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Your Ref: EN010012

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The Planning Inspectorate
Temple Quay House
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1st June 2021

Dear Sir/Madam,

Nationally Significant Infrastructure Project
Public Consultation for the Sizewell C Project, Suffolk [PINS Reference: EN010012]
Sizewell C Examining Authority's Written Questions

Thank you for your letter of 22 April 2021 inviting Public Health England (PHE) to provide responses to the written questions relating to the above Nationally Significant Infrastructure Project (NSIP), detailed below.

Question	PHE Response
AQ 1.13	<p>(i) PHE note that this element of the question is for the applicant to answer.</p> <p>(ii) The applicant has presented a dust risk assessment which concludes that without mitigation there is a moderate risk to human health at the accommodation campus. The applicant further details how high-risk mitigation measures will be applied, and that baseline and activity specific monitoring of particulate matter will be undertaken. The applicant concludes that there will be no change in PM₁₀ and PM_{2.5} concentrations.</p> <p>Based on the information provided and the understanding that appropriate mitigation measures and monitoring will be implemented, PHE are satisfied with the risk assessment from potential emissions to air impacting the proposed accommodation campus.</p>
AQ 1.14	<p>Poor air quality is the largest environmental risk to public health in the UK. Long-term exposure to air pollution can cause chronic conditions, leading to reduced life expectancy. Sources of air pollution include industrial processes, energy industries, construction, road transport, residential dwelling and agriculture. PHE have reviewed the applicant's environmental statement, which details impacts from air quality to human health during the construction and operational phases of the proposed development. Impacts have been assessed against relevant air quality standards and guidelines and any comments raised following our reviews have been detailed in our responses.</p>

	<p>We do not have any additional comments.</p>
AQ 1.18	<p>PHE have reviewed the receptors detailed in the air quality assessments and are satisfied that those included are relevant and the worst case of those included have been appropriately assessed.</p> <p>PHE would expect East Suffolk Council, as local experts in air quality, their population and region to confirm and ensure that all appropriate sensitive receptors have been included in the assessment.</p>
AQ 1.20	<p>PHE responded to the scoping consultation in our letter dated 20th June 2019, noting our position is that pollutants, particularly particulate matter and oxides of nitrogen are non-threshold and that reducing public exposures to these pollutants below air quality standards will have potential public health benefits. It is noted that the applicant has assessed emissions against air quality standards. PHE supports approaches which minimise or mitigate public exposure to non-threshold air pollutants.</p>
AQ 1.34	<p>. PHE have not identified any concerns with the proposed mitigation measures which appear in line with relevant guidance; however, note that a dust management plan is to be prepared. As the local authority regulators, PHE note that ESC and SCC would be best placed to provide a detailed assessment and response to this question.</p>
AQ 1.35	<p>PHE note that the applicant has reported in their Outline Dust Management Plan, that a Dust Management Plan will be prepared and include details of the monitoring. Whilst PHE have not had sight of the latter document, it is noted in the former reports that particulate monitoring will be undertaken. PHE recommend that any monitoring strategy should include sources of dust emissions; the location of sensitive health receptors; monitoring standards and guidelines; and a reporting schedule which allows for timely intervention if elevated concentrations are recorded.</p>
AQ 1.42	<p>PHE's position is that pollutants, particularly particulate matter are non-threshold; i.e., an exposed population is likely to be subject to potential harm at any level and that reducing public exposures of non-threshold pollutants (such as particulate matter) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure), maximise co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent.</p> <p>PHE note that the applicant has reported in their Outline Dust Management Plan, that a Dust Management Plan will be prepared and include details of the monitoring. Whilst PHE have not had sight of the latter document, PHE consider that providing suitable particulate monitoring is in place at sensitive receptors and suitable mitigation measures are implemented based on review of monitoring data, then adverse effects would not be expected.</p>
AQ 1.66	<p>Discharges of radioactivity from nuclear power plants during normal operations in England and Wales are regulated by the Environment Agency according to the principles of optimisation and use of Best Available Techniques. There is substantial scientific evidence which suggests that the controlled and regulated release of low level radioactivity from nuclear power plants does not cause serious illnesses and presents a very low health risk to people residing in the vicinity. Annex A of the 2012 Report of the UN Scientific Committee on the Effects of Atomic Radiation, entitled 'Attributing health effects to ionizing radiation exposure and inferring risks', provides a detailed review of the risks associated with ionising radiation at all levels and in particular at the level associated with controlled and regulated release of low level radioactivity from nuclear</p>

	<p>power plants.</p> <p>, It should be noted that detection of tritium in drinking water is not an indication per se that there is a risk associated with this radionuclide; tritium has a low radiotoxicity and monitoring systems used to measure radioactivity in the environment are able to detect very low levels. Regular monitoring of radioactivity carried out around nuclear power plants as well as models used to predict the dispersion of radionuclides in the environment have not shown that tritium in drinking water (or any other environmental material) due to discharges from nuclear facilities poses a radiological risk to the UK population. The Radioactivity in Food and the Environment (RIFE) report series available on the gov.uk website (https://www.gov.uk/government/publications/radioactivity-in-food-and-the-environment-rife-reports), include detailed information on the regular monitoring of radioactivity performed around nuclear facilities in the UK.</p> <p>Our assessment of potential additional numbers of cancer fatalities or possible increase in cancer incidence rates associated with discharges from new nuclear power plants built in the UK, shows that the collective dose associated with releases from all possible facilities planned to be built will be very low (0.6 personSv to the UK population and 90 personSv to the world population) indicating that the expected increase in cancer incidence rates and fatalities will be negligible compared to the natural cancer incidence rate and number of fatalities. Our assessment is described in the paper Jones, A. L., et al. (2013). Assessing the possible radiological impact of routine radiological discharges from proposed nuclear power stations in England and Wales. Journal of Radiological Protection 33: 163-174.</p>
HW 1.23	<p>PHE are satisfied that the Environmental Statement and Equalities Assessment adequately address reasonably foreseeable direct or indirect effects on population health. Local liaison and funding arrangements are proposed to be place via a s106 agreement to identify and agree mitigation for unintended consequences or unforeseen impacts. The proposed SoCG with PHE identifies the requirement to add monitoring to the s106 agreement and or Terms of Reference for the Community Safety Working Group, which includes representatives from the local public health teams.</p>
NV 1.19	<p>In preparing this response, PHE has assumed that this question is with reference to the LOAEL specified for the maximum noise level (L_{Amax}).</p> <p>The second aim of the Noise Policy Statement for England (Defra, 2010) is to “mitigate and minimise adverse impacts on health and quality of life” through the effective management and control of environmental noise.</p> <p>The health effects attributable to transportation noise are associated with both the long-term averaged noise, and the maximum noise level of each passby [1]. The latter is particularly relevant to physiological sleep disturbance (sometimes know as EEG awakenings). The scientific evidence has shown that every noise event above a certain threshold has an associated probability of disrupting sleep[1]. Therefore when carrying out a risk assessment for physiological sleep disturbance above the LOAEL it is important to take into account both the maximum levels and the number of events that occur during the night [2,3].</p> <p>PHE considers the dose-response relationships derived for the systematic review commissioned by the WHO [1] to be the most scientifically robust for estimating noise-induced physiological sleep disturbance. Using these relationships, and assuming a conservative 10dB outdoor to indoor level difference (equivalent to windows wide open, for example to mitigate overheating), PHE has translated the levels assigned to “Low”,</p>

“Medium” and “High” magnitude of impact associated with new or altered railway lines (cf. Table 4.7 in ES_V9_Ch4).

Maximum noise level outside ($L_{Amax,outside}$)	Maximum noise level inside bedroom ($L_{Amax,inside}$)	Probability of noise-induced sleep state change	Minimum no. of train passbys required to result in one additional awakening per night*
60	50	3.8%	26
70	60	6.9%	15
77	67	9.5%	11

* Note: Whilst there is evidence that sleep fragmentation is associated with health morbidity [4] and mortality [5], it is not yet possible to directly link average number of noise-induced awakenings with chronic health outcomes. One health-based approach that has been used for controlling night-time movements at a German airport has three principles [2]:

- On average, there should be less than one additional awakening induced by noise.
- Awakenings recalled in the morning should be prevented as much as possible. For aircraft noise this meant avoiding noise events in the bedroom exceeding 65dB $L_{Amax,inside}$.
- There should be no relevant impairment of the process of falling asleep again.

It is important to note that the noise and sleep data that informed this evidence is primarily from studies based on physically-healthy subjects free of intrinsic sleep disorders. There are non-negligible inter-individual differences in the susceptibility to noise-induced sleep disturbance even amongst this subset of the general population [6]. The effect of transportation noise on sleep in those with pre-existing medical conditions is unknown. Therefore the results in the table above may underestimate the effect of noise on sleep in the general population[1].

Another consideration is that in practice maximum noise levels may differ significantly from what was predicted. PHE encourages the Applicant to

- a) be clear on the assumptions made to arrive to the numbers in Table 4.27
- b) what is the expected variation around the “typical” levels reported in Table 4.28
- c) how much control would the Applicant have on which rolling stock would be running on these lines – for example a single wagon on a freight train with poorly maintained wheels may give rise to significantly higher maximum noise levels [7]

These uncertainties could be addressed by widening the scope of the monitoring system described in 4.5.11.

PHE is not able to dictate which mitigation measures would be appropriate for the properties identified in Table 4.27. The Applicant states that these will be *“mitigated and minimised through the use of the quietest trains available, strategically located speed restrictions, changes to the operational practices on the line, and the measures described in section 4.5.”*

PHE would recommend that *“the use of the quietest trains available”* is clarified to mean

	<p>that a system would be put in place to ensure that the levels specified in Table 4.28 will be relevant in practice. Consideration should also be given to what happens if the frequency of trains needs to be increased in the future, as this will change the risk of sleep disturbance.</p> <p>[1] M. Basner, S. McGuire. WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Effects on Sleep. Int. J. Environ. Res. Public Health 2018, 15, 519.</p> <p>[2] M. Basner, A. Samel, U. Isermann. Aircraft noise effects on sleep: Application of the results of a large polysomnographic field study. J. Acoust. Soc. Am. 119 (5), May 2006.</p> <p>[3] M. Basner, U. Müller, B. Griefahn. Practical guidance for risk assessment of traffic noise effects on sleep. Applied Acoustics 71 (2010) 518–522.</p> <p>[4] WHO Regional Office for Europe. Night Noise Guidelines for Europe. 2009.</p> <p>[5] S. Shahrababaki et al. Sleep arousal burden is associated with long-term all-cause and cardiovascular mortality in 8001 community-dwelling older men and women. European Heart Journal (2021) 00, 1–12.</p> <p>[6] S. McGuire et al. Inter-individual Differences in the Effects of Aircraft Noise on Sleep. SLEEP, Vol. 39, No. 5, 2016.</p> <p>[7] D. Thompson. On the relationship between wheel and rail surface roughness and rolling noise.</p>
NV 1.28	<p>In preparing this response, PHE has assumed that this question is with reference to the SOAEL and the levels associated with “Low”, “Medium” and “High” magnitude of impact expressed in terms of the maximum noise level (L_{Amax}).</p> <p>PHE is not able to provide an evidence-based general recommendation for a single SOAEL that is able to achieve the aims and objectives of the Noise Policy Statement for England and the Planning Practice Guidance on noise. As noted in our response to question NV.1.19, consideration of physiological sleep disturbance from train pass-bys need to take into account both the maximum levels and number of events.</p> <p>For ES assessments, PHE welcomes judgements of significance that take into consideration a number of additional factors that are relevant to the noise-health association. For transportation schemes these factors can include:</p> <ul style="list-style-type: none"> • The existing noise exposure of affected communities – in particular, consideration of any designated Noise Important Areas identified in proximity to the scheme; • The size of the population affected – for example an effect may be deemed significant if a large number of people are exposed to a relatively small noise change; • The relative change in number and type of vehicle pass-bys; • Changes in the temporal distribution of noise during day/evening/night, or between weekdays and weekends; • Soundscape and tranquillity, in particular the value that communities put on the lack of environmental noise in their area, or conversely, on the lack of public areas within walking distance that are relatively free from environmental noise; • Opportunities for respite (predictable periods of relief from noise), either spatially or temporally; • Cumulative exposure to other environmental risk factors, including other sources of noise and air pollution, <p>Local health needs, sensitivities and objectives.</p>

NV 1.68	<p>As noted in the response to NV 1.19 and 1.28, PHE welcomes assessments that determine significance in ES terms by taking into consideration a number of additional relevant factors, rather than comparing against a single SOAEL.</p> <p>Noise mitigation can consist of different options. In general control of noise at source should be the preferred form of mitigation. This can be achieved by the appropriate procurement, management and maintenance of trains and infrastructure (including wheel and rail roughness); and operational procedures and restrictions, such as speed limits.</p> <p>Noise mitigation at the receptor (noise insulation) should be used as a last resort. PHE expects any proposed noise insulation schemes to take a holistic approach which achieves a healthy indoor environment, taking into consideration noise, ventilation, overheating risk, indoor air quality and occupants' preference to open windows.</p>
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Please do not hesitate to contact us if you have any questions or concerns.

Yours faithfully,

On behalf of Public Health England
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Please mark any correspondence for the attention of National Infrastructure Planning Administration.