Technical Note

Project:	**Humber Zero**	Job No:	**60712174**
Subject:	**Response to Environmental Protection Team- VPI**		
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Introduction

VPI have submitted a planning application (PA/2023/421) for Planning permission for the construction & operation of a postcombustion carbon capture plant, including carbon dioxide compressor & metering, coding equipment, stacks, substations, internal roads, partial ditch realignment, new & modified services, connections, internal roads, accesses, maintenance & laydown areas.

The Environmental Protection Team at North Lincolnshire Council (NLC) have provided comments in a memo dated 8 June 2023 (Ref PLU007747) on the Noise and Vibration Environmental Statement and associated Figures and Appendices which were submitted as part of the planning application.

VPI submitted a technical note (AECOM Ltd, Technical Note Reference 60712174) dated 8 September 2023 in response to the Environmental Protection Team memo dated 8 June 2023.

The Environmental Protection Team issued a response to AECOM technical note dated 8 September 2023 on 7 November 2023 which states:
"This department has reviewed the information submitted and can confirm that our comments remain unchanged as detailed in our memo dated 8 June 2023.

In addition to our previous comments, this department does not consider it appropriate to recommend a condition which would effectively increase the noise levels compared to those permitted by the Development Consent Orders for recent developments in the vicinity.

This department would therefore recommend the following condition on any permission granted:

- *Noise (in terms of the BS4142:2014 rating level) from the operation of the authorised development must be no greater than 3dB higher than the defined representative background sound level during each of the daytime and the night-time, adjacent to the nearest residential properties at locations agreed with the relevant planning authority."*

Operational Noise Impacts.

The operational noise impacts of the proposed development have been assessed following guidance in BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound.'

The standard states that:

> *"Typically, the greater the difference, the greater the magnitude of impact.*
> *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
> *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
> *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound will have an adverse impact or a significant adverse impact. Where*

the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

The Noise and Vibration ES chapter has set the Significant Observed Adverse Effect Level (SOAEL) is set at a *rating level* above the *background sound level* of +10 dB, and the Lowest Observable Adverse Effect Level (LOAEL) at +5 dB, although it should be noted that the context assessment (including the absolute level of the sound under consideration) can vary the overall classification of effects.

VPI and Phillips 66 Ltd are already a continuously operating industrial source in the study area, and there are other industrial and commercial activities in the vicinity. This is likely to mean that residents at the noise sensitive receptors (NSRs) are already accustomed to industrial sources.

The Environmental Protection Department at NLC considers the LOAEL of +5 dB is too high.

The LOAEL was set as +5 dB in the Environmental Statement as it relates to 'observed' effects, a small difference e.g. 1- 2 dB is not likely to be observed by local residents and typically a 3 dB difference is the minimum perceptible under noise conditions. Therefore a 5 dB difference has been applied for the lowest observed adverse effect.

The Noise and Vibration ES chapter based the BS4142 assessment and proposed mitigation on achieving a Rating Level of +5 dB above the representative background sound level. However as stated in the Noise and Vibration ES chapter, VPI and Phillips 66 Ltd are aiming to achieve a lower rating level of +3 dB above representative background sound level where practicable.

NLC have stated in order to prevent 'background creep' and to prevent the potential for adverse impact the Environmental Protection department generally recommends cumulative noise levels should not exceed background sound levels. However, to be consistent with previous VPI permission and others granted under Development Consent Orders in the area, the Environmental Protection department would be willing to accept +3dB above background and would like the applicant to demonstrate they can comply with this level.

Updated BS 4142 Assessment

To demonstrate that that proposed VPI development alone and the cumulative operation of both VPI and Phillips 66 Ltd can achieve a Rating Level of no more than +3 dB above the representative background sound levels the proposed mitigation measures have been updated as shown in Table 1 below.

The potential attenuation required from the source sound power levels of the key noise emitting plant in order to meet the NLC proposed operational noise criterion of *rating level* no more than +3 dB above the *background sound level* is listed in Table 1.These reductions could be achieved either through reduction of sound power level at source or by application of the mitigation measures listed in the ES Chapter 7, submitted as part of the planning application.

Table 1 Attenuation required (dB) from individual plant items

Plant Item*	Attenuation required to achieve a rating level no greater than + 3 dB above the defined background sound level.- VPI Only	Attenuation required to achieve a rating level no greater than + 3 dB above the defined background sound level.- Cumulative (Both Proposed VPI and Proposed Phillips 66)
P66-39, P66-56, P66-57	-	-15
P66-33, P66-34, P66-35, P66-36, P66-13, P66-51, P66-52, P66-55, P66-37, P66-58, P66-67	-	-11
P66-32, P66-66, P66-70	-	-10
P66-3	-	-9
P66-27, P66-28, P66-29, P66-38, P66-40, P66-41, P66-42, P66-47, P66-48, P66-49, P66-26, P66-24, P66-25, P66-4, P66-10, P66-68, P66-69	-	-7
P66-7, P66-45	-	-6
P66-18	-	-5
P66-65	-	-4
P66-43, P66-44	-	-3
VPI-54	-13	-13
VPI-19, VPI-99 A-D, VPI-70	-12	-12
VPI-46, VPI-47, VPI-48, VPI-29, VPI-31, VPI-32, VPI-33, VPI-34, VPI-35, VPI-36, VPI-37, VPI-39	-11	-11
VPI-5	-10	-10
VPI-112, VPI-113	-	-5

* List of plant relating to Plant ID can be found in ES Appendix 7C.

The potential mitigation measures and general principles to achieve this may include, but are not limited to, the following measures, depending upon the potential benefits achieved from such measures:

- reducing the breakout noise from plant through the use of enhanced enclosures, or potentially containing them within a building;
- reducing air inlet noise emissions by the addition of further in-line attenuation;
- reducing stack outlet noise emissions by the addition of silencers or sound proofing panels;
- reducing fin fan cooler noise emissions by screening, re-sizing, fitting low noise fans or attenuation;
- screening or enclosing the compressors or other equipment;
- use of screening or bunding to shield receptors from noise sources; and/or
- orientation of plant within the Site to provide screening of low-level noise sources by other buildings and structures, or orientating fans and the air inlets away from sensitive receptors.

During detailed design of the Proposed Developments it may be desirable or more practical to apply higher attenuation to some plant items/ buildings than listed in Table 1 in order to reduce the attenuation applied to other plant items/ buildings and still achieve the +3 dB criteria.

The daytime and night-time BS 4142 assessment results for these mitigated predictions (with the application of the attenuation set out in Table 1) are presented in Table 2 and Table 3 (Proposed VPI only) and Table 4 and Table 5 (cumulative assessment of both proposed VPI and Proposed Phillips 66).

Table 2: Daytime BS4142 assessment with additional mitigation (to achieve up to +3 dB above the background sound level) – Proposed VPI Development

Receptor	**NSR 1 – Staple Road**	**NSR 2 – Clarkes Road**	**NSR 3 – Church Lane**	**NSR 4 – Hazel Dene**
Specific sound level L_s ($L_{Aeq,Tr}$), dB	40	37	40	50
Acoustic feature correction, dB	+3	+3	+3	+3
Rating level ($L_{Ar,Tr}$), dB	43	40	43	53
Representative *background sound level* ($L_{A90,T}$), dB	49	46	46	50
Excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	-6	-6	-3	+3
BS 4142:2014 effect category (assigned from Table 7.8 In ES Chapter 7)	Indication of low effect	Indication of low effect	Indication of low effect	Indication of a low to adverse impact, depending upon context
Magnitude of impact (assigned from Table 7.8 In ES Chapter 7)	Very low	Very low	Very low	Very Low/Low
Initial classification of effect (assigned from Table 7.10 in ES Chapter 7)	Negligible	Negligible	Negligible	Negligible/ Minor adverse (not significant)

Table 3: Night-time BS4142 assessment with additional mitigation (to achieve up to +3 dB above the background sound level) – Proposed VPI Development

Receptor	NSR 1 – Staple Road	NSR 2 – Clarkes Road	NSR 3 – Church Lane	NSR 4 – Hazel Dene
Specific sound level L_s ($L_{Aeq,Tr}$), dB	41	38	40	51
Acoustic feature correction, dB	+3	+3	+3	+3
Rating level ($L_{Ar,Tr}$), dB	44	41	43	54
Representative *background sound level* ($L_{A90,T}$), dB	48	45	45	51
Excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	-4	-4	-2	+3
BS 4142:2014 effect category (assigned from Table 7.8 In ES Chapter 7)	Indication of low effect	Indication of low effect	Indication of low effect	Indication of a low to adverse impact, depending upon context
Magnitude of impact (assigned from Table 7.8 In ES Chapter 7)	Very low	Very low	Very low	Very Low/Low
Initial classification of effect (assigned from Table 7.10 in ES Chapter 7)	Negligible	Negligible	Negligible	Negligible/ Minor adverse (not significant)

Table 3: Daytime BS4142 assessment with additional mitigation (to achieve up to +3 dB above the background sound level) – Proposed VPI Development +Proposed Phillips 66 development combined.

Receptor	NSR 1 – Staple Road	NSR 2 – Clarkes Road	NSR 3 – Church Lane	NSR 4 – Hazel Dene
Specific sound level L_s ($L_{Aeq,Tr}$), dB	47	44	45	50

Receptor	NSR 1 – Staple Road	NSR 2 – Clarkes Road	NSR 3 – Church Lane	NSR 4 – Hazel Dene
Acoustic feature correction, dB	+3	+3	+3	+3
Rating level ($L_{Ar,Tr}$), dB	50	47	48	53
Representative *background sound level* ($L_{A90,T}$), dB	49	46	46	50
Excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	+1	+1	+2	+3
BS 4142:2014 effect category (assigned from Table 7.8 In ES Chapter 7)	Indication of a low to adverse impact, depending upon context	Indication of a low to adverse impact, depending upon context	Indication of a low to adverse impact, depending upon context	Indication of a low to adverse impact, depending upon context
Magnitude of impact (assigned from Table 7.8 In ES Chapter 7)	Very Low	Very Low/	Very Low/Low	Very Low/Low
Initial classification of effect (assigned from Table 7.10 in ES Chapter 7)	Negligible	Negligible/	Negligible/Minor adverse (not significant)	Negligible/Minor adverse (not significant)

Table 4: Night-time BS4142 assessment with additional mitigation (to achieve up to +3 dB above the background sound level) – Proposed VPI Development +Proposed Phillips 66 development combined.

Receptor	**NSR 1 – Staple Road**	**NSR 2 – Clarkes Road**	**NSR 3 – Church Lane**	**NSR 4 – Hazel Dene**
Specific sound level L_s ($L_{Aeq,Tr}$), dB	48	44	45	51
Acoustic feature correction, dB	+3	+3	+3	+3
Rating level ($L_{Ar,Tr}$), dB	51	47	48	54
Representative *background sound level* ($L_{A90,T}$), dB	48	45	45	51
Excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	+3	+2	+3	+3
BS 4142:2014 effect category (assigned from Table 7.8 In ES Chapter 7)	Indication of a low to adverse impact, depending upon context	Indication of a low to adverse impact, depending upon context	Indication of a low to adverse impact, depending upon context	Indication of a low to adverse impact, depending upon context
Magnitude of impact (assigned from Table 7.8 In ES Chapter 7)	Very Low/Low	Very Low/Low	Very Low/Low	Very Low/Low
Initial classification of effect (assigned from Table 7.10 in ES Chapter 7)	Negligible/Minor adverse (not significant)	Negligible/Minor adverse (not significant)	Negligible/Minor adverse (not significant)	Negligible/Minor adverse (not significant)