

**Norfolk Vanguard Offshore Wind Farm**

# **Noise Mitigation Measures at the Old Railway Gatehouse Position Statement**

**Issue Specific Hearing 6, Action Point 14**

Applicant: Norfolk Vanguard Limited  
Document Reference: ExA; ISH6; 10.D7.7

Deadline 7

Date: 02 May 2019



## Table of Contents

<b>1</b>	<b>Noise &amp; Vibration – The Old Railway Gatehouse .....</b>	<b>1</b>
<b>1.1</b>	<b>Noise and vibration .....</b>	<b>1</b>
1.1.1	Optional mitigation measures identified by Hornsea Project Three .....	1
1.1.2	Potential noise increases related to priority vehicle signage.....	2
<b>2</b>	<b>Appendix 1 Noise Assessment – Idling and Accelerating HGVs in Proximity to The Old Railway Gatehouse .....</b>	<b>5</b>
<b>2.1</b>	<b>Introduction .....</b>	<b>5</b>
<b>2.2</b>	<b>Baseline Sound Levels (Link 68) at The Old Railway Gatehouse.....</b>	<b>5</b>
<b>2.3</b>	<b>Road Traffic Noise Emissions 2022 .....</b>	<b>5</b>
2.3.1	Road Traffic Noise Emissions 2022 - Norfolk Vanguard alone .....	5
2.3.2	Road Traffic Noise Emissions 2022 – Cumulative scheme .....	7
2.3.3	Cumulative construction phase noise – Mitigation Link 68 (speed restriction and road re-grading).....	9
2.3.4	Cumulative construction phase noise – Link 68 HGVs use of lay-by.....	11

## 1 NOISE & VIBRATION – THE OLD RAILWAY GATEHOUSE

---

1. The Applicant undertook a cumulative impact assessment (CIA) of the combined construction traffic from Norfolk Vanguard and Hornsea Project Three, which was submitted to the examination at Deadline 5 (ExA; ISH1; 10.D5.3). This included an assessment of cumulative noise and vibration impacts along Link 68 (The Street at Oulton) and specifically at the Old Railway Gatehouse.
2. During the Issue Specific Hearing on Environmental Matters (ISH6) on the 24 April 2019, the Examining Authority (ExA) requested a position statement from the Applicant setting out the latest position in relation to:
  - Cumulative noise and vibration impacts at the Old Railway Gatehouse related to the introduction of priority signage in proximity to the property and the resulting potential for heavy goods vehicles idling and accelerating from a standing start outside the property; and
  - The status of optional mitigation proposed by Hornsea Project Three (double glazing and garden wall) in relation to the Old Railway Gatehouse (both covered under Action Point 14).

### 1.1 Noise and vibration

#### 1.1.1 Optional mitigation measures identified by Hornsea Project Three

3. A scheme of mitigation has been proposed by Hornsea Project Three (and agreed with Norfolk County Council) along The Street at Oulton (Link 68) to mitigate construction traffic impacts associated with Hornsea Project Three both alone and in combination with Norfolk Vanguard. The scheme of mitigation includes the re-grading of the road surface outside of the Old Railway Gatehouse, the introduction of a temporary speed limit for the length of The Street, and traffic management signage to give priority for southbound vehicles in the vicinity of The Old Railway Gatehouse.
4. This scheme of mitigation has been assessed by Norfolk Vanguard and it has been concluded that these mitigation measures will reduce traffic related noise impacts to negligible in the cumulative scenario. Norfolk Vanguard has therefore committed to also adopt this scheme of mitigation. The first project to proceed to construction would deliver the full scheme of mitigation and the second project would be responsible for removing the measures once both project's construction phases are complete. This commitment has been captured in an update to the Norfolk Vanguard Outline Traffic Management Plan (OTMP) submitted at Deadline 7.

5. The scheme of mitigation developed by Hornsea Project Three also includes optional measures that may be implemented subject to agreement from the owner of The Old Railway Gatehouse. These measures include installation of double glazing along the façade closest to The Street, or the provision of a wall along the garden of the property. Hornsea Project Three state that these options would be taken forward should residents wish; however they are not essential to mitigate the potential noise effects (*Hornsea Project Three, Deadline 6 submission: Appendix 23 – Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse*).
6. During ISH6 Broadland District Council confirmed that their approval of the Hornsea Project Three scheme of mitigation was on the basis that these optional mitigation measures are part of the package of measures available, although accepting that they are not essential to mitigate potential noise effects.
7. Broadland District Council has confirmed that the Council's position is that the mitigation measures along Link 68 should be consistent between both Hornsea Project Three and Norfolk Vanguard.
8. The Applicant is in the process of discussing these optional mitigation measures with the owner of The Old Railway Gatehouse and a further update will be given at Deadline 8.

#### 1.1.2 Potential noise increases related to priority vehicle signage

9. The width of The Street immediately adjacent to The Old Railway Gatehouse is sufficiently narrow that two Heavy Goods Vehicles (HGVs) would have difficulty passing. The scheme of mitigation along The Street proposes the introduction of a passing bay located 40m south from The Old Railway Gatehouse and the inclusion of a sign to give priority to oncoming vehicles, i.e. to ensure that vehicles do not attempt to pass each other directly outside of the property.
10. This 40m distance is designed to allow a loaded HGV to traverse through their gears avoiding HGVs changing gear directly outside the property. Furthermore, there is an existing 'informal' passing bay which is already used by vehicles waiting to pass at The Old Railway Gatehouse, thus the introduction of a passing bay as part of the scheme of mitigation formalises an existing arrangement, albeit the intensity of the frequency of the events would increase.
11. Only a small proportion of passing vehicles would be required to stop at the proposed passing place at The Old Railway Gatehouse, and only a small proportion of those vehicles would be HGVs. An assessment of the potential noise increases associated with a proportion of HGVs stopping at the passing bay located 40m south of the Old Railway Gatehouse and then moving slowly past the property is presented in detail in Appendix 1 to this note. A summary of the findings is presented below.

12. Research reported in a commission by the UK Noise Association (2009) titled “Speed and Road Traffic Noise – The role that lower speed could play in cutting noise from traffic” states that “accelerations from 20km/h to 50km/h accounted for 10% of traffic noise while accelerating from traffic lights accounted for 5%”. Table 1 below reproduces reported noise levels associated with accelerating HGVs from the 2009 document.

**Table 11 Acceleration and braking noise level effects**

Acceleration/deceleration	Vehicle Type	Noise influence	Note
0.5 m/s <sup>2</sup> (acceleration)	Heavy	+2.1dB	Moderate acceleration
1 m/s <sup>2</sup> (acceleration)	Heavy	+4.5dBA	High acceleration
-1.5m/s <sup>2</sup> (deceleration)	Heavy	-4.5dBA	Moderate deceleration
	Parameters included in the Lay-by assessment		

Reproduced from UK Noise Association (2009) *Speed and Road Traffic Noise*

13. Based on the details in Table 1, the following assumptions were included for the assessment of potential noise impacts at the lay-by within the vicinity of The Old Railway Gatehouse from HGV acceleration and deceleration noise and the results of the noise calculations for cumulative construction traffic are presented in Table 2:

- Link 68 speed would be restricted to 30mph;
- Link 68 carriageway would be re-graded from a 5.6% to 3.2% gradient;
- A heavy vehicle under moderate acceleration would increase noise levels by +2.1dBA;
- A heavy vehicle under moderate deceleration would be 4.5dBA quieter than a vehicle travelling at speed;
- 10% of HGV traffic would be required to wait in the lay-by until the carriageway was passable;
- A Sound Exposure Level (SEL) of 93dBA obtained from the data presented in Hornsea Project Three baseline<sup>1</sup> was used in the event calculation to determine the effect of accelerating and decelerating vehicles -this value has been reviewed by Norfolk Vanguard and is considered to be robust;
- A -5.0dBA correction for mean traffic speed (V) and percentage heavy vehicles (p) as detailed in CRTN was included to account for the lower speed of the 10% HGVs accelerating/decelerating (approximated to 30 km/h);

<sup>1</sup> Hornsea Project Three, Deadline 6 submission: Appendix 23 – Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse

- 18hr Annual Average Weekday Traffic (AAWT) %HGVs flows were calculated based on a 10% reduction to account for the numbers of HGVs involved in accelerating and decelerating; and
- Total noise level (LAeq,16hr) = Predicted LAeq,16hr noise levels (based on 18hr AAWT flows) + Predicted LAeq,16hr noise levels (10% HGVs accelerating and decelerating).

**Table 2 Cumulative construction phase road traffic noise emissions assessment 2022 – with proposed mitigation – with and without lay-by accelerating effects**

Link No.	Predicted LAeq,16hr (2022 Norfolk Vanguard Baseline + Growth) no mitigation	Predicted LAeq,16hr (2022 Baseline + Growth + Cumulative traffic) including mitigation	Predicted LAeq,16hr (2022 Baseline + Growth + Cumulative traffic + Lay-bys) including mitigation	Difference (dBA)	Impact magnitude	Impact significance
68*	58.4	59.9	n/a	+1.5	Minor	Minor
68**	58.4	n/a	60.8	+2.4	Minor	Minor

\*Speed restriction of 30mph (48.1 km/h), Re-grading of Link 68 carriageway  
 \*\* Speed restriction of 30mph (48.1 km/h), Re-grading of Link 68 carriageway, including Lay-by passing areas

14. Re-calculating the relative change in noise level for Link 68, using the Norfolk Vanguard peak construction scenario of 2022 Baseline + growth versus 2022 Baseline + growth + cumulative traffic + lay-bys (including mitigation), predicts an increase in noise of +2.4dB which represents a residual impact of **minor adverse** significance.
15. This represents a non-significant impact in EIA terms; however, the Applicant is in the process of discussing optional mitigation measures with the owner of The Old Railway Gatehouse, and a further update will be given at Deadline 8.



## 2 APPENDIX 1 Noise Assessment – Idling and Accelerating HGVs in Proximity to The Old Railway Gatehouse

### 2.1 Introduction

1. This assessment considers the potential for noise and vibration impacts at The Old Railway Gatehouse, resulting from Norfolk Vanguard construction traffic and cumulatively with Hornsea Project Three construction traffic travelling along Link 68 (The Street, Oulton); specifically the potential road traffic noise effects associated with the introduction of traffic mitigation - regrading of the road surface and introduction of passing bay and the associated effects of Heavy Goods Vehicles (HGVs) idling and accelerating in proximity to The Old Railway Gatehouse.
2. This document supports Environmental Statement Chapter 25 Onshore Noise and Vibration (document reference 6.1.25) and Appendix G of the Traffic Cumulative Impact Assessment (CIA) submitted at Deadline 5 (document reference ExA;ISH1;10.D5.3).

### 2.2 Baseline Sound Levels (Link 68) at The Old Railway Gatehouse

3. Baseline sound levels were measured at The Old Railway Gatehouse during 15 to 21 October 2018 by the consultants (RPS) assessing the noise and vibration effects of Hornsea Project Three. The findings were reported in Table 2.1 of Hornsea Project Three document “Appendix 23 to Deadline 6 submission – Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse (REP6-037)”.
4. A summary of the baseline sound data is provided in Table 2.1.

Table 2.1 Baseline Sound Survey

Reference Period	Ambient Noise Level (dB) LAeq,T	Level exceeded 10% of the time (dB) LA10,T	Level exceeded 90% of the time (dB) LA90,T	Maximum Daily (dB) LAFmax,T
Daytime (07:00 – 23:00)	59	54	30	N/A
Night time (23:00 – 07:00)	50	36	25	81 <sup>B</sup>

### 2.3 Road Traffic Noise Emissions 2022

#### 2.3.1 Road Traffic Noise Emissions 2022 - Norfolk Vanguard alone

5. Table 2.2 presents shared Link 68 (Norfolk Vanguard scheme Link ID) and Link 208 (Hornsea Project Three Link ID) speed data and year of observation.

**Table 2.2 Link survey detail (recorded speeds)**

Link No.	Road	Survey type	Survey year	Speed (km/h)
68	The Street/Heydon Road	Estimated	2017	96.6
208*	The Street*	Measured*	2018*	69*
Note: *Details obtained from the Hornsea Project Three report - Appendix 23 to Deadline 6 submission - <i>Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse</i>				
	Posted Speed Limit			Measured speed during survey period

- An assessment was undertaken following the methodology contained in Design Manual Roads and Bridges (DMRB) (Volume 11, Section 3, Chapter 3) to assess whether there would be any significant changes in traffic volumes and composition on surrounding local roads as a result of the construction of Norfolk Vanguard. The significance of any predicted change in noise level was then assessed in accordance with the criteria contained in the DMRB.
- Table 2.3 presents the Norfolk Vanguard traffic flow data for the assessment year 2022 (as previously detailed in the ES Chapter 25 Noise and Vibration).

**Table 2.3 Link 68 Traffic Flows 2022 – Norfolk Vanguard**

Link No.	2022 Baseline + Growth (18hr AAWT)		2022 Baseline + Growth + Development (18hr AAWT)		% Change	
	Total Flow	HGVs	Total Flow	HGVs	Total Flow	HGVs
68	1,142	52	1318	148	15.4	182.9
	Change >25% or <20% in accordance with DMRB screening criteria.					

- Table 2.4 shows the predicted relative decibel (dB) change for Norfolk Vanguard construction traffic using the LA<sub>10,18h</sub> criteria for traffic in accordance with Calculation of Road Traffic Noise (CRTN) methodology.

**Table 2.4 Norfolk Vanguard - Construction phase road traffic noise emissions assessment 2022**

Link No.	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth)	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth + Development)	dB Change LA <sub>10, 18hr</sub>	Speed (km/h)	Impact magnitude	Impact significance
68	63.1	64.7	+1.6	96.6	Minor	Minor
	Posted Speed Limit				Measured speed	



9. Table 2.5 shows the predicted relative dB change for Norfolk Vanguard construction traffic using the  $L_{A10,18h}$  criteria for traffic in accordance with CRTN methodology using the measured speed for Link 68 obtained from the Hornsea Project Three 2018 survey.

**Table 2.5 Norfolk Vanguard - Construction phase road traffic noise emissions assessment 2022 revised speeds**

Link No.	Predicted Basic Noise Level $L_{10,18hr}$ dBA (2022 Baseline + Growth)	Predicted Basic Noise Level $L_{10,18hr}$ dBA (2022 Baseline + Growth + Development)	dB Change $L_{A10, 18hr}$	Speed (km/h)	Impact magnitude	Impact significance
68	60.5	62.5	+2.0	69*	Minor	Minor
Note: *Details obtained from the Hornsea Project Three report - Appendix 23 to Deadline 6 submission - Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse						
	Measured speed					

10. A difference of +0.4dB  $L_{A10,18h}$  is evident between the posted speed limit for Link 68 in Table 2.4 and the measured speed data in Table 2.5. The impact remains of minor adverse significance in both instances; therefore, the original conclusions presented in Norfolk Vanguard ES Chapter 25 Noise and Vibration remain valid and no further mitigation is required for Norfolk Vanguard alone.

### 2.3.2 Road Traffic Noise Emissions 2022 – Cumulative scheme

11. An assessment was undertaken for cumulative traffic flows for Norfolk Vanguard and Hornsea Project Three on Link 68 and is presented in Appendix G of the Traffic CIA submitted at Deadline 5 (document reference ExA;ISH1;10.D5.3).
12. Following the methodology contained in DMRB (Volume 11, Section 3, Chapter 3) an initial screening exercise was undertaken to determine whether there would be any significant changes in traffic volume and composition on shared links related to both projects' construction traffic during the year 2022 (worst-case year). The predicted changes in volume for Link 68 is given in Table 2.6.

**Table 2.6 Link 68 Traffic Flows 2022 - Cumulative**

Link No.	2022 Baseline + Growth (18hr AAWT)		2022 Baseline + Growth + Cumulative + Development (18hr AAWT)		% Change	
	Total Flow	HGVs	Total Flow	HGVs	Total Flow	HGVs
68	1,142	52	1,566	266	37.1	408.1
	Change >25% or <20% in accordance with DMRB screening criteria.					

13. Table 2.7 details the results of the cumulative construction phase noise road traffic emissions calculations for 2022 for Link 68 as reported in the CIA submitted at Deadline 5 (document reference ExA;ISH1;10.D5.3) using the speed data as reported in the ES Chapter 25 Noise and Vibration.

**Table 2.7 Cumulative construction phase road traffic noise emissions assessment 2022 (estimated speeds)**

Link No.	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth)	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth + Cumulative)	dB Change LA <sub>10, 18hr</sub>	Speed (km/h)	Impact magnitude	Impact significance
68	63.0	66.1	+3.1	96.6	Moderate	Moderate
	Posted Speed Limit				Measured speed	

14. Table 2.8 details the results of the cumulative construction phase noise road traffic emissions calculations for 2022 using the revised speed data for Link 68.

Table 2.8 Cumulative construction phase road traffic noise emissions assessment 2022 (measured speeds)

Link No.	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth)	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth + Cumulative)	dB Change LA <sub>10, 18hr</sub>	Speed (km/h)	Impact magnitude	Impact significance
68	60.5	64.1	+3.6	69*	Moderate	Moderate
Note: *Details obtained from the Hornsea Project Three report - Appendix 23 to Deadline 6 submission - Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse						
	Measured speed					

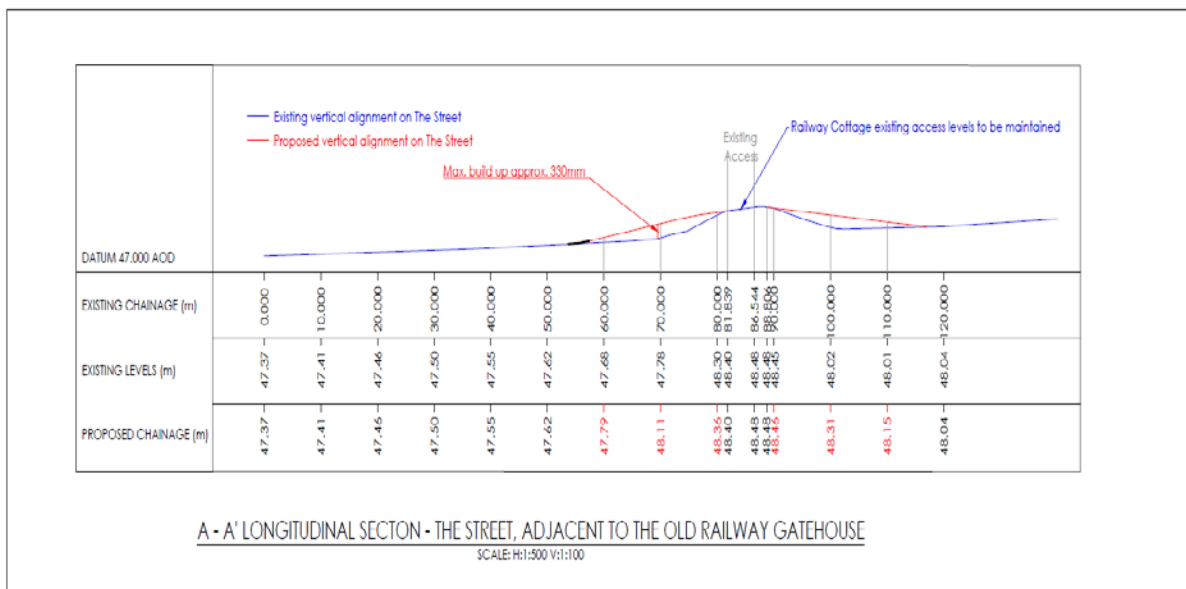
15. A difference of +0.5dB LA<sub>10,18h</sub> is evident between the posted speed limit for Link 68 in Table 2.7 and the measured speed data in Table 2.8 for the cumulative scenario. The impact is moderate adverse significance in both instances; therefore, the conclusions presented in the CIA submitted at Deadline 5 (document reference ExA;ISH1;10.D5.3) remain valid and mitigation measures are presented in the following sections.

**2.3.3 Cumulative construction phase noise – Mitigation Link 68 (speed restriction and road re-grading)**

16. A scheme of mitigation has been proposed by Norfolk Vanguard along Link 68 which includes re-grading the carriageway for approximately 120m adjacent to the Old Railway Gatehouse and reducing the speed of the link to 30mph.

17. The proposed carriageway regrading is shown on Figure 1.

Figure 1 Proposed road regrading in proximity to the Old Railway Gatehouse



Source: Hornsea Project 3 Offshore Wind Farm, Appendix 20 to Deadline 9 submission Outline Construction Traffic Management Plan APFP Regulation 5(2)a, dated 26<sup>th</sup> March 2019

18. A comparison of the existing highway was undertaken in order to calculate the extent of the change in gradient.

**Table 2.9 Link 68 gradient – existing and proposed**

Distance (m)	Existing Elevation AOD (m)	Proposed Elevation AOD (m)	Difference (m)	Existing Gradient	Proposed Gradient
0	47.37	47.37	0.00	0.0	0.0
10	47.41	47.41	0.00	0.4	0.4
20	47.46	47.46	0.00	0.5	0.5
30	47.5	47.5	0.00	0.4	0.4
40	47.55	47.55	0.00	0.5	0.5
50	47.62	47.62	0.00	0.7	0.7
60	47.68	47.79	0.11	0.6	1.7
70	47.78	48.11	0.33	1	3.2
80	48.3	48.36	0.06	5.2	2.5
81.8	48.4	48.4	0.00	5.6	2.2
86.54	48.48	48.48	0.00	1.7	1.7
88.8	48.48	48.48	0.00	0	0
90	48.45	48.46	0.01	-2.5	-1.7
100	48.02	48.31	0.29	-4.3	-1.5
110	48.01	48.15	0.14	-0.1	-1.6
120	48.04	48.04	0.00	0.3	-1.1
	Section of link closest to The Old Railway Gatehouse Link 68				

19. For the purposes of assessing the effect of the carriageway re-grading, the gradient at the closest point to the Old Railway Gatehouse (at 70m to 81.8m) was included in the CRTN calculations i.e. 5.6 (existing) and 3.2 (proposed).
20. The effects of re-grading the carriageway and reducing the speed limit to 30mph (48.1 km/h) were assessed using the CRTN methodology for Norfolk Vanguard and Hornsea Project cumulatively and are presented in Table 2.10.

**Table 2.10 Cumulative Construction phase road traffic noise emissions assessment 2022 - mitigated**

Link No.	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth + Cumulative) Unmitigated	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth + Cumulative) With mitigation	dB Change LA <sub>10,18hr</sub>	Speed (km/h)
68 <sup>A</sup>	64.1	62.8	-1.3	69*
68 <sup>B</sup>	64.1	63.6	-0.5	69*
68 <sup>C</sup>	64.1	62.2	-1.9	69*
	Measured speed			
Note: *Details obtained from the Hornsea Project Three report - Appendix 23 to Deadline 6 submission - <i>Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse</i>				
68 <sup>A</sup> Speed restriction ONLY, 68 <sup>B</sup> Regrade of Carriageway ONLY, 68 <sup>C</sup> Speed restriction and Regrade				

**Table 2.11 Cumulative construction phase road traffic noise emissions assessment 2022 – with proposed mitigation**

Link No.	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth) no mitigation	Predicted Basic Noise Level L <sub>10,18hr</sub> dBA (2022 Baseline + Growth + Cumulative) with proposed mitigation	dB Change LA <sub>10,18hr</sub>	Speed (km/h) as per mitigation	Impact magnitude	Impact significance
68	60.5*	62.2	+1.7	48.1	Minor	Minor
Note: *Details of speed (69 km/h) obtained from the Hornsea Project Three report - Appendix 23 to Deadline 6 submission - <i>Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse</i>						
	Mitigated speed					

21. Re-calculating the relative change in noise level for Link 68, using the scenario of 2022 Baseline + growth versus 2022 Baseline + growth + cumulative (including mitigation), predicts a residual impact of **minor adverse** significance.

#### 2.3.4 Cumulative construction phase noise – Link 68 HGVs use of lay-by

22. Due to a restricted width of the carriageway along Link 68, Hornsea Project Three has proposed mitigation in the form of a lay-by approximately 40m south from The Old Railway Gatehouse to allow HGVs to pass each other.

23. The effect of HGV traffic accelerating and decelerating from the lay-by has been considered cumulatively to the additional traffic flows from Norfolk Vanguard and Hornsea Project Three.
24. Research reported in a commission by the UK Noise Association (2009) *Speed and Road Traffic Noise – The role that lower speed could play in cutting noise from traffic*, Watts et al. 2005, (as reported in Page 10 of the UK Noise Association 2009 document) states that “accelerations from 20km/h to 50km/h accounted for 10% of traffic noise while accelerating from traffic lights accounted for 5%”. Table 3 taken from the UK Noise Association document is reproduced in Table 2.11.

**Table 2.11 Acceleration and braking noise level effects**

Acceleration/deceleration	Vehicle Type	Noise influence	Note
<b>0.5 m/s<sup>2</sup> (acceleration)</b>	Heavy	+2.1dB	Moderate acceleration
<b>1 m/s<sup>2</sup> (acceleration)</b>	Heavy	+4.5dBA	High acceleration
<b>-1.5m/s<sup>2</sup> (deceleration)</b>	Heavy	-4.5dBA	Moderate deceleration
Parameters included in the Lay-by assessment			

25. Based on the details in Table 2.11, the following assumptions were included for the assessment of the lay-by HGV acceleration and deceleration noise and the results of the assessment are presented in Table 2.12:
  - Link 68 speed would be restricted to 30mph;
  - Link 68 carriageway would be re-graded from a 5.6% to 3.2% gradient;
  - A heavy vehicle under moderate acceleration would increase noise levels by +2.1dBA;
  - A heavy vehicle under moderate deceleration would be 4.5dBA quieter than a vehicle travelling at speed;
  - 10% of HGV traffic would be required to wait in the lay-by until the carriageway was passable;
  - Predicted  $L_{A10,18hr}$  relative noise change results were converted to  $L_{Aeq,16hr}$  using the TRL conversion of -2dBA;
  - An SEL of 93dBA obtained from the Hornsea Project Three baseline was used in the event calculation to determine the effect of accelerating and decelerating vehicles;



- A -5.0dBA correction from Chart 4 Correction for mean traffic speed V and percentage heavy vehicles p detailed in CRTN was included to account for the lower speed of the 10% HGVs accelerating/decelerating (approximated to 30 km/h);
- 18hr AAWT %HGVs flows were calculated based on a 10% reduction to account for the numbers of HGVs involved in accelerating and decelerating; and
- Total noise level (LAeq,16hr) = Predicted LAeq,16hr noise levels (based on 18hr AAWT flows) + Predicted LAeq,16hr noise levels (10% HGVs accelerating and decelerating).

**Table 2.12 Cumulative construction phase road traffic noise emissions assessment 2022 – with proposed mitigation and Lay-by effects**

Link No.	Predicted LAeq,16hr (2022 Norfolk Vanguard Baseline + Growth) no mitigation	Predicted LAeq,16hr (2022 Baseline + Growth + Cumulative traffic) including mitigation	Predicted LAeq,16hr (2022 Baseline + Growth + Development + Cumulative traffic + Lay-bys) including mitigation	Difference (dBA)	Impact magnitude	Impact significance
68*	58.4	59.9	n/a	+1.5	Minor	Minor
68**	58.4	n/a	60.8	+2.4	Minor	Minor

\* Speed restriction of 30mph (48.1 km/h), Re-grading of Link 68 carriageway  
 \*\* Speed restriction of 30mph (48.1 km/h), Re-grading of Link 68 carriageway, including lay-by passing areas

26. Re-calculating the relative change in noise level for Link 68, using the scenario of 2022 Baseline + growth versus 2022 Baseline + growth + cumulative traffic + lay-bys (including mitigation), predicts an increase in noise of +2.4dB which represents an impact of **minor adverse** significance.
27. This represents a non-significant impact in EIA terms; however, the Applicant is in the process of discussing optional mitigation measures with the owner of The Old Railway Gatehouse, and a further update will be given at Deadline 8.

## References

Department of Transport, Welsh Office (1988). Calculation of Road Traffic Noise. HMSO, London.

Highways Agency (2011). Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7: Noise and Vibration. The Highways Agency.

Mitchell, P. (2009). Speed and Road Traffic Noise – The role that lower speeds could play in cutting noise from traffic. UK Noise Association

Norfolk Vanguard. (2018) Norfolk Vanguard Offshore Wind Farm Chapter 25 Onshore Noise and Vibration Environmental Statement, Volume 1 (Reference: PB4476-005-025).

Orsted. (2019) Orsted Hornsea Project Three Offshore Wind Farm - Appendix 23 to Deadline 6 submission - Construction Traffic Noise and Vibration Assessment at The Old Railway Gatehouse, submitted 8 February 2019

Orsted. (2019) Orsted Hornsea Project Three Offshore Wind Farm - Appendix 24 to Deadline 7 submission - Construction Traffic Noise Assessment Clarification Note, submitted March 2019

Orsted. (2019) Orsted Hornsea Project Three Offshore Wind Farm - Appendix 20 to Deadline 9 submission - Outline Construction Traffic Management Plan APFP Regulation 5(2)(a) submitted 26<sup>th</sup> March 2019