

# **An Bord Pleanála Oral Hearing**

**Irish Water**

**Greater Dublin Drainage**

**Brief of Evidence**

**Noise and Vibration**

**Dr. Imelda Shanahan**

**GDD Oral Hearing  
Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

**Qualifications and Role on the Proposed Project**

- 1 My name is Imelda Shanahan. I have a Bachelor of Science (BSc) (Hons) degree in Chemistry and a PhD in Physical Chemistry (Atmospheric Chemistry) from University College Dublin. I am a Fellow of the Institute of Chemistry of Ireland and I am a Chartered Chemist and Fellow of the Royal Society of Chemistry.
- 2 I am founder and Managing Director of TMS Environment Ltd, a company that specialises, since 1994, in the provision of environmental consultancy and monitoring services. I have extensive professional experience of providing specialist research and consultancy services in environmental monitoring, analysis and impact assessment, and in the preparation and evaluation of Environmental Impact Statements and Environmental Impact Assessment Reports (EIARs) for clients in the public and private sector, in Ireland, Europe, the UK and the Middle East. My particular specialisations are air quality, odour and climate impact assessment and noise and vibration impact assessment.
- 3 I was the lead Consultant for the Proposed Project with overall responsibility for completion of Chapter 15 Noise and vibration in Volume 3 Part A of the EIAR. I was supported in this work by Tom Ryan, a senior consultant with over 20 years' experience, specialising in Noise and Vibration impact assessment. Tom has a BSc Honours Degree in Chemistry (1993) and a Masters of Science (MSc) Degree in Environmental Science (1995) both from University College Cork and has been involved in noise and vibration monitoring, impact assessment and reporting since 1998. The assessment team has extensive experience in carrying out noise and vibration impact assessments of this type and a very thorough assessment of potential impacts has been carried out and reported in the EIAR.

**Likely Significant Impacts and Mitigation**

- 4 Chapter 15 Noise and Vibration in Volume 3 Part A of the EIAR evaluates the noise and vibration impacts of the Proposed Project anticipated to occur during the Construction Phase and Operational Phase. Impacts of the Construction Phase and Operational Phase are considered in comparison to appropriate standards and guidelines, together with requirements for noise and vibration monitoring and control.
- 5 Guidelines consulted and adopted where appropriate for this assessment include the following Guidance for the Construction Phase impacts:
  - *BS 5228-1:2009+A1:2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites, Part 1: Noise;*
  - Transport Infrastructure Ireland (formerly the National Roads Authority (NRA)) present construction noise limits in their document *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*; while the NRA Guidelines are not mandatory but are recommended to achieve appropriate consistency with respect to the treatment of noise and vibration during the construction phase of road developments;
  - EPA Guidance Note for Noise (NG4, 2016);
  - World Health Organisation (WHO) *Guidelines for Community Noise* (1999) and WHO Environmental Noise Guidelines 2018;
  - *BS 5228-2:2009+A1:2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2: Vibration;*
  - *BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Guide to Damage Levels Arising from Groundborne Vibration*
- 6 Operational Phase noise impacts were evaluated with reference to the following guidance:
  - EPA Guidance Note for Noise (NG4, 2016);

**GDD Oral Hearing**  
**Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

- The *Design Manual for Roads and Bridges Volume 11, Section 3 Part 7* (Highways Agency 2011);
- *BS 4142:2014 – Method for Rating and Assessing Industrial and Commercial Sound*;

7 In addition to the above Internationally accepted guidance documents, the specific requirements of Iarnród Éireann, Gas Networks Ireland and the HSE in respect of Connolly Hospital were also considered.

- Irish Rail and Gas Networks Ireland were contacted regarding vibration level requirements for potential microtunnelling works beneath railway lines and gas distribution lines. Irish Rail do not have any specific vibration criteria but request a minimum depth of 4.5m between the rail line and the crown of the underground pipe, which will be satisfied for this Proposed Project. Gas Networks Ireland stipulate a limit of 100mm/s PPV on the gas transmission pipeline before a stress analysis of the pipeline will be required.
- The UK Department of Health's (2013) *Health Technical Memorandum 08-01: Acoustics* sets limits that are applicable for operational hospital noises which, for night-time, are 35dB LAeq,1hr for multi-bed wards, single-bed wards and recovery rooms. This more stringent standard was adopted for the assessment and management of night time noise impacts at Connolly Hospital.
- The Health Technical Memorandum Guidance also sets out criteria in respect of the assessment of vibration impacts which were considered in the assessment and the potential impact of vibration on sensitive equipment and instrumentation.

8 The Study Area for this assessment includes all areas in the vicinity of elements of the Proposed Project with the potential to be impacted by the Proposed Project. Potential noise and vibration impacts are predicted to be at their highest in the immediate vicinity of the construction works boundaries and operational boundaries, but effects can also be experienced at further distances. For the purpose of this assessment, the general area surrounding all elements of the Proposed Project was studied in order to identify the receptors that have the potential to be impacted by noise emissions associated with the Proposed Project works. The identified noise sensitive receptors (NSRs) which could potentially be adversely affected by the noise and vibration impacts of the Proposed Project were then considered in the assessment.

9 The detailed impact assessment methodology adopted is described in Section 15.2.4 in Chapter 15 in Volume 3 Part A of the EIAR. A summary of the approaches adopted is as follows:

- A project specific baseline noise and vibration survey was carried out to provide up-to-date information on existing background and specific site noise levels at the Proposed Project boundaries, as described in Section 15.3 in Chapter 15 in Volume 3 Part A of the EIAR. Noise monitoring was carried out at 20 noise monitoring locations near the Proposed Project. The monitoring locations are shown in Figure 15.1 Noise Monitoring Locations in Volume 5 Part A of the EIAR;
- Identification of appropriate criteria against which to assess the noise and vibration impacts associated with the Proposed Project is discussed in Section 15.2.5, and the criteria for vibration assessment are discussed in Section 15.2.6 in Chapter 15 in Volume 3 Part A of the EIAR;
- Noise and vibration impacts associated with the Construction Phase have been calculated in accordance with International Standard BS5228-1, BS5228-2 and ISO 9613-2, and with the use of noise modelling software as described in Section 15.4 in Chapter 15 in Volume 3 Part A of the EIAR;
- Noise impacts associated with the Operational Phase were calculated in accordance with International Standard ISO 9613-2 and with the use of noise modelling software as described in Section 15.4 in Chapter 15 in Volume 3 Part A of the EIAR;

**GDD Oral Hearing**  
**Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

- The results generated by the impact assessments have been compared against the relevant criteria for both the Construction Phase and Operational Phase; and
  - Mitigation and avoidance measures were proposed where required to ensure that impacts are managed and controlled to minimise the impact on receptors.
- 10 The principal Construction Phase noise and vibration impacts will be associated with machinery use, excavation works, tunnelling works and construction of the proposed Wastewater Treatment Plant and Abbotstown pumping station, while Operational Phase noise and vibration impacts are anticipated to be imperceptible following completion of the Construction Phase works.
- 11 Noise levels will vary throughout the Construction Phase with a range of noise generating activities involved in the various locations where construction works will take place. Noise modelling was completed for a set of conservative worst-case scenarios to account for all significant noise generating activities and has shown that noise impacts can be effectively managed and controlled. It is noted specifically that while a worst-case scenario was considered for the assessment, it is expected that noise levels associated with construction would be significantly lower than those modelled in this assessment and therefore the impacts associated with the construction works are likely to be significantly lower than presented in the EIAR. Even with such a conservative assessment approach, the assessment demonstrated that noise impacts can be effectively managed and controlled.
- 12 The entire construction programme has been assessed as being short-term in duration, and the significance of noise impacts was assessed for all stages of the Construction Phase. The significance of the noise impacts is assessed by considering the change in noise level associated with the activity. A change in noise level of 3dB is the smallest change in environmental noise that is perceptible to the human ear. A change in noise level of less than 1dB is imperceptible, a change of 3 to 5dB is of Moderate significance and above 5dB is significant. Using these criteria, and the application of routine mitigation measures during construction, the vast majority of NSRs would experience impacts classified as being imperceptible to slight significance.
- 13 A very small number of NSRs were identified which could experience Moderate to Significant noise impacts for short periods of time (days to weeks) during selected construction works. For these NSRs, appropriate mitigation measures were identified and described in Section 15.4.2 and in Section 15.7 in Chapter 15 in Volume 3 Part A of the EIAR. It should be noted again that these predictions are for the worst-case scenarios and that actual impacts would be expected to be significantly lower when the final programmes are developed. What is important is that it has been demonstrated for even the worst-case scenarios that there are appropriate mitigation measures available, where required, to ensure that compliance with the relevant Standards can be achieved.
- 14 The predicted night-time Tunnel Boring Machine (TBM) construction works will be within the noise assessment criterion of 45dB  $L_{Aeq,1hr}$  at all locations with the exception of two locations at Connolly Hospital (R1 and R2), a private residence on Clonshaugh Road (R19), St Michael's House (R21), the Educate Together National School on the R107 Malahide Road (R29) and the cottage on the R124 Road (R31). Since most of these receptors are not occupied at night time, there are no concerns about the night time works.
- 15 Mitigation is required for the night-time TBM works approaching NSR19 on the Clonshagh Road, NSR R21 (St Michael's House) and NSR 31 on the R124 Road. The mitigation required in order to comply with the proposed noise criteria includes the use of localised acoustic screens of 2.4m height surrounding the stationary noise generating plant on the dwelling house side of the works. This information shall be included in the Noise and Vibration Management Plan (NVMP) as discussed in Section 15.7 of the EIAR.
- 16 There are three residences where ground-borne noise is predicted to exceed the night time guide limit of 30dB  $L_{Aeq}$ , namely the cottage at Cappagh Road (R8), the house at Clonshaugh Road (R19) and the house on Golf Links Road (R35). The properties at Cappagh Road and the Clonshaugh Road may experience

**GDD Oral Hearing  
Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

indoor noise levels above 30dB LAeq for between one to two days, while the property on Golf Links Road may experience indoor noise levels above 30dB LAeq for up to 10 days. It may be feasible for the appointed contractor(s) to complete the works at the Cappagh Road residence during daytime hours only. However, this option is not available at the Clonshaugh Road and the Golf Links Road residences due to ground conditions. In accordance with the guidance from BS5228, relocation for short periods of time might be required for NSR R35. This is the worst case scenario and it is anticipated that impacts would be less significant at this location.

- 17 It is important to note that the predicted ground-borne levels are an estimate based on the BS 5228 empirical formula, while in practice it is possible that the impact will be much lower.
- 18 There is one building (West Wing) on the Connolly Hospital grounds where the nearest boundary is located within 28m of the proposed tunnelling works. Potential noise levels of up to 49dB LAeq are predicted here. Using the BS 5228 empirical formula method, the night time criteria of 30dB LAeq in occupied rooms will only be met in sections of this building that are approximately 63m or further removed from the actual underground tunnelling works themselves. There are occupied wards located on the ground, first and second floors of this building, and as such, this building is therefore considered an NSR, particularly at night-time. In order to comply with the 30dB LAeq criteria, it will be required that tunnelling works are only carried out during daytime hours once they are within approximately 63m of this hospital building. This option is anticipated to be available, as the tunnelling works within this distance from the hospital will be carried out in rock (where the TBM can be stopped during the microtunnelling works). On-site noise measurements during the construction works will be used to precisely define the distance from the hospital building where night-time works can be carried out to comply with the 30dB LAeq criteria.
- 19 Construction traffic noise impacts have been assessed as Moderate and within the adopted noise criteria.
- 20 The results of the Operational Phase noise assessment indicate that the operation of the Proposed Project will make no measurable change to the prevailing daytime, evening time and night-time ambient noise environment. The predicted increase in Operational Phase traffic noise at the NSRs is anticipated to be barely perceptible, and the associated noise impact is classified as negligible.
- 21 A range of best practice noise management measures will be employed to mitigate any potential noise disturbance during the Construction Phase. As the noise impact assessment has shown there are no adverse noise impacts associated with the Operational Phase of the Proposed Project, and mitigation measures are therefore not required.
- 22 Vibration impacts during construction will be at levels that will not cause structural or cosmetic damage to any buildings or infrastructure. A small number of activities were identified which, for short periods of time, could lead to noticeable vibration levels for affected NSRs. Section 15.4.4 and Section 15.7 in Chapter 15 in Volume 3 Part A of the EIAR set out appropriate mitigation and management measures to ensure that these activities are managed to minimise any disturbance.
- 23 Vibration impacts during the Operational Phase will be imperceptible for all elements of the Proposed Project.

**Responses to Issues Raised in Submissions/Observations**

- 24 I addressed each of the submissions that were made to An Bord Pleanála in Irish Water's Response to Submissions January 2019 document and a summary of the responses to the issues raised is provided below. The following general themes were raised in submissions in relation to noise and vibration:
  - General noise pollution;
  - Construction and Operational noise impacts on local community;

**GDD Oral Hearing**  
**Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

- Health issues as a result of noise impact;
- Monitoring;
- Noise from trucks; and
- Cumulative noise impact with aircraft.

- 25 There were no specific issues raised in the submissions relating to noise and vibration that were not already assessed as part of the EIAR. It is considered that all issues were comprehensively addressed in Chapter 15 Noise and Vibration in Volume 3 Part A of the EIAR.
- 26 Issues relating to general noise pollution and operational noise impacts on local communities were raised in several submissions. Section 15.5 in Chapter 15 of the EIAR demonstrates that there will be no perceptible change to the noise environment during the Operational Phase of the Proposed Project and there will therefore be no adverse community noise impact as a result of the operation of any element of the Proposed Project.
- 27 Construction noise impacts on local communities are evaluated by comparing the potential noise levels associated with construction with recognised international standards. It was shown in Section 15.4 in Chapter 15 of the EIAR that construction noise impacts are within the adopted noise criteria and that a range of best practice mitigation measures will be implemented during construction to mitigate any potential noise disturbance from construction.
- 28 Health issues as a result of noise impact were addressed in Chapter 7 Human Health in Volume 3 Part A of the EIAR. Since the relevant standards will be complied with, it was shown that there will be no significant human health effects from noise.
- 29 A requirement for monitoring during construction was raised in some submissions. There will be a Noise and Vibration Management Plan developed by the appointed contractor(s) for the works which will set out in detail how the noise limits will be complied with, as described in Section 15.7.1 in Chapter 15 of the EIAR. In particular, details of the comprehensive monitoring programme proposed are outlined in this section. Continuous unattended noise and vibration monitoring will be carried out in several key locations and the unattended noise and vibration monitoring will be supported by attended measurements completed on a regular basis. Continuous vibration monitoring will also be carried out at potentially affected locations, and this will be a key element of the interactive mitigation plan for the Proposed Project. For information purposes and for ease of reference I have set out in Schedule 1 to this Witness Statement further details on how this monitoring Plan will be implemented and how the information will feed into an active management plan to minimise noise and vibration impacts during construction.
- 30 Noise from trucks was addressed in Section 15.5.5 in Chapter 15 of the EIAR. Traffic noise impacts from the Proposed Project are predicted to be negligible for the Operational Phase. All predicted construction traffic noise levels are well within the assessment criteria and are mainly classified as Negligible to Minor. One section of road has a Moderate prediction which is short term. It should be noted that at all NSR locations the existing daytime noise environment is dominated by passing road traffic and, to a lesser extent, by passing aircraft. Consequently, the noise levels generated by construction traffic is not expected to change the character of the existing noise environment in any observable manner.
- 31 Cumulative noise impact with aircraft was questioned in some submissions. The assessment showed that there will be negligible cumulative impact from this source.

**GDD Oral Hearing**  
**Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

**Response to Specific Issues Raised by Prescribed Bodies**

32 There were a number of specific issues raised in submissions to An Bord Pleanála which are considered under the following headings:

- Monitoring programmes during the Construction and Operational Phases;
- Launch-shaft and microtunnelling construction impacts; and
- Potential impacts on Connolly Hospital.

**Monitoring Programmes during the Construction and Operational Phases**

33 The Principal Environmental Health Officer of the Health Service Executive (HSE) recommended that regular noise and vibration monitoring be carried out during the Construction and Operational Phases particularly at vibration sensitive locations. Section 15.7 in Chapter 15 of the EIAR sets out the comprehensive monitoring programme planned for the Proposed Project. As noted have, I attach in Schedule 1 an example of how such a monitoring programme would be implemented for the proposed project.

**Launch-Shaft and Microtunnelling Construction Impacts**

34 The launch shaft construction was found to be the most significant element of the microtunnelling works with respect to potential noise impact on NSRs. The launch shaft construction works will be of a very short duration and it is anticipated that the launch shaft construction works will be completed at the majority of locations where these works are required in under 3 days. The larger launch shafts will be completed in under two weeks. It is important to note that the maximum noise levels predicted in Chapter 15 of the EIAR associated with the launch shaft construction works will only occur for a small fraction of the time that the launch shaft construction works are occurring. The predicted maximum impacts would only occur for a portion of the works and would decrease as the depth of the shaft increases.

**Potential impacts on Connolly Hospital**

35 General concerns expressed in the HSE Estates and Fingal County Council submissions about potential noise and vibration impacts on Connolly Hospital were addressed in Chapter 15 of the EIAR and further clarification was provided in Irish Water's Response to Submission January 2019 document. General concerns raised included the following:

- the longer-term construction works i.e. tunnelling at Connolly Hospital and night time assessment of this impact;
- the predicted vibration levels at the West Wing of Connolly Hospital; and
- the general impact of noise and vibration on patients at Connolly Hospital.

36 The internal room noise levels generated by the external works were estimated in Chapter 15 of the EIAR. The assessment showed that the internal noise that will be experienced due to the most intensive external construction works is estimated to be 26dB  $L_{Aeq,1hr}$ . This is well within the permissible Health Technical Memorandum criteria, and is also lower than the 45dB(A) threshold for residential accommodation. It is therefore concluded that the overall noise and vibration emissions at the Connolly Hospital site will be effectively controlled, and the overall noise and vibration impact has been assessed as Not Significant.

37 The HSE Estates submission expressed concern that the EIAR does not consider potential impacts on the proposed Community Nursing Unit on the site of Unit 8 at Connolly Hospital. As noted in Irish Water's Response to Submissions January 2019 document, the Community Nursing Unit will be approximately

**GDD Oral Hearing**  
**Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

overlaying the existing out-patient unit. The out-patient unit was considered in the EIAR, and we are satisfied that the potential impact on the Community Nursing Unit has therefore been considered and will be effectively and satisfactorily controlled. The following clarifications are also provided:

- Although the most widely used assessment criteria for construction noise are those specified by TII, a more stringent criterion as specified in BS5228 was adopted for evaluating and limiting construction phase noise at Connolly Hospital;
- Micro-tunnelling was chosen specifically to minimise disruption at Connolly Hospital;
- Night time tunnelling works will cease within specified distances of Connolly Hospital to minimise disturbance;
- A hospital specific sensitive vibration study was commissioned in order to predict the likely impact of vibration on sensitive instruments and locations within the hospital;
- The location of construction compounds was selected to minimise disruption and disturbance at the hospital;

**Conclusion**

- 38 A comprehensive assessment of Construction and Operational Phase noise and vibration impacts was carried out and documented in the EIAR. That assessment clearly showed that with the application of appropriate mitigation measures, where required, impacts will be within the specified criteria for the vast majority of receptors. There is one receptor where relocation for a short period of time might be required under certain circumstances but as noted in the assessment this is a worst-case scenario and might not arise.
- 39 The vast majority of issues raised in the various submissions were identified and addressed more than adequately in the EIAR and in Irish Water's Response to Submissions January 2019 document. The only element which was not directly mentioned in the EIAR is the Community Nursing Unit. However, its indicative layout shows that it will be overlaying the existing out-patient unit and this was adequately assessed as part of the EIAR. A summary of how those issues were addressed has been set out in this statement, and we welcome the opportunity to clarify how the matters were addressed.

**GDD Oral Hearing  
Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

**SCHEDULE 1 – Noise and Vibration Management Plan (NVMP)**

*Purpose and Scope*

Prior to the commencement of any works, the appointed contractor(s) will prepare an NVMP. The NVMP will be developed as part of the overall Outline Construction and Environmental Management Plan (CEMP) developed by the appointed contractor(s) and approved by Irish Water. The NVMP will detail how the appointed contractor(s) will comply with the noise criteria set out in the EIAR and will deal specifically with construction activities in a strategic manner to remove or reduce significant noise and vibration impacts associated with the Construction Phase works.

The following summarises the key elements of the Plan:

- Specification from the EIAR of the key limits to be met at all specified locations;
- Identification and specification of the best practice noise and vibration minimisation techniques to be employed during construction;
- Definition of the detailed noise and vibration monitoring programme which will be applied, to include methodologies and monitoring locations; and
- Details of the required mitigation measures as identified in the EIAR and any modifications required based on the findings of ongoing monitoring and management.

The NVMP will be a living document which is reviewed and revised as needed to reflect lessons learned during the Programme and to ensure that up-to-date information is available and factored into the management of noise and vibration impacts associated with the proposed Project construction.

*Communications*

A dedicated contact shall be appointed by the appointed contractor(s), in agreement with Irish Water, for all communications in relation to noise and vibration for the duration of the Proposed Project construction works and any queries, complaints or other formal correspondence regarding noise and vibration.

The appointed contractor(s) shall ensure good communication and engagement with local residents and stakeholders and will notify them before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works, and the monitoring and mitigation measures that are being implemented.

Any complaints relating to Construction Phase noise and vibration for the Proposed Project from local residents or other stakeholders shall be recorded, immediately addressed and notified to Irish Water. A record of how the complaint was addressed, the follow-up actions and outcome shall be maintained.

*Monitoring*

Continuous unattended noise and vibration monitoring shall be carried out at the sensitive receptor locations including Connolly Hospital and the Golf Links Road house during the construction works with the potential to impact these locations. The number of monitoring units required at each location shall be agreed by the appointed contractor(s) with Irish Water. The monitoring equipment shall be set up to show a live display of the measurement levels and also provide remote access to the real-time data. The system shall allow a text message or email alert for exceedance of any limit values or threshold values, and these alerts will be routed to designated personnel including a designated Irish Water Contact.

The unattended noise and vibration monitoring shall be supported by independent attended measurements completed on a regular basis. The attended noise measurements shall be completed at least monthly and weekly

**GDD Oral Hearing**  
**Noise and Vibration – Dr. Imelda Shanahan Brief of Evidence**

for the most sensitive works.

On-site noise and vibration monitoring during the actual works will be a key part in the mitigation programme for the proposed works. Monitoring of the noise and vibration levels at NSR locations for comparison with the limits during the different construction works will be critical, and the live measurement results will be used by the appointed Construction Manager to assist in the scheduling of works to ensure that the noise and vibration emissions from the various works are kept within the limits.

*Noise Audits*

Noise audits shall be carried out by a suitably qualified independent auditor, appointed by Irish Water in advance, at routine intervals to ensure that the mitigation measures are being correctly implemented at the various construction sites, including operating hours, use of appropriate mitigation measures, siting of plant items, scheduling of works, communications with stakeholders and noise control measures. Noise and vibration monitoring data shall also be reviewed at weekly intervals and more frequently during sensitive phases of works.

*Construction Works at Connolly Hospital*

Before any construction works commence at Connolly Hospital the appointed contractor(s) will be required to set up a dedicated contact, in agreement with Irish Water, to communicate with the HSE Estates Department at Connolly Hospital. The appointed contractor(s) will be required to provide detailed method statements prior to any works commencing at Connolly Hospital which will show how the required standards will be met during the works.

Once the precise equipment proposed to be used for the microtunnelling works is known by the appointed contractor(s), the specific noise and vibration impacts associated with the microtunnelling works shall be presented in detailed method statements and discussed directly with Connolly Hospital as part of the overall management strategy. Preliminary discussions with the HSE Estates Department indicated that this was a reasonable and agreeable approach and was also the approach that they had undertaken at the hospital for previous construction works.

The method statements shall detail the permitted hours of work and the number of plant items that can operate simultaneously for microtunnelling works once within specified distances from the Hospital buildings.

The appointed contractor(s) shall conduct attended and unattended noise and vibration monitoring at Connolly Hospital with the number of monitoring locations to be agreed with the HSE Estates Department. This monitoring data shall be used to assess compliance with the proposed criteria for all the construction works to be carried out near Connolly Hospital. The data shall also be used to assist the appointed contractor(s) to schedule work times and the intensity of plant items that will be permitted to operate simultaneously in close proximity to the Hospital buildings.

All proposed temporary construction compounds shall have a 2.4m high site hoarding around their perimeter. In addition, the proposed temporary minor construction compound near the West Wing of Connolly Hospital will locate all stationary noise generating plant along the most north-westerly section of the compound as far away from the hospital buildings as possible. There will be local acoustic screens of 4m height positioned adjacent to all stationary noise generating plant on the hospital side of the plant items.

The construction works will be managed through the use of construction noise limits as detailed in Section 15.2.5 of the EIAR which the appointed contractor(s) will work within. Best practice control measures, including choice of plant, scheduling of works on-site, provision of temporary acoustic screening, on-site noise monitoring and other measures, will be employed in order to ensure noise limits are not exceeded.