproportionate number of adverse impacts elsewhere. The scale of impacts still predicted in relation to rail freight indicates this is not the case. On this basis ESC consider that more must be done to protect residents, particularly in terms of night-time airborne noise impacts resulting from freight train movements.

Report Status

Revision	Date	Prepared by	Checked by
-	10 March 2021	Gary Percival MIOA	Adrian James FIOA

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TECHNICAL MEMORANDUM

Project	Sizewell C DCO – Main Development Site Noise & Vibration Review		
Date	6 April 2021	**Memo No**	M005
Written by	Joe Bear MIOA	**Checked by**	Adrian James FIOA
Filename	12804 M005		

SIZEWELL C DCO APPLICATION WITH CHANGES PROPOSED JANUARY 2021

MAIN DEVELOPMENT SITE NOISE AND VIBRATION REVIEW

This document sets out the additional comments and clarification requests from ESC and AJA in relation to the Applicants' assessments of

1. Construction vibration
2. Noise impact in amenity and recreation areas using the Natural Tranquillity Method.

This follows previously issued comments on construction noise & vibration and operational noise, including requests for information numbers 1-20 set out in our technical memo M004. Requests for information in this memo are therefore numbered 21 onwards.

1 CONSTRUCTION VIBRATION

1.1 Calculations and results

The methodology used to estimate the construction vibration levels is described in Volume 1, Appendix 6G, Annex 6G.2. This document presents PPV source data for various vibration sources at a reference distance of 10m, and shows the predicted levels as a function of distance from source. The propagation graphs appear plausible and the levels at receptors are well below the SOAEL values presented in Chapter 11 of the Environmental Statement. There are, however, a few areas where some extra information or commentary would provide additional confidence in the overall assessment outcome.

Request for information 21

Can the Applicant please provide the following?

a) Commentary on how the data from the Transport Research Laboratory Report 429 and BS5228-2 Annex D were interpreted at a reference distance of 10m.

b) The source of the vibration propagation equation reproduced in Section 3.1.

c) Whether there is a potential range of input data for n (decay rate) presented in Thompson, "Railway Noise and Vibration" 2009 for construction sources?

d) The potential ranges of input data for ground wave friction / damping loss per metre for different ground conditions presented in New Zealand Transport Agency Research Report 485: 2012 "Ground Vibration from Road Construction"?

e) From the above, what range of uncertainty is expected in the construction vibration levels presented in Table 11.25 of Chapter 11 of the Environmental Statement?

1.2 Duration and mitigation

In commentary on the results presented in Table 11.25 of Chapter 11 of the Environmental Statement paragraph 11.6.63 of the ES, it is stated:

> "*The LOAEL of 0.3mm/s is predicted to be exceeded at all eight of the receptors considered in Table 11.25. This will be mitigated and minimised through the measures described later in this chapter, which will be secured through the CoCP*".

However paragraph 11.7.13 of the ES goes on to state:

> "*Given the short duration and the levels of vibration predicted, no vibration mitigation measures are considered necessary*."

Request for information 22

Can the Applicant please confirm the following?

a) The durations for which the events presented in Table 11.25 of Chapter 11 of the Environmental Statement are expected to occur.

b) What mitigation measures, if any, have been considered to control construction vibration where the predicted levels fall between LOAEL and SOAEL.

2 NOISE IMPACT TO AMENITY AND RECREATION AREAS

In the absence of any formally agreed methodology, the Applicants have assessed the impact of construction noise on amenity and residential areas using a proprietary methodology, The Natural Tranquillity Method. We understand that this method provides a single figure descriptor of tranquillity from input data for the following four key aspects:

- The overall level of sound (how loud or quiet it is);
- The relative levels of man-made and natural sounds;
- The proportion of the time during which only natural sounds are present; and
- The amount of transportation noise

The calculation formulae and methodology are set out clearly in Volume 1, Appendix 6G, Annex 6G.2. We are not aware of this methodology being peer reviewed or otherwise validated previously in other similar assessments. However, both the inputs (noise levels and observation scores) and the outputs (tranquillity scores and conclusions) presented in the ES appear plausible.

On the basis of this assessment, Chapter 15 of the Environmental Statement (Amenity and Recreation) concludes that noise will be a contributory factor in significant impacts in the following areas:

- Receptor 11 – Minsmere South (major adverse effect)
- Receptor 12 - Minsmere to Sizewell Coast (major adverse effect)
- Receptor 14 – Northwest Site (major adverse effect)
- Receptor 15 – Sizewell Belts (major adverse effect)
- Suffolk Coast Path and Future England Coast Path (major adverse effect)
- Sandlings Walk (major adverse effect)
- Receptor 5 – Westleton Walks and Dunwich Heath (moderate adverse effect)
- Receptor 7 – RSPB Minsmere (moderate adverse effect)
- Receptor 8 – Dunwich to Minsmere Coast (moderate adverse effect)
- Receptor 10 – Eastbridge and Leiston Abbey (moderate adverse effect)
- Receptor 16 – North of Leiston (moderate adverse effect)
- Receptor 19 – Aldringham Common and the Walks (moderate adverse effect)

Request for information 23

Can the applicant please confirm what mitigation measures, if any, have been considered to minimise the impact of construction noise on the above amenity and recreation areas?

Report Status

Revision	Date	Prepared by	Checked by
-	6 April 2021	Joe Bear MIOA	Adrian James FIOA

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