

1 NOISE & VIBRATION

- 1.1 My name is Darragh Kingston and I am an experienced professional in Environmental Noise & Vibration Assessment employed as an Associate in the Environment & Waste Section of RPS Group (RPS). I have a Bachelor of Science (Honours) Degree in Environmental Earth Studies, from the University of Wales, Aberystwyth; a Higher Diploma in Environmental Engineering from Trinity College Dublin; and a Diploma in Acoustics and Noise Control from the University of Ulster, Jordanstown.
- 1.2 I have more than ten years experience in environmental consultancy and noise monitoring and assessment. During that time I have carried out investigations and assessments of noise for Industry, Government, Local Authorities, Public Licensing Hearings, Quarries, Commercial Facilities, Entertainment Events, Concert Venues and Residential and Leisure Developments. I have both carried out and project managed the noise assessments for many Environmental Impact Assessments, including those on road projects; road construction, waste management activities, pharmaceutical plants, entertainment events, commercial and industrial manufacturing and processing facilities.

2 ROLE IN THE PROJECT

- 2.1 I carried out the Environmental Noise and Vibration Impact Assessment for the proposed Corrib Onshore Pipeline Environmental Impact Statement (EIS).
- 2.2 The Noise & Vibration Impact Assessment served to identify potential impacts from the proposed development and to outline mitigation measures to mitigate against those identified impacts.

3 SCOPE OF EVIDENCE

- 3.1 This statement summarises the key points arising from the Noise and Vibration Impact Assessment, details of which are provided in full in Chapter 9 and Appendix H of the EIS. It focuses on the impacts arising during the construction stage, as there will be no significant noise and vibration impacts as a result of the operation of the proposed development.
- 3.2 Noise is defined as unwanted sound, (World Health Organisation (WHO) Guidelines for Community Noise, 1999). Sound pressure is a basic measure of the vibrations of air that make up sound. Because the range of sound pressures that human listeners can detect is very wide (levels range from 20Hz – 20 kHz for younger listeners with unimpaired hearing), these levels are measured on a logarithmic scale with units of decibels (dB). Consequently, sound pressure levels (i.e. noise levels) cannot be added or averaged arithmetically. For example if two noise sources producing sound pressure levels of 60dB(A) each are operating together, the resultant combined noise level is not 120dB(A), rather it is 63dB(A), due to the logarithmic scale. The unit of noise (sound) measurement is dB(A), the decibel value on the A-weighting scale (the A-weighting scale approximates to the response of the human ear). Typical noise levels on the dB(A) scale are shown in Figure 1 (**Slide 1**).

4 ASSESSMENT APPROACH

- 4.1 An assessment of existing ambient noise levels in the surrounding area was undertaken which included carrying out noise monitoring surveys at a number of representative noise sensitive locations. The noise sensitive locations included properties located in the vicinity of the proposed onshore pipeline and along the proposed haul route, to establish the current ambient noise levels in the area (**Slide 2**). Particular attention was focused on sensitive receptors, such as residential areas in the vicinity of the route and the extent of the exposure of these receptors to noise and vibration generated by the proposed development.
- 4.2 For baseline monitoring the nearest noise sensitive receptors to the proposed pipeline are residential properties situated in the surrounding areas. In total twelve representative noise monitoring locations were identified in the area (N1 – N12) in the vicinity of the proposed pipeline route (**Slide 3**). In addition to the proposed pipeline route, seven representative noise sensitive receptors (N13 – N19) were also identified in proximity to the proposed haulage route to be utilised by vehicles during the construction phase of the proposed pipeline (**Slide 4**). The noise sensitive receptors represent a variety of properties throughout the area, located both in proximity to the proposed pipeline route, the proposed haulage route (**Slide 5**) and the wider surrounding area. The noise sensitive properties were identified on the basis of representing typical properties in the area, in order to determine the nature of the existing noise environment in the area.
- 4.3 Noise prediction modelling was carried out to assess potential impacts. The noise and vibration assessment included carrying out a review of the construction methodologies with respect to the location of sensitive receptors. The screening effect of topography was incorporated into the noise prediction models using ground contour data in the noise models.
- 4.4 As the area is considered to be relatively quiet, stringent noise and vibration limits were applied for the impact assessment (as outlined in Section 2 of Appendix H of the EIS, and Section 9.2 of Volume 1 of the EIS). Predicted noise levels were compared against construction phase and operational phase noise criteria to assess the requirement for noise mitigation at the nearest noise sensitive properties. The potential for negative noise and vibration impact is greatest at the representative sensitive receptors identified in the assessment.

5 ASSESSMENT CRITERIA

- 5.1 In setting criteria for construction noise, account has to be taken of the technical feasibility of the proposed criterion, and also the trade-off between the noise level, and the duration of the noise exposure. The National Roads Authority (NRA) outlined construction noise limits in its "Guidelines for the Treatment of Noise and Vibration in National Roads Schemes, 2004". These limits outlined in Table 1, represent a reasonable compromise between the practical limitations in a construction project, and the need to ensure an acceptable ambient noise level for residents. These guidelines were used in the assessment given that there are no statutory Noise Regulations with regard to control of noise during construction activities in Ireland. These Guidelines are also in accordance with the recommendation of the Health Services Executive (HSE) submission to the Petroleum Affairs Division (PAD) of the Department of Communications, Energy and Natural Resources (DCENR), in respect of the concurrent Section 40 Pipeline Application. The general construction works associated with the on-shore pipeline are similar to earthworks and drainage works associated with road construction activities.

Table 1 Maximum daytime permissible noise levels at the façade of dwellings during construction (NRA Guidelines, October 2004)

Days & Times	L _{Aeq} (1hr) dB	L _{AMax} dB
Monday to Friday – 07.00 to 19.00	70	80*
Monday to Friday – 19.00 to 22.00	60*	65*
Saturday - 08.00 to 16.30	65	75
Sundays and Bank Holidays - 08.00 to 16.30	60*	65*

* Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant Local Authority.

- 5.2 Considering the relatively quiet nature of the area (as determined by baseline noise monitoring surveys, outlined in Section 3 and Section 4 of Appendix H of the EIS, and Section 9.3 of Volume 1 of the EIS), the more stringent limit of 65dB(A) as applied to the construction phase of the Bellanaboy Bridge Terminal was also adopted for the assessment of the proposed on-shore pipeline.
- 5.3 No night-time limit is specified in the NRA Guidelines, however, the Environmental Protection Agency (EPA) guideline noise limit for industrial noise during the daytime (08:00 – 22:00) is 55dB(A), and the limit during the night-time (22:00 – 08:00) is 45dB(A), at the nearest noise sensitive location(s).
- 5.4 Best practice guidance documents for vibration were used for the assessment with regard to vibration that would be likely to lead to complaints, and vibration levels that would be likely to lead to structural damage, (as outlined in Section 2 of Appendix H of the EIS, and Sections 9.2 and 9.4 of Volume 1 of the EIS).

6 ASSESSMENT FINDINGS

- 6.1 The most noticeable noise impact will occur during the construction phase of the proposed development. It is envisaged that the construction phase can be completed within approximately 12 months (as outlined in Section 5 of Appendix H of the EIS and Section 9.4 of Volume 1 of the EIS). The construction phase of the project will introduce additional noise sources to the surrounding environment by way of mobile and stationary plant used for site preparation, site clearance, installation and commissioning of the pipeline and reinstatement of the site. Noise generated during this phase will be temporary and transient in nature as the construction and installation of the pipeline progresses. This will reduce the actual impact duration at the noise sensitive receptors (as outlined in Section 6 of Appendix H of the EIS and Section 9.2 of Volume 1 of the EIS).
- 6.2 The predicted construction noise level will range between L_{eq} 54dB(A) and 65dB(A), incorporating all construction works including rock breaking, giving rise to predicted cumulative noise levels expected to range between L_{eq} 57dB(A) and 65dB(A) (as outlined in Table 6.2 of Appendix H of the EIS). The predicted construction noise levels excluding rock breaking works will range between L_{eq} 47dB(A) and 60dB(A), giving rise to predicted cumulative noise levels expected to range between L_{eq} 55dB(A) and 60dB(A) (as outlined in Table 6.3 of Appendix H of the EIS and Table 9.6 of Volume 1 of the EIS. Table 9.6 of Volume 1 of the EIS is based on Table 6.3 of Appendix H but presents the Cumulative Noise Levels, i.e. the Baseline Noise Levels combined with the Construction Noise Levels).
- 6.3 Commercial vehicles will deliver materials and equipment and will be involved in the haulage of surplus peat away from the site. This additional traffic will cause a temporary localised increase in noise in the vicinity of the local road network. Considering the short time frame for the peak

- traffic volumes, which is estimated to be less than six months the impact is not considered significant (as outlined in Section 5.1 of Appendix H of the EIS, and Section 9.2 of Volume 1 of the EIS).
- 6.4 It is predicted that properties located along the haul routes will experience an increase in traffic noise levels ranging from a minimum of less than 2dB (i.e. 1.4dB) which would be considered as an imperceptible impact; to a maximum of 9dB (i.e. 8.7dB) which would be considered as a significant, negative, short term impact (as outlined in Section 5.1 of Appendix H of the EIS, and Section 9.2 of Volume 1 of the EIS). These impacts are associated with construction traffic during the busiest stage of the construction programme, which is expected to be Month 4 in terms of traffic movements.
- 6.5 On-site construction works will increase the noise levels in the immediate vicinity of the works during the construction phase of the project. The results indicate that the predicted noise level will not exceed the NRA assessment criteria for construction works or the 65dB(A) limit as applied to the Terminal construction works (which is in accordance with the recommendation of the HSE submission to the Petroleum Affairs Division (PAD) of the DCENR, but as expected will temporarily rise significantly (>3dB(A)) above existing baseline levels. However, the impact on sensitive receptors will diminish as construction works progress along the route of the pipeline (as outlined in Section 6.1 of Appendix H of the EIS and Section 9.4 of Volume 1 of the EIS).
- 6.6 In absolute terms the predicted noise levels would not be considered excessive for construction works. When consideration is given to the existing low baseline level in the area, the perceived noise impact associated with all construction sources including rock breaking will be significant negative (>3dB(A)) at the sensitive receptors B, C and D, to profound significant negative (>15dB(A)) at the sensitive receptors A and E. The perceived noise impact associated with all construction sources except rock breaking will be significant negative (>3dB(A)) at the sensitive receptors A, B, C, D and E). There will be no significant impact for either scenario at the sensitive receptor F. Elevated noise levels during construction programmes is generally considered less intrusive, i.e. the tolerance is increased if it is known that the works are to be completed within a short timeframe.
- 6.7 For the trenchless construction activities (i.e. micro-tunnelling works) associated with the Sruwaddacon Bay crossings a noise level of 65dB(A) will be audible at 30m from the plant (at the launch pit). This will have a minor negative impact at one sensitive receptor (receptor F).
- 6.8 While considered unlikely, if an obstacle is encountered by the micro-tunnelling boring machine, and the obstruction cannot be cleared manually from behind the boring head of the machine, an intervention pit will be installed in order to remove the obstruction and recommence the micro-tunnelling works. During this time the tunnel boring machine and activities generally at the launch pit for the relevant crossing will cease until the obstruction has been cleared and thereafter micro-tunnelling works will recommence.
- 6.9 Noise levels were predicted for three potential scenarios associated with intervention pit works whereby an intervention pit would be required on both the lower and upper crossings of Sruwaddacon Bay at the same time. The first scenario considered a requirement for an intervention pit on the western side of the lower crossing combined with an intervention pit on the southern side of the upper crossing. The resultant predicted noise levels for this scenario at the nearest sensitive receptors to the intervention pits, i.e. receptor F is 43dB, receptor A is 52dB and receptor E is 48dB. The second scenario considered a requirement for an intervention pit approximately midway across Sruwaddacon Bay for both the lower and upper crossing. The resultant predicted noise levels for this scenario at the nearest sensitive receptors, i.e. receptor F is 41dB, receptor A is 54dB and receptor E is 46dB. The third scenario considered a requirement for an intervention pit on the eastern side of the lower crossing combined with an intervention pit on the northern side of the upper crossing. The resultant predicted noise levels for this scenario at the nearest sensitive receptors, i.e. receptor F is 40dB, receptor A is 56dB and receptor E is 42dB.

- 6.10 The cumulative noise level at receptor F associated with the intervention pit works closest to the property would not be raised above the existing ambient noise levels and there would be no impact at this property. The cumulative noise level at receptor A associated with the intervention pit works closest to the property will be 57dB(A) giving rise to a significant negative temporary impact. The cumulative noise level at receptor E associated with the intervention pit works closest to the property will be 49dB(A) giving rise to a significant negative temporary impact. Therefore, in the unlikely event of an intervention pit being required to complete the micro-tunnelling lower or upper crossings of Sruwaddacon Bay, there will be significant negative temporary impact at two of the sensitive receptors in the vicinity of the pits but the predicted noise levels will be within the recommended construction noise criteria.
- 6.11 The potential impacts on fauna (avian and non-avian) resulting from increased noise levels during the construction phase will be addressed in the Statement of Evidence on Terrestrial Ecology and Marine Ecology.
- 6.12 Once the development is operational there will be no significant residual noise or vibration impacts. The only residual noise generated will be from weekly visits to the LVI, and any maintenance works. Any additional traffic generated by this activity will be negligible. There will be no noise or vibration impact at sensitive receptors associated with gas flowing through the LVI and on-shore pipeline.
- 6.13 In the unlikely occurrence of a shutdown of the LVI system the re-starting of the system (as outlined in Chapter 4 of the EIS) would produce an elevated level of noise (potentially 60 dB(A)) within the pipe work/valves of the system at the LVI compound, for an estimated maximum period of 36 hours. It should be noted that this is an extremely unlikely event, associated only with a shutdown and subsequent re-start of the LVI. It should also be noted that the pipe work and valves of the LVI will be buried approximately 1.2m below ground level within the LVI compound.
- 6.14 Potential sources of vibration during construction include rock-breaking equipment, sheet piling machinery, excavators, dump trucks and HGVs. During trenching where rock occurs and ground conditions are not suitable for normal excavation it may be necessary to break the rock mechanically (details are provided in Chapter 5 of the EIS). Blasting is not proposed during construction works associated with the proposed development. There will be no significant sources of vibration during reinstatement. It is anticipated that the levels of vibration generated by construction activities will be below the criteria specified in the relevant standards, outlined in Section 2 of Appendix H of the EIS.
- 6.15 Mitigation measures, as outlined in BS5228 "Noise and Vibration Control on Construction and Open Sites" will be employed on-site during construction, details of which are provided in Section 7 of Appendix H of the EIS and Section 9.5 of Volume 1 of the EIS.
- 6.16 Apart from the trenchless construction activities (i.e. micro-tunnelling works), for the upper and lower crossings of Sruwaddacon Bay, normal working hours will be 0700-1900 hours Monday to Friday and 0700-1600 hours on Saturdays. Sunday working will be avoided but may be necessary on some occasions. When non-emergency working outside of normal hours is required the works will be discussed with Mayo County Council before operations begin.
- 6.17 A programme of noise and vibration monitoring at sensitive receptors will be detailed prior to works beginning and will be implemented as part of the Environmental Management Plan for the construction phase. This will allow for a constant review of noise and vibration levels generated by the construction works, and will highlight the need for further mitigation measures should they be required.

- 6.18 Details of the Environmental Management Plan will be agreed with the Local Authority and in accordance with An Bord Pleanála's requirements, prior to any works commencing on-site, should permission be granted for the proposed on-shore pipeline and LVI.

7 CONCLUSION

- 7.1 Elevated noise levels raised above the existing baseline levels will arise from construction activities and construction related traffic, associated with the proposed on-shore pipeline, but these will be temporary in nature.
- 7.2 It is anticipated that construction works will take approximately 12 months to complete. As the proposed on-shore pipeline is a progressive linear development any impact on individual receptors will be significantly less than one year. In addition strict adherence to mitigation measures and best practice will ensure that potential negative noise and vibration impacts are kept to a minimum.
- 7.3 There will be no significant residual noise and vibration impacts as a result of the operation of the proposed on-shore pipeline development.