



Supplementary Environmental Information

Effects of Soft Start

Explanatory Note EX 10.7

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ERM

EXPLANATORY NOTE ON EFFECT OF SOFT START

1.1 INTRODUCTION

1.1.1 In order to protect aquatic receptors from underwater noise from piling associated with AMEP, slow start (or soft start) procedures are to be implemented to displace marine mammals from the area close to the piling activity to reduce the potential for hearing damage. Although the default soft start period is generally taken as 20 minutes in the absence of other guidance, it is understood that this could have a significant effect on the programme for the piling works. The JNCC guidance ⁽¹⁾ on which this is based says “*Developers might want an alternative soft-start duration depending upon the specifics of the project and outcomes of the EIA process; any requested variation from a 20 minute soft-start should be agreed with the relevant agency and regulator.*” It is noted that JNCC guidance is intended as best practice for use on wind farm projects, which may involve larger pile diameters than will be used at AMEP, and which may generate higher levels of underwater noise.

1.1.2 The need for and duration of this soft start period will depend on the level of noise generated by the piling operation, the likely starting distance of animals from the pile and the piling rate during soft start. These factors will be established following best detailed design of the piling works and methods. However, in order to estimate the likely required durations of soft start a preliminary analysis has been considered to establish if 20 minute soft start is actually likely to be required.

1.2 DERIVATION OF SOFT START NOISE EFFECTS

1.2.3 Analysis has been carried out in the Environmental Statement (ES) on behalf of ABP for their Green Port Hull Development ⁽²⁾ (GPH) for similar purposes and we understand that this has been agreed with Natural England. The work involved calculating the accumulated sound exposure level (SEL) over the time when the animal swam away

(1) Joint Nature Conservation Committee (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise, available at http://jncc.defra.gov.uk/pdf/JNCC_Guidelines_Piling%20protocol_August%202010.pdf

(2) Appendix 12 C: Assessment of Effects of Piling Noise During Construction Causing Potential Disturbance and Injury to Marine Mammals.

from the piling operation, and comparing the resulting noise exposure to the criteria set out in the guidance by Southall et al (1). The approach taken in considering the effects of soft start for AMEP has, therefore, been to compare the relevant factors at the two sites and to make adjustments to estimate what the equivalent work would suggest regarding the effects of soft start.

1.2.4 The key factors can be defined as below in *Table 1.1*.

Table 0.1 *Comparison of Key Input Factors and Effect on SEL*

Factor	AMEP	GPH	Effect on SEL of making AMEP assumptions (dB)
Piling Source Term (SEL single strike in dB re 1 ·Pa ² /s)	188-4 dB @ 25 m i.e. 184 dB @ 25 m	187 dB @ 10 m	
Adjusted Source Term at 25 m	184 dB @ 25 m	184 - 20*log(25/(10+5)) =180 dB @ 25 m (assuming 6 dB per doubling of distance after 5 m)	+4 dB
Typical piling rate during soft start for all rigs (blows per minute)	40 to 60	45	+0 dB (assuming piling limited to 40 piles per minute during soft start)
Percentage of full piling energy per blow used during soft start	20% (assume same reductions as ABP so zero dB correction applies relative to ABP analysis)	20% (formula not stated, but reduction is "piling noise levels are related directly to energy per blow of hammer")	+0 dB
Key species likely to be affected	Seal (harbour porpoise unlikely to be found close to piling)	Seal	+0 dB

(1) Southall, B.L. et al (2007) 'Marine mammal noise exposure criteria: initial scientific recommendations', in *Aquatic Mammals*, Vol. 33(4), pages 411-522.

Factor	AMEP	GPH	Effect on SEL of making AMEP assumptions (dB)
Likely starting distance from pile	100	50	~-3 dB (based on trend in Table 12C.13 from ABP work)
Assumed worst case 1 swim speed (m/s)	1	1	
Soft start time (s)	120	120	+0
Overall difference in assessments (dB)			+1 (ie predicted SEL values will be 1 dB higher than in the ABP study)
Predicted accumulated SEL (dB re 1 · Pa ² /s)	185	184	
Criterion for seals	186	186	
Criterion met during soft start?	Yes	Yes	

- 1.2.5 At the end of the soft start period a seal would be 125 to 170 m away from the pile according to the work carried out by ABP (based on a conservative swim speed of 1 m/s). As described in *Table 10.12* of the ES for AMEP the criterion for instantaneous damage to hearing for seals of 218 dB re 1 µPa (Peak) is likely to be met at zero to 12 metres from the pile, and therefore at the end of the soft start period it is likely that no seals would be close enough to the piling to experience instantaneous damage due to individual peak levels from the piling activity.
- 1.2.6 Following the soft start period the animal would continue to exhibit behaviour changes up to a distance of about 1.7 km (see *Table 10.14* of the ES) and would accumulate energy whilst leaving the area, although at much lower noise levels than close to the pile.
- 1.2.7 The animal would eventually reach the distances at which accumulated SEL meets the criteria in Southall et al at which noise exposure could result in permanent hearing damage. These distances are shown in *Table 10.13* of the ES (and extend up to 10.6 km for Seals). The predictions are based on two piling rigs working at the same time with a total number of blows ranging between 20,000 and 40,000 per day at

full piling energy and assume that the animals do not move during a typical day. The largest seal colony is at Donna Nook, and as noted in the ES (para 10.6.50 of the ES), *“seals on land or in the water at Donna Nook will not be affected”* due to its distance (over 30 km from the development site).

1.3 CONCLUSION

- 1.3.8 It can therefore be concluded that with mitigation in the form of soft start over a period of 120 seconds, the risk on instantaneous damage to seals who may be in the area around the piling activity is low.