

Intended for
FORTH CROSSING BRIDGE CONTRACTORS (FCBC)

Document type
Report (REPO)

Date
2011-09-21

Document number
FCBC-4-PRW-ENVIRON-GENE00-020 Rev G

FORTH REPLACEMENT CROSSING

NOISE AND VIBRATION

MANAGEMENT PLAN



FORTH REPLACEMENT CROSSING NOISE AND VIBRATION MANAGEMENT PLAN

Revision **G**
Date **2011-10-25**
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Description

Ref *FCBC-4-PRW-ENVIRON-GENE00-020 Rev G*

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NOISE AND VIBRATION MANAGEMENT PLAN

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1. INTRODUCTION

- 1.0.1 This Noise and Vibration Management Plan (NVMP) describes the management process, procedures and measures that will be employed to control, mitigate and monitor noise and vibration emissions during the construction phase. This plan also details the monitoring methodology and equipment systems which will be used to demonstrate compliance with the noise and vibration requirements. The process for producing and gaining consent for individual Plans for the Control of Noise and Vibration (PCNVs) for specific phases of the construction works is described.
- 1.0.2 This NVMP has been produced as part of the Construction Environmental Management Plan (CEMP) taking account of the commitments and requirements as detailed in the following documents:
- Forth Crossing Act;
 - Forth Crossing Bill Commitments and Undertakings;
 - Code of Construction Practice (CoCP), Revision 5, December 2010;
 - Employers Requirements, contract issue, 18 April 2011, TS/MTRIPS/WKS/2009/02, Part A2: Specification, Appendix 1/9: Control of Construction Noise and Vibration;
 - Environmental Statement (ES) 2009; and,
 - Report to Inform Appropriate Assessments (RIAA).
- 1.0.3 The Environmental Statement and RIAA commitments relating to noise and vibration emissions occurring as a result of construction activities are reproduced in Appendices L, M, N & O.
- 1.0.4 During the construction period for the Forth Replacement Crossing, there are potentially significant noise and vibration impacts which will affect the amenity of local communities, and may also impact on terrestrial and marine ecology. These potential impacts were assessed during the Environmental Impact Assessment and the Reports to Inform Appropriate Assessment (RIAA). Within the Environmental Statement and RIAAs there are a series of commitments which have been set out as Employer's Requirements within the contract documents. Further to the commitments within the Environmental Statement and RIAAs there are general and specific commitments which were undertaken during the Forth Crossing Bill Process and subsequent Act which also appear in the Employer's Requirements.
- 1.0.5 For activities, construction methods or design developments that are different to those in the Stage 3 design (or different to those agreed previously under the Appendix 5 process) then the process as set out in Appendix R of Part A1 of the Employers Requirements will be implemented. This process is to ensure that the proposed activities, methods or changes are not environmentally worse than those given in the Environment Statement.
- 1.0.6 The Employer's Requirements for noise and vibration are detailed in Appendix 1/9 *Control of Construction Noise and Vibration* and Appendix 1/24 *Quality Management Systems* of Part A2, Volume 5 in addition general and specific commitments undertaken during the Act are detailed in the contract documents Part A1, Section 2.17.
- 1.0.7 The Employer's Requirements reference other documents to assist with the management of noise and vibration during the construction phase, such as the Code of Construction Practice, and the Construction Environment Management Plan. The hierarchy of the documents is detailed in Figure 1.1.

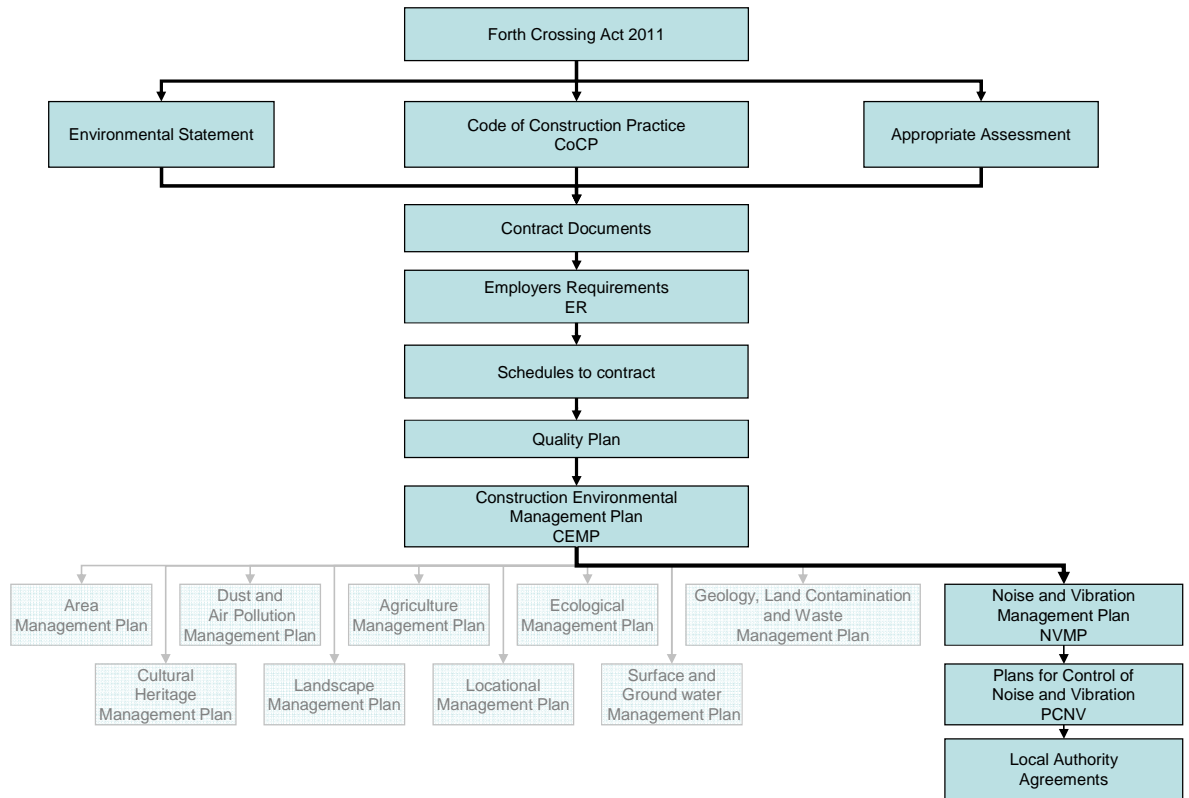


Figure 1.1; Flowchart showing the structure and hierarchy of the documents

2. FCBC POLICY ON NOISE MANAGEMENT FOR THE FORTH CROSSING

- 2.0.1 FCBC is committed to implementing the best practicable means¹ to minimise construction noise and vibration during the works to meet all of the requirements within the contract documents which detail the commitments undertaken within the Environmental Statement, RIAAs and the Forth Crossing Act. FCBC is committed to providing the minimum standard of mitigation detailed in the ES and the RIAAs. Works will be designed, executed and monitored to ensure that significant noise and vibration effects due to construction activities are no worse than the significant residual effects reported in the ES and where practical additional mitigation in line with best practicable means will be employed. Noise and vibration control will form an integral part of the construction process, fully involving the construction team, to ensure that working methods are adopted to minimise noise and vibration in line with the requirements with all commitments and to comply with the Code of Construction Practice.
- 2.0.2 Reducing noise and vibration impacts was an important element of the design, thinking and development of ideas discussed with Transport Scotland during the dialogue period. For example, the choice of marine foundations and the advantages that this brings, has been assessed to achieve best practicable means to reduce wherever possible the noise and vibration impacts generated by this development.

¹ Best practicable means is defined in the Control of Pollution Act 1974, also see Appendix A

- 2.0.3 This will continue to be FCBC's approach throughout the detailed design and construction phases; environmental impacts and their mitigation, including noise and vibration, will be part of the design and construction thinking and methodologies that are proposed. Wherever improvements or alternatives can be delivered to achieve best practicable means, this will be done.
- 2.0.4 All construction activities will be assessed through the use of Plans for the Control of Noise and Vibration (PCNVs) which will be developed and implemented in accordance with this NVMP. This NVMP and all PCNVs will be developed and reviewed in line with the requirements of Appendix 1/9 and all revisions will be implemented according to the prescribed process.
- 2.0.5 Activity-specific PCNVs will be developed and approval sought for each of the construction activities proposed on site. Noise emission levels will be calculated for each activity, taking into account the proposed methods of work, the proposed plant and the geographic extent of the operations. Within each PCNV the choice and positioning of plant and the use of permanent and temporary mitigation measures will be assessed and measures included to reduce the noise levels at receptors. The aim of the mitigation will go beyond achieving the various threshold values, and will seek to minimise levels to as low a value as is reasonably practicable. The programme will be carefully examined and adjusted whenever possible by changing the phasing of works to reduce the cumulative noise from multiple operations.
- 2.0.6 FCBC is fully aware and supportive of the need for consultation with the Noise Liaison Group (NLG) and will submit all documentation for review to the group at least 7 days in advance of any meeting at which they will be discussed. We will work with the Employer and the NLG to ensure a timely and effective operation for approval of individual PCNVs and to ensure a smooth construction phase for the works. It is intended that this process will be the primary and dominant route for the approval of site works. Should the noise and vibration effects from the proposed construction activities be assessed as being worse than the residual noise and vibration effects identified in the ES and, following detailed discussion of options and alternatives with appropriate stakeholders, this cannot be reasonably mitigated then approval will be sought from the relevant local authority. In such circumstances, FCBC will seek final approval from the Employer via the Review Procedure to ensure that the works proposed will comply with the Contract.
- 2.0.7 FCBC will employ sufficient qualified staff to deliver its commitment to monitoring the construction operations and activities to demonstrate compliance using sensors placed at sensitive and strategic locations. Noise and vibration thresholds will be set within the equipment to trigger immediate alarms to the Clerk of Works for Noise and Vibration (CoWNV) who will take appropriate action as described in Section 4 of this NVMP, including where necessary, stopping the works to investigate any exceedance or complaint. The output from these monitors will be made available to the Employer on a weekly basis and will be publicly available via a website. In addition, the data from the monitors along with regular inspection of the noise generated by the construction plant will be used to reduce noise levels in an iterative manner wherever it is practical to do so.
- 2.0.8 Underwater noise is a particular concern because of the potential impacts on marine mammals and fish migration. FCBC has recognised the importance of this by including hydrophone locations for real time underwater noise monitoring. This will provide continuous coverage of the area of the works and enable our marine mammal observer to ensure effective protection to these marine species.

3. KEY ISSUES

3.1 Best Practicable Means

- 3.1.1 All construction works will be carried out using the Best Practicable Means (BPM) as defined in the Control of Pollution Act 1974² and described in British Standard 5228. All measures discussed below are considered to be BPM and hence will be implemented during the works where practicable. The list is not considered to be exhaustive and the over-riding principle of BPM will apply to all activities at all times.
- 3.1.2 Guidance on Best Practicable Means is outlined in BS 5228 and these measures are given in Appendix A. These include the following:
- 3.1.3 Appropriate selection of plant, construction methods and programming, including appropriate scheduling of noisier activities within the permitted working hours. Only plant conforming with or better than relevant national or international standards, directives or recommendations on noise and vibration emissions will be used. Construction plant will be maintained in good condition with regard to minimising noise output and workers' exposure to harmful noise and vibration.
- In addition to minimising noise and vibration at source or adverse effects through other mitigation measures, the contractor will demonstrate in its planning and assessments that it has considered undertaking works in those hours that minimise potential disturbance.
 - Construction plant will be operated and maintained appropriately, having regard to the manufacturer's written recommendations or using other appropriate operation and maintenance programmes which reduce noise and vibration emissions. All vehicles and plant will be switched off when not in use.
 - Design and use of site hoardings and screens, where necessary, to provide acoustic screening at the earliest opportunity, including appropriate screening of the haul road to be constructed from the site compound to the west of South Queensferry to Society Road. Where practicable, doors and gates will not be located opposite occupied noise-sensitive buildings. The mechanisms and procedures for opening and closing doors/gates will minimise noise, as far as reasonably practicable.
 - Erection of operational noise barriers as early as practicable in the construction process to provide additional protection against construction noise.
 - Choice of routes and programming for the transport of construction materials, spoil and personnel to reduce the risk of increased noise and vibration impacts due to the construction of the Project.
 - The positioning of construction plant and activities to minimise noise at sensitive locations.
 - The use of mufflers on pneumatic tools.
 - The use of non-reciprocating constructional plant.
 - The use, where necessary, of effective sound reducing enclosures.
 - The use of single tone reversing alarms will be limited and consideration will be given to adopt non-tonal white noise reversing systems where appropriate.
- 3.1.4 Piling works and blasting works will be kept to the minimum practicable taking consideration of the requirements of the design and programme requirements for construction of the Project and the commitment in the Environmental Statement not to undertake percussive piling at night.

² Best practicable means is defined in section 72 of the Control of Pollution Act 1974 and in section 79 of the Environmental Protection Act 1990. Definitions can be found in Appendix A

4. MANAGEMENT PROCESS

4.1 Reporting and Responsibilities

4.1.1 Figure 4.1 shows the roles and responsibilities of the noise team. Additional survey personnel will be employed on an activity basis as the work programme and monitoring commitments dictate. Survey personnel will be competent in environmental noise monitoring. The CVs for the noise and vibration team can be found at Appendix B.

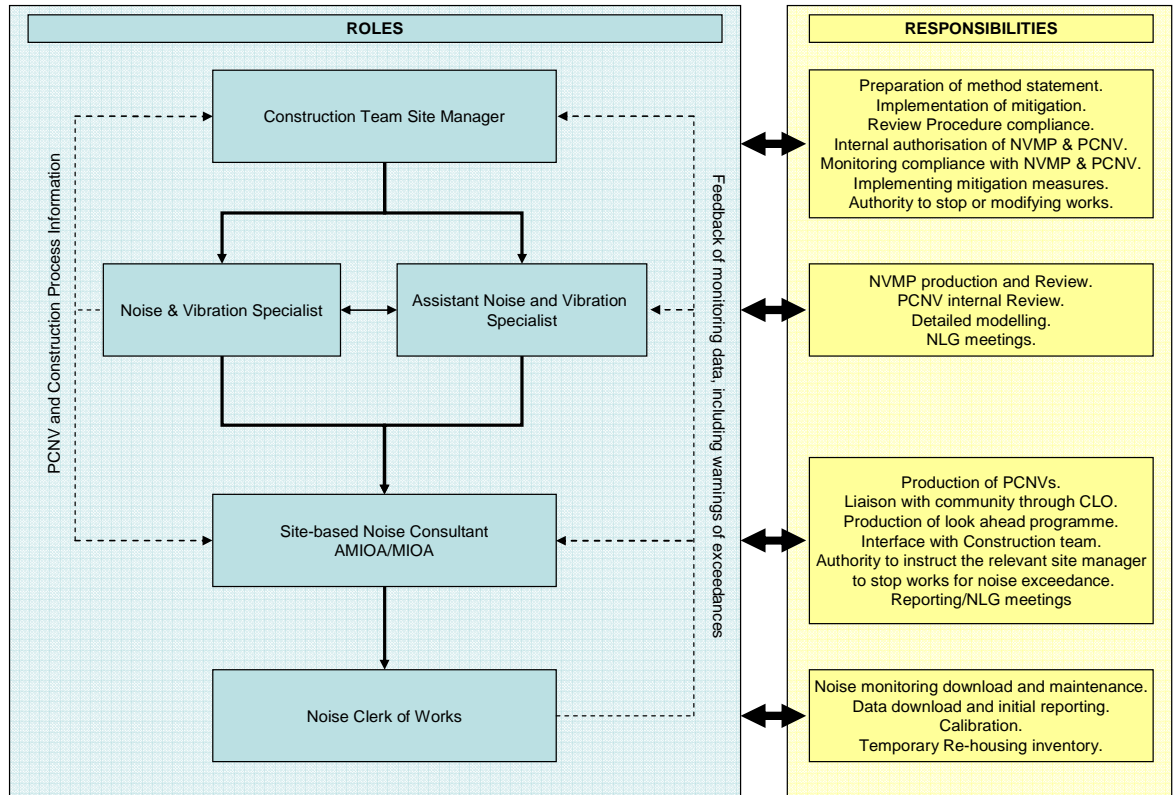


Figure 4.1; Flowchart showing the roles and responsibilities

4.1.2 The team of noise specialists and contractor will work closely together to ensure that the control and management of noise and vibration informs emerging method statements for the works. An example of how the internal functions of this team will operate is shown in Figure 4.2 for the derivation of Best Practicable Means.

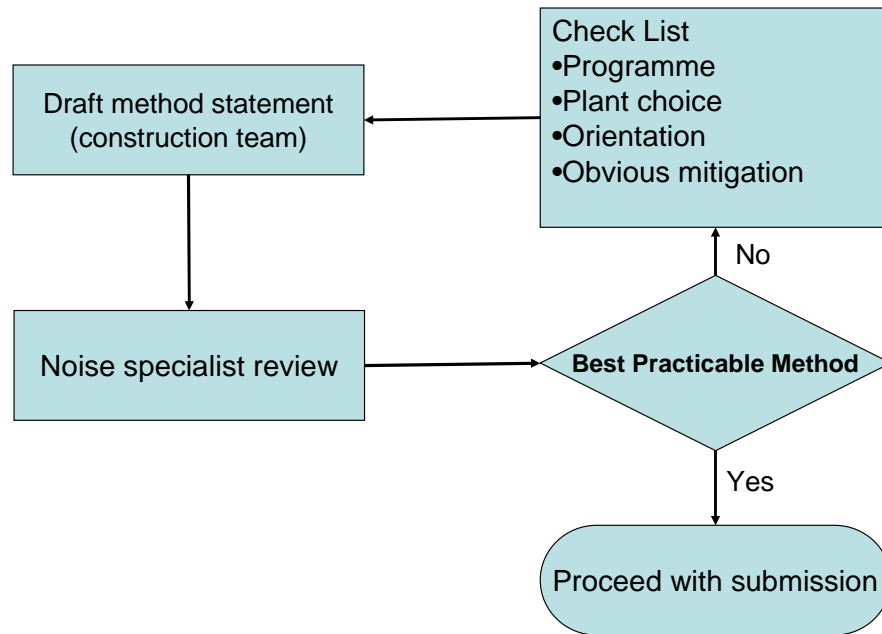


Figure 4.2; Flowchart showing team interaction in the determination of best practicable means prior to submission of a PCNV.

4.1.3 Site Management procedures to be adopted to ensure that PCNVs are being implemented during the execution of the works and demonstrating Best Practicable Means include:

- Checks to ensure that the plant being used is consistent with that assessed in the PCNV;
- If plant is changed, on its initial use a plant noise assessment will be completed;
- If the plant noise assessment is worse than that used in the PCNV, reference will be made back to the PCNV to see if the calculated noise levels exceed thresholds, or the plant will be changed;
- Following any plant changes, the PCNV will be checked and updated;
- Records of noise monitoring and plant assessments will be held to demonstrate the on going performance and compliance of the works and plant;
- Where a construction process is required to be amended reference will be made back to the method statement and the PCNV to ensure compliance;
- Consultation with the ecological team will be made to ensure that any ecological constraints are understood and appropriate mitigation has been included in the PCNV and Method Statement for the activity;
- The Ecological Clerk of Works will attend at the outset of any works where the PCNV indicates a potential impact on sensitive receptors to ensure the proposed mitigation measures are effective;
- Site staff and operatives will be informed of the requirements of PCNVs and the expected standards via the site induction and Tool Box Talks specific to the activity.

4.1.4 The mechanism to collect information and method statements from the construction team is presented in appendix R. This information request proforma will be used to collect information on the proposed construction methods and to ensure that best practicable means are thought about at a very early stage in the process. The construction methods will be reviewed and iterated to ensure best practicable means is achieved prior to the draft submission of the PCNV.

4.2 Noise Liaison Group

4.2.1 A Noise Liaison Group (NLG) has been formed including representatives of the following:

- Transport Scotland
- Local Authorities
 - West Lothian Council
 - The City of Edinburgh Council
 - Fife Council
- Scottish Natural Heritage
- Marine Scotland
- Contractor

4.2.2 Monthly meetings are initially expected with additional meetings as and when required. The NLG will meet at least every two months. The NLG will review this NVMP and all activity-specific PCNVs to ensure that the contractor has fully considered noise and vibration, has implemented the Best Practicable Means and demonstrated a method to comply with the commitments.

4.2.3 An agenda will be circulated 14 days prior to a NLG meeting for comment and all documentation to be reviewed at the meeting will be available 7 days prior to the meeting date.

4.3 NVMP Approval

4.3.1 Construction activities will not commence until this NVMP and each activity-specific PCNV is approved. The following approval process, as shown in Figure 4.3 below, will apply to the NVMP.

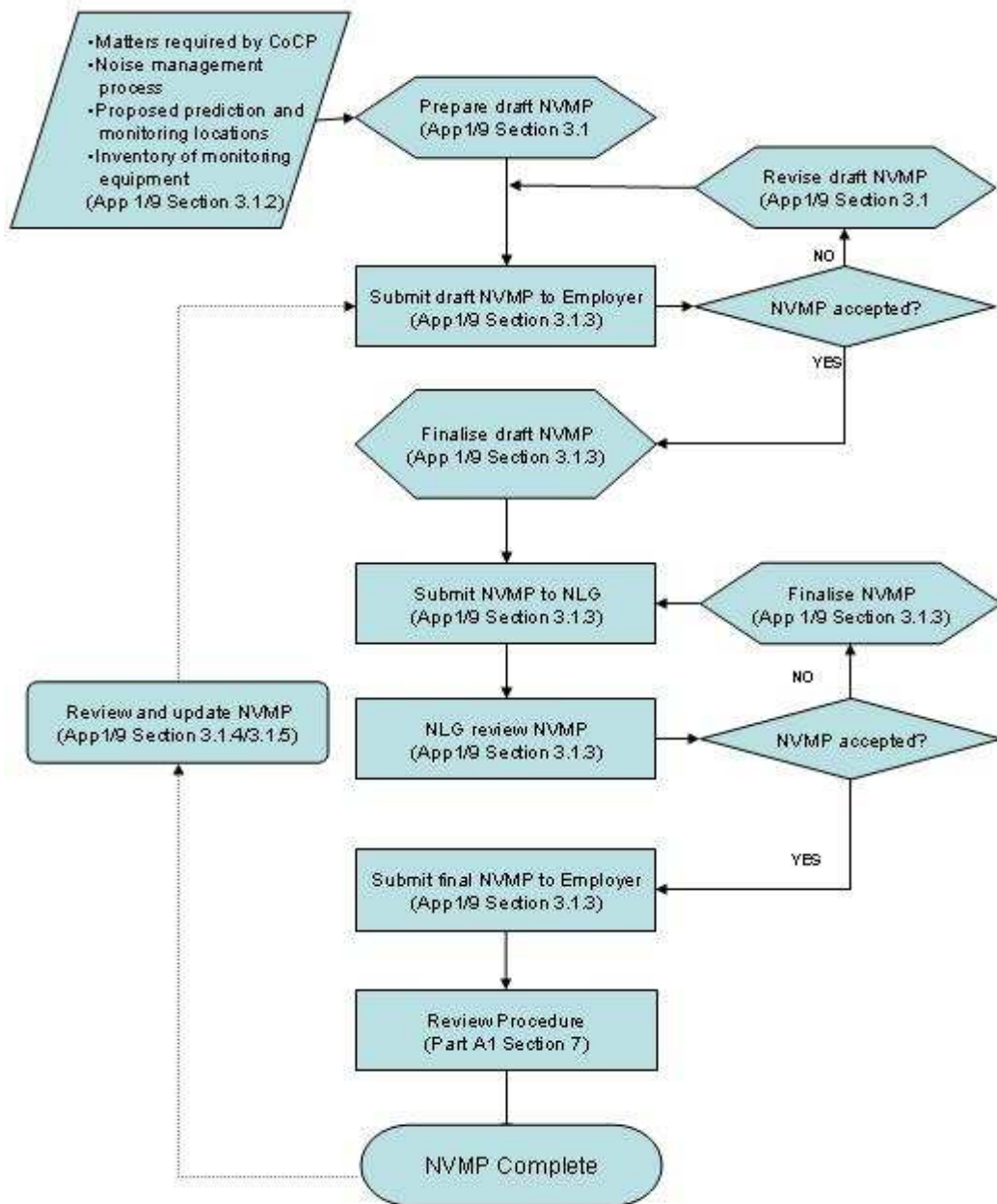


Figure 4.3; Flowchart for the approval and review of the Noise and Vibration Management Plan

4.3.2 Within the appendices of this document are a number of example proformas, inventories and schedules, these are intended to be examples and form the basis of live documents which will be submitted outside of the NVMP, with change control and version numbering for approval or acceptance by the employer as appropriate for the document. The completed appendices are not included in the NVMP to avoid the need to re-issue the NVMP whenever there is a minor change to those documents, this method also allows for the individual documents to be correctly approved or accepted by the employer. Should it become appropriate to include those live documents within the NVMP then that will be reviewed and they will be incorporated at the appropriate time prior to the next review of the NVMP.

4.4 PCNV Approval Process

4.4.1 PCNVs will be produced based on the construction programme which will be circulated and updated as required. The minimum time line for the approval process of each PCNV is as shown in Figure 4.4. Sufficient time will be allowed for the Employer to consider the plans depending upon the complexity and scale of the works covered by the PCNVs and the number being submitted simultaneously.

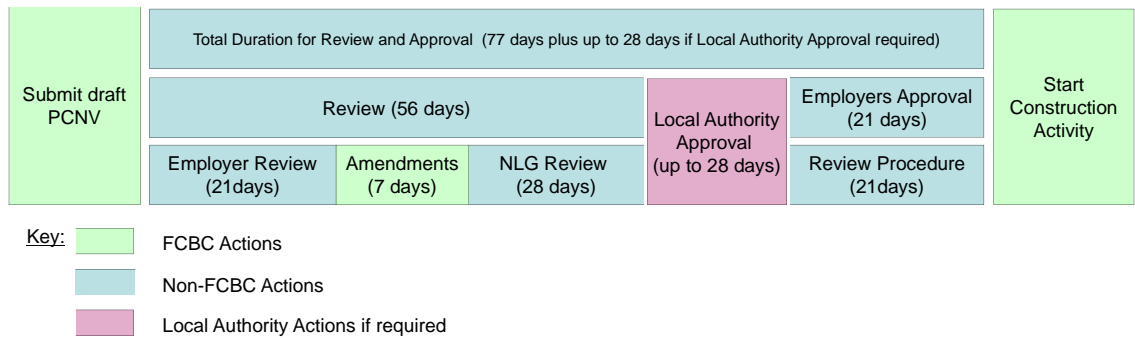


Figure 4.4; Time line for PCNV approvals

4.4.2 The flow diagram showing the detailed approval process for PCNVs is presented in Figure 4.5. This differs from the one presented in Appendix 1/9 in that it provides a feedback loop for comment from the Employer prior to submission to the NLG.

4.4.3 Should it be demonstrated that prior consent is required from the local authority this process will be initiated upon completion of a finalised PCNV, following the NLG review process. Although the local authority review process may take up to an additional 28 days, the presence of local authority representatives on the NLG should hopefully reduce the period for local authority approval prior to submission of the final PCNV to the Employer.

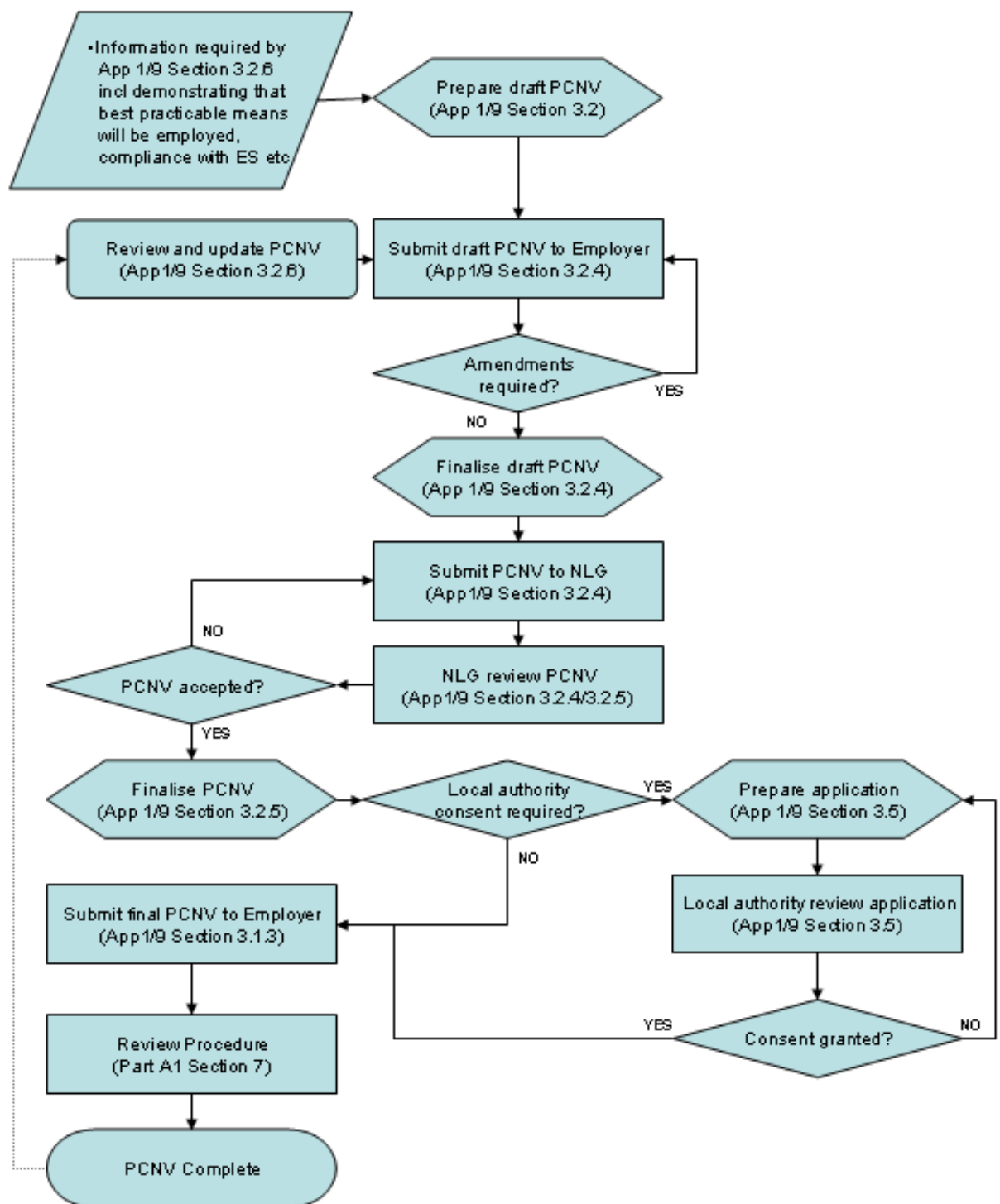


Figure 4.5; Flow diagram for approval of Plans for Control of Noise and Vibration

4.4.4 Revised PCNVs will be submitted when there are deviations from the anticipated programme or working methods, as soon as is practical after the amended programme or working method is defined and in any event prior to construction for that activity starting.

- 4.4.5 A rolling programme of PCNVs will be presented at the NLG monthly/two monthly meetings for information purposes and drafts of the forthcoming plans will also be discussed.
- 4.4.6 A PCNV will cover all noise or vibration generating construction activities. An individual PCNV will cover either a discreet activity, or combination of activities if the activities occur within a small area, which for the purposes of this NVMP will be deemed to be within 100m of each other. Each PCNV will set out noise, and where relevant vibration, emission levels for the assessed activities, as well as the cumulative emission levels from activities covered under other PCNVs.

4.5 Noise and Vibration Staff

- 4.5.1 A database of noise and vibration staff and their competency level will be compiled for all personnel involved in delivering and implementing the PCNVs. This competency matrix along with CVs where required will be submitted to the Employer for acceptance prior to any construction activities being undertaken and will be updated and acceptance sought whenever there is a change of personnel. An example proforma can be found at Appendix B.
- 4.5.2 A Clerk of Works for Noise and Vibration (CoWNV) will be the main focus for day to day enquiries and to ensure the PCNVs are implemented in accordance with the approvals.

4.6 Construction Plant Source Levels

- 4.6.1 Prior to arriving on-site, plant will be chosen based on the published or best available estimates of the noise emission levels and suitability for purpose in line with best practicable means. Once on-site, noise from the plant will be measured to confirm the source noise levels under representative operating conditions.
- 4.6.2 If these initial measurements require the PCNV to be revised, this revision will be issued at the earliest opportunity and in any event within 2 working days. If the measured noise levels are lower than the assessed levels in the PCNV, the works shall not be delayed. If the level is higher, the works will not commence until the revised PCNV is approved.
- 4.6.3 Following the initial measurement, a monthly plant inspection programme will be followed to ensure there is no deterioration in noise levels due to maintenance issues. Maintenance work will be scheduled as necessary to ensure that optimum noise emissions are restored.
- 4.6.4 Maximum noise levels ($L_{A_{fmax}}$) may not be available for particular items of plant or the processes employed prior to use on-site, so the initial measurement of the source levels will include measurement of maximum noise levels in order that the PCNVs can be updated. A database will be compiled to include the maximum noise levels, an example of which can be found at Appendix C. Should $L_{A_{fmax}}$ levels not be available nor a suitable option to measure then plant then an estimate based on professional judgement and the operating cycle will be used to inform the assessment in the PCNV application.
- 4.6.5 An inventory of construction plant will be maintained, with each item of plant assigned a unique database number. The database will record relevant information against each item, including the manufacturer's quoted noise level, closest match within BS5228 along with the measured noise levels on site. These noise levels will be recorded as sound pressure levels (SPLs) at a distance of 10m, sound power levels and octave data where available. Checks will be conducted to ensure the plant noise levels are no higher than the previously recorded values. An example database for recording this information is included at Appendix C. The noise level

data from this database will form the input for the noise prediction modelling required for each phase of works within the PCNVs and the latest data will be used for each assessment.

4.7 Noise Insulation and Temporary Re-Housing Inventory

- 4.7.1 A noise insulation and temporary re-housing inventory will be compiled and updated as necessary based on the trigger levels in the following table, a proforma of which can be found at Appendix P & Q.

Table 4.1; Airborne Noise Trigger Levels for Noise Insulation and Temporary Re-Housing

Day	Time	Averaging Period, T	Noise Insulation Trigger Level dB L _{Aeq,T}	Temporary Re-Housing Noise Trigger Level dB L _{Aeq,T}
Mondays to Fridays	0700 – 0800	1 hour	70	80
	0800 – 1900	11 hours	75	85
	1900 – 2200	1 hour	65	75
Saturdays (excl main crossing)	0700 – 0800	1 hour	70	80
	0800 – 1900	10 hours	75	85
	1900 – 2200	1 hour	65	75
Saturdays (main crossing)	0700 – 0800	1 hour	70	80
	0800 – 1900	11 hours	75	85
	1900 – 2200	1 hour	65	75
Sundays and Public Holidays	0700 – 2200	1 hour	65	75
Any Day	2200 – 0700	1 hour	55	65

- 4.7.2 Dwellings where the predicted noise levels are expected to exceed any of the Noise Insulation Trigger Levels (Table 4.1) for at least 10 days out of any 15 consecutive days or alternatively 40 days in any 6 month period will be identified in the inventory.
- 4.7.3 The inventory will also identify if the dwellings are listed buildings or are situated in a conservation area.
- 4.7.4 Within the inventory all dwellings where the predicted noise levels exceed the Temporary Re-housing Noise Trigger Levels (Table 4.1) for at least 10 days out of any 15 consecutive days or alternatively 40 days in any 6 month period will be identified along with the period of the exceedances and the activity causing the exceedance.
- 4.7.5 If the Noise Insulation Trigger Level is only predicted to be exceeded during the same period that the Temporary Re-housing Noise Trigger Level is predicted to be exceeded, then the dwelling will be identified as qualifying for temporary rehousing only. Negotiations will take place with the affected party to reach agreement.
- 4.7.6 Where the property qualifies for noise insulation, this will be installed as appropriate and be decided on a case by case basis.
- 4.7.7 Should the owner or occupier propose a reasonable alternative then this will be submitted to the Employer for approval.

4.8 Exposure of Workers to Noise

- 4.8.1 The exposure of workers to noise and vibration will be assessed on a regular basis. Noise at Work Regulation Assessments will be carried out for new activities and heavily utilised areas will be assessed and demarcated for hearing protection if engineering solutions cannot reduce the noise levels below the exposure or limit values. Noise and vibration assessments will be conducted for individuals as necessary, utilising hand arm vibration assessments and noise dose meters where appropriate. This will be done through annual medicals to be conducted by an Occupational Health Nurse employed full time by FCBC, or at times when it is deemed appropriate. (See Health and Safety Plan).

4.9 Details of Included Mitigation and Maintenance Schedule

- 4.9.1 Site hoardings, screens and bunds that form part of the environmental commitments, will be installed as early as possible in the construction programme as is feasible. The measures are set out in Appendix L of this NVMP, and include items N1 to N8 inclusive.
- 4.9.2 The condition of the structures will be inspected weekly to ensure that they remain fit for purpose. An inspection and maintenance log will be maintained. This inventory can be found at Appendix G.

4.10 Details of Additional Mitigation and Maintenance Schedule

- 4.10.1 The need for additional physical mitigation, such as site hoardings, screens or bunds, will be identified and detailed in PCNVs for individual works.
- 4.10.2 FCBC will provide additional mitigation where the daily average is calculated or monitored to be above 5dB above the relevant threshold however the monthly level is to be below the threshold. The exceedance will be either be captured by the monitoring process (section 6.10) or via the PCNV process. The noise specialist will be consulted in both occurrences in order to determine the mitigation to be put in place. For insulation and temporary rehousing refer to section 4.7.
- 4.10.3 Where additional mitigation is installed, it will be inspected weekly to ensure it remains fit for purpose. An inspection and maintenance log for will be maintained using the inventory which can be found at Appendix G.

4.11 Community Engagement

- 4.11.1 Community engagement will be through the Community Liaison Officer (CLO) the Community Liaison Team (CLT) and in accordance with the Community Liaison and Communications Procedures Plan (CLCP).
- 4.11.2 A three month look ahead will be published in both a monthly newsletter, which will be circulated to all local residents, and on a website. The newsletter and website will provide advance warning of works, set out routes for enquiries and complaints, and describe what mitigation is to be used to reduce the effects of the works.

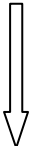
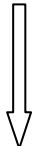
4.11.3 Wherever possible, the information will be provided in non-technical language, to ensure that it is readily understandable to the public. Example of this approach might include references to the type of noise that might be expected, e.g. bangs, crashes, or hums, how vibration effects might manifest, e.g. rattling objects on shelves, and once the works have started, comparisons with previous activities, e.g. noise from upcoming general construction work will be quieter than the piling work undertaken last month.

4.12 Respite Periods and Hierarchy for Extended Working Hours

4.12.1 It is recognised that during periods where extended working hours are required a respite period will be provided each week in line with Best Practicable Means except where it is accepted by the Employer’s Representative through the Plans for Control of Noise and Vibration that continuous working over this period is necessary. Local community needs and the existing conditions will be considered along with the cumulative effect of other activities in the day and other periods of consented works that are being undertaken in the area.

4.12.2 Extended working hours will be sought only where there is full justification for undertaking the works and it can be demonstrated as being necessary to the Employer. The following considerations will be given to extending the working hours.

Table 4.2; Extended Working Hours Hierarchy

Potential Additional Noise Impact	Preference	Extended Working Hours	
		Areas with low ambient noise†	Areas with high ambient noise
Lowest  Highest	Most preferred  Least preferred	Sunday 10:00 to 19:00	Evenings 19:00 to 22:00
		Sunday 07:00 to 10:00	Sunday 10:00 to 19:00
		Evenings 19:00 to 22:00	Sunday 07:00 to 10:00
		Night-time 22:00 to 07:00	Night-time 22:00 to 07:00

†ambient noise levels in assessment category A in Table E.1 of BS5228: 2009: Part 1

5. PLANS FOR THE CONTROL OF NOISE AND VIBRATION

5.1 Number and Scope of PCNV Submissions

5.1.1 Plans for the control of noise and vibration will be submitted using the form outlined in Appendix I.

5.1.2 The scope and duration of each PCNV application will depend on the programme, however the number of applications will also depend on the number of concurrent activities and the locations of the works. The Contractor considers that a single plan covering all activities within a time period may prove to be too onerous to manage due to the number of amendments which this approach could generate. Plans will therefore be developed for activities or groups of activities at specific locations where these are known within the programme to be concurrently operating. Should the programme change and individual works become concurrent or likely to generate a cumulative impact then an amendment to the plans will be submitted to account for the cumulative impact. The scope of a PCNV will not exceed 6 months in duration.

- 5.1.3 A rolling three month look ahead programme will be issued for discussion at the NLG meetings containing a risk register identifying those activities which have the potential to create high noise or vibration levels both for residential and ecological receptors.

5.2 Demonstration of Compliance with ERs ES and RIAA

- 5.2.1 Noise, vibration and underwater noise requirements detailed by these documents will be demonstrated using the data collected at the fixed monitoring locations and through the use of the portable equipment deployed in accordance with the monitoring programme agreed within the particular PCNV. This data will be reported to the Employer on a weekly basis and at each of the NLG meetings, cross-referenced against the schedule of commitments in Appendices L, M, N & O.
- 5.2.2 The responsibility for ensuring compliance during the works will be with the Site Manager. The Noise and Vibration Clerk of Works will assess that works are compliant with method statements and PCNVs in respect of noise and vibration.

5.3 Procedure in the Event of Likely Exceedance

- 5.3.1 Where the noise and vibration assessment of the construction activities show that the residual noise and vibration impacts and effects identified in the Environmental Statement could be exceeded, corrective actions will be employed to avoid any exceedances. Any additional mitigation measures, changes to working practices or other appropriate measures are to be instigated (e.g. securing local authority consent in accordance with the CoCP) these measures will be submitted to the NLG for approval. Where monitoring shows a likely exceedance, refer to section 6.8.

5.4 Procedure for Dealing with a Noise and Vibration Pollution Incident

- 5.4.1 If noise level or vibration thresholds, Appendices J & K, are exceeded on any of the fixed monitors or temporary monitors, this information will trigger an alert to the Clerk of Works in real time as they happen and will be investigated. Should the source of the exceedance be attributable to a construction activity associated with the works then measures will be undertaken immediately to mitigate the noise or the activity will cease until this can be achieved. The Noise and Vibration Clerk of Works will contact the Works Foreman responsible for the works covered under the PCNV and ask for the works to cease immediately when a noise and vibration pollution incident occurs. No works will be allowed to recommence until the Noise and Vibration Clerk of Works is satisfied that the appropriate level of mitigation has been employed. Regular assessments will continue throughout the period of the works to ensure there are no further incidents.

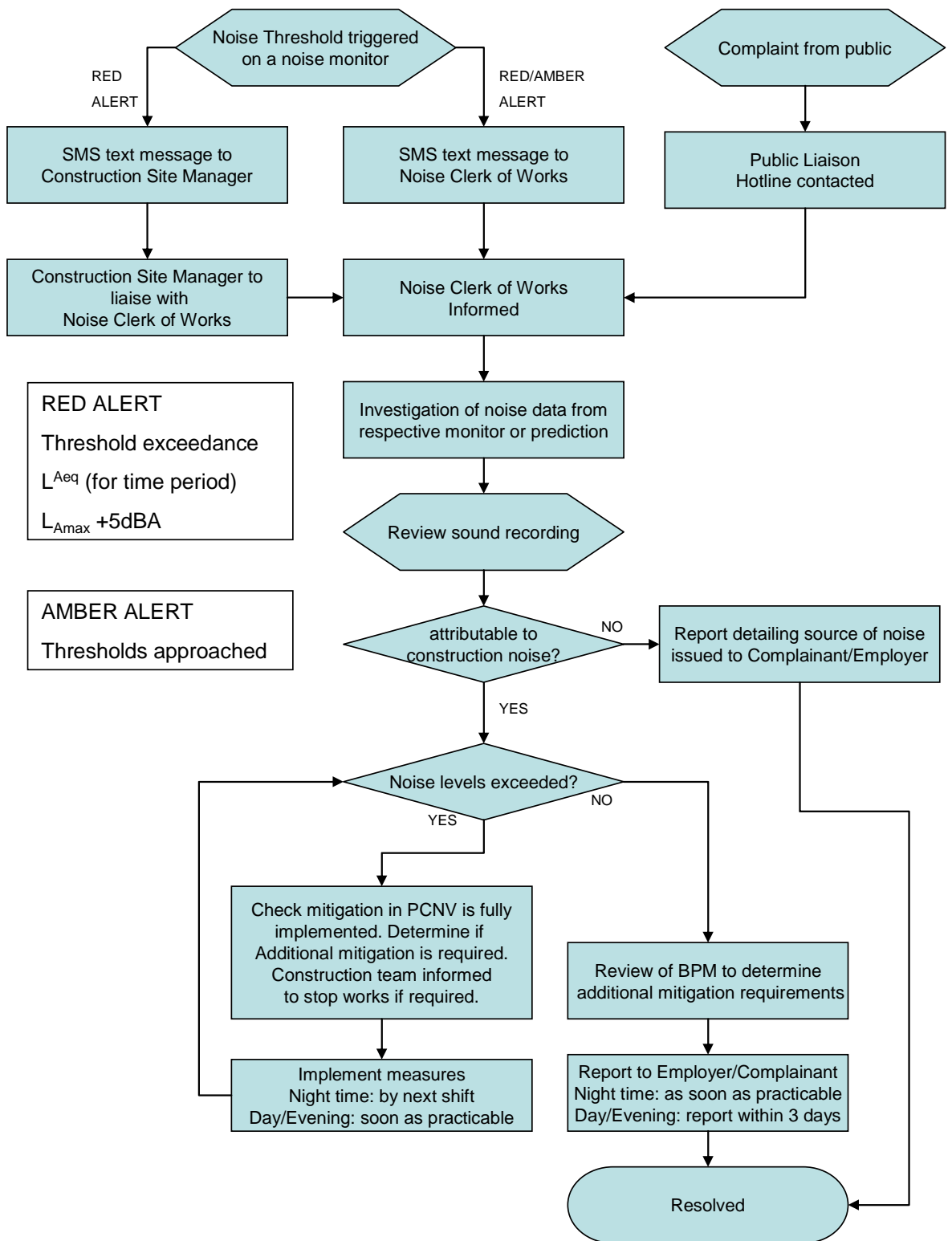


Figure 5.1; Flow diagram for dealing with a noise and vibration pollution incident

5.5 Procedure for Obtaining Local Authority Consent

- 5.5.1 As indicated in paragraph 2.06, the need to obtain Local Authority Consent where it is predicted that a noise level threshold will be exceeded will only be sought as a last resort having exhausted all practicable options
- 5.5.2 Should the Plans for Control of Vibration indicate that the noise level thresholds may be exceeded and all practicable options have been exhausted, applications will be prepared and submitted for local authority consent at the earliest opportunity in accordance with the process outlined in Figure 4.5 and the timescales outlined in Figure 4.3.

5.6 Implementation

- 5.6.1 See section 4.1 for Roles and Responsibilities. The site manager will be responsible for ensuring the works are carried out in accordance with the PCNV and that control measures have been put in place. The site foreman will have responsibility for making checks in accordance with the PCNV such as plant checks whilst the Noise and Vibration Clerk of Works will be responsible for monitoring (see section 6.8)

6. NOISE AND VIBRATION PREDICTION AND MONITORING

6.1 Sensitive Receptors

- 6.1.1 Sensitive receptor locations have been identified at which an assessment of the noise impacts from construction activities will be undertaken for each of the PCNVs. These locations are listed for the main crossing and network connections in Appendix H. These sensitive receptors will be agreed for each of the noise assessments undertaken. The receptors presented in Appendix H include all of the identified receptors for the principal contract, within the ES Appendix 19.2. Additional receptors will be added to this list as they are identified and assessments undertaken for those locations as appropriate.

6.2 Calculation Methodologies

- 6.2.1 All noise and vibration prediction assessments will be undertaken in accordance with the methods set out in BS 5228 Part 1 and Part 2: 2009. The calculations will be undertaken using either a spreadsheet model for single location and small scale works or through the use of a 3D noise modelling package for more complex cumulative noise assessments. The noise calculations will be performed for both the $L_{Aeq,T}$ metric and where appropriate and where data exists for the L_{AFmax} metric, the same calculation methods will be used for both metrics. The spreadsheet used in the analysis will be attached to each PCNV submitted for approval.
- 6.2.2 Source data for performing calculations of L_{Aeq} and L_{AFmax} will be based on the best available information and will be derived either from BS5228, manufacturers data or from on site measurements of the specific activity. Where L_{AFmax} information is not readily available, judgement and experience will be used to determine a value for use in initial calculations. The calculations and PCNV will then be updated when site measurement of the plant or equipment becomes available.
- 6.2.3 Where calculations of vibration are required reference shall also be made to:
 - 1) BS 6472 "Guide to evaluation of human exposure to vibration in buildings": Parts 1 and 2: 2008

- 2) BS 7385 "Evaluation and Measurement for Vibration in Buildings: Part 2. Guide to Damage Levels from Groundborne Vibration": 1993.
- 3) BS5228: Part 2: 2009
- 4) Transport Research Laboratories Report 429 'Groundborne vibration caused by mechanised construction works'
- 5) Transport Research Laboratories Report 53 'Ground vibration caused by civil engineering works'

6.3 Noise Monitoring Locations

- 6.3.1 The list of the locations for fixed noise monitors is given in Appendix D. This sets out the fixed noise monitoring locations and describes the general approach to siting the equipment at each.
- 6.3.2 An inventory of all noise and vibration monitoring equipment will be kept and issued to the Employer whenever there is a change or update. The inventory is shown in Appendix E and the noise thresholds are given in Appendix K. In addition to the fixed monitoring additional temporary monitoring will be undertaken as set out within the PCNVs to demonstrate compliance.

Separate north and south plans are provided at Appendices F and G showing the general locations of these monitoring points, drawing numbers FCBC-1-SNC-U102805-ENV-020 & FCBC-1-SNC-U102805-ENV-021.

- 6.3.3 Temporary monitoring of vibration will be conducted at all of these locations based on the construction activity programme within the area.

6.4 Micro-siting of Fixed Monitors

- 6.4.1 The micro-siting drawing for each of these locations is given in Appendix D. Consultation with property owners and residents has taken place.
- 6.4.2 Micro-siting has been determined through consultation with the land owner. This has included consideration of access, security, powering constraints and any hindrance to the land owner. All locations will be chosen with agreement by the Employer. As a guide the following principles were used to determine the exact location.

- 1) Where specific properties are being monitored the monitor will be located if possible (and by agreement) at 1m from the façade at a location which is representative of the most sensitive window.
- 2) Where monitoring is located in a more general area to represent multiple properties or receptors then a judgement will be taken as to whether to mount the monitor at 1.5m or at 4m. (1.5m for bungalows and 4m for 2 storey buildings)
- 3) For ecological receptors, monitors will be set to collect free field measurements at 4m above the local ground height.
- 4) For continuous vibration monitoring of PPV and VDV levels the monitors will be located outside the property at the foundations of the property being monitored.
- 5) For specific complaint generated monitoring of VDV dose values the monitors will be located inside at the location of the input of the vibration to the sensitive receptor.
- 6) Hydrophones will be deployed in the estuary at mid water depth based on the tidal range. Cables will be routed along the bottom and the hydrophone element will be held up through the use of a buoy.

- 6.4.3 The noise monitoring equipment will perform to the minimum specification for Sound Level Meters given in Appendix 1/9 paragraph 3.4.4.10. The following parameters will be capable of being provided by the SLM:

L_{pA} – instantaneous weighted level

L_{Aeq} – equivalent sound level

L_{Amax} – fast time response

L_{Cpeak} – peak sound level

- 6.4.4 These fixed monitor locations will be continuously recorded and logged to a central server location which can be accessed by the noise Clerk of Works.

- 6.4.5 In addition to the fixed monitors at least two hand held monitors capable of being installed in environmental housings for additional monitoring points will be available on site. These will be used to measure the source levels of equipment and undertake investigations of noise complaints. They can be installed at specific locations if there is a noise incident. Should the need arise then additional temporary noise monitors will be available for the duration of any investigation. These will be added to the inventory of noise monitoring equipment as necessary.

6.5 Underwater Monitoring

- 6.5.1 In addition to the in-air noise monitoring, continuous underwater monitoring will be undertaken at two locations in the estuary to provide information to demonstrate compliance with the ES commitments for underwater noise levels, specifically the requirement to retain 50% of the estuary width below the dBht +90dB level for all expected species.

- 6.5.2 A marine mammal observer will be present when blasting or piling occurs in the vicinity of the estuary. A vessel based Passive Acoustic Monitoring System (PAM) will be deployed to identify if marine mammals are in the mitigation zone prior to piling. This will follow the current guidelines of the JNCC 'Guidelines for minimising the risk of injury to marine mammals from using explosives', 2010 and complies with the requirements of EE9, Appendix L, Schedule of Environmental Commitments.

6.6 Vibration Monitoring

- 6.6.1 Vibration thresholds are in Appendix L.

- 6.6.2 Vibration monitoring will be undertaken on an activity basis where the potential for vibration impacts are identified in the PCNVs. Regardless of whether the predictions show that the thresholds will or will not be exceeded, vibration monitoring will be undertaken at the closest receptors to those activities likely to cause perceptible vibration and will be conducted weekly thereafter to ensure compliance.

- 6.6.3 Additional portable vibration monitors will be available to be deployed at the closest sensitive receptors to any works likely to cause perceptible vibration. These will be capable of recording both PPV and VDV and will conform to the requirements of BS7482, BS6472 and BS6841. Should the need arise then additional temporary vibration monitors will be available for the duration of any investigation. These will be added to the inventory of noise monitoring equipment as necessary, along with the dates and locations of use and issued to the Employer, see Appendix E.

6.7 Weather Stations

- 6.7.1 Weather stations will be deployed which will record hourly temperature, wind speed and wind direction parameters. The details will be added to the inventory of equipment and updated as necessary.

6.8 Measurement, Review and Reporting of Noise Monitoring Results

- 6.8.1 Real time noise level data will be available for viewing by the noise Clerk of Works at the main site compound for each of the monitoring locations. The results of all monitoring will be submitted weekly to the Employer and local authorities for review. Summary information will be uploaded regularly onto the project web site.
- 6.8.2 Each month a report will be issued onto the publicly accessible website detailing the noise levels, vibration levels and underwater noise levels that have been recorded for the previous month. This will be annotated to show which activities were being undertaken at respective times and details of any exceedance and their respective source.
- 6.8.3 If noise and vibration monitoring is showing that noise and/or vibration levels are close to exceeding limits then the Noise and Vibration Clerk of Works will undertake regular assessments of the noise and vibration levels at the closest monitoring stations during the works to ensure the noise and vibration levels remain within thresholds (as specified by the PCNV, RIAA and ES) and inform the FCBC Environmental Manager of any potential exceedances. The FCBC Environmental Manager will then inform the Employer. The Noise and Vibration Clerk of Works will review the works to ensure the conditions of the PCNV are being followed. The Noise and Vibration Specialist will then determine whether any measures to reduce noise and vibration can be implemented. These will include-
- use of alternative, quieter equipment
 - changing of working hours
 - modifying methods of construction
 - increasing the level of mitigation
- 6.8.4 When monitoring demonstrates that noise and vibration effects which are worse than the relevant threshold (PCNV, RIAA and ES) FCBC shall, except in the case of maximum noise levels, halt those works until corrective actions are agreed with the Employer, and as necessary the relevant local authorities and the corrective actions have been implemented. The Construction site manage with assistance from the Noise and Vibration Specialist will be responsible for agreeing corrective actions with the employer.
- 6.8.5 In the event that measured noise levels indicate that additional noise insulation is required, FCBC will update the NITRI and submit to the Employer for acceptance.

6.9 Inventory of Noise and Vibration Monitoring Equipment

- 6.9.1 An inventory of all noise and vibration monitoring equipment used by the Contractor, detailing type, serial number, date last calibrated and when next calibration due, an example of which can be found at Appendix ED. This inventory will be kept up to date and reissued to the Employer whenever the equipment on site changes. The inventory provided in this NVMP is an example only to show the information that will be made available. The appendix will form a live document which will be updated as necessary with change control and issued to the employer, this will avoid the need to reissue the NVMP each time the noise inventory changes.

7. REVIEW SCHEDULE

- 7.0.1 The NVMP will be reviewed at times which are the earlier of:
- (a) every six months, or:
 - (b) where, in the opinion of the Contractor, NLG or the Employer, compliance with the NVMP, predicted noise levels, PCNV and / or local authority consent applications indicates that the management processes defined in the NVMP require review, and submit the results of the review and any proposed alterations to the NVMP to the Employer for approval.
- 7.0.2 The NVMP may require review depending upon the monitoring results obtained as the works progress. Maximum noise levels thresholds for instance may require review if compliance with the existing thresholds results in complaints.
- 7.0.3 When the NVMP is updated or modified, changes will be submitted to the Employer for approval. The NVMP will be submitted in a timely manner to allow consultation with the NLG regarding the changes prior to approval by the Employer to the changes.
- 7.0.4 The PCNVs will be reviewed and changed whenever there is a deviation from the planned Works. Approval will be sought from the Employer for the respective change using the change processes detailed in Appendix 1/9.
- 7.0.5 For dispensations, modifications and overruns the respective proforma in Appendix 1/9 Annex A will be used to apply for authorisation to continue.

APPENDIX A
BEST PRACTICABLE MEANS

8. APPENDIX A: BEST PRACTICABLE MEANS

8.0.1 Control of Pollution Act 1974

8.0.2 Section 72

- (1) This section shall apply for the construction of references in this Part of this Act to best practicable means.
- (2) In that expression “practicable” means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications.
- (3) The means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures.
- (4) The test of best practicable means is to apply only so far as compatible with any duty imposed by law, and in particular is to apply to statutory undertakers only so far as compatible with the duties imposed on them in their capacity of statutory undertakers.
- (5) The said test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances.
- (6) Subject to the preceding provisions of this section, regard shall be had, in construing references to “best practicable means”, to any relevant provision of a code of practice approved under the preceding section.

8.0.3 All available techniques will be used to minimize, as far as is appropriate, the level of noise to which operators and others in the neighbourhood of site operations will be exposed.

8.0.4 BS 5228 lists the following measures which will be taken to demonstrate BPM.

- a) The hours of working will be planned and account will be taken of the effects of noise upon persons in areas surrounding site operations and upon persons working on site, taking into account the nature of land use in the areas concerned, the duration of work and the likely consequence of any lengthening of work periods.
- b) Where reasonably practicable, quiet working methods will be employed, including use of the most suitable plant, reasonable hours of working for noisy operations, and economy and speed of operations. Site work continuing throughout 24 h of a day will be programmed, when appropriate, so that haulage vehicles will not arrive at or leave the site between 19.00 h and 07.00 h. On tunnel sites, for example, it is common practice to provide night-time storage areas for soil and debris.
- c) Noise will be controlled at source and the spread of noise will be limited, in accordance with Clause 8.
- d) On-site noise levels will be monitored regularly, particularly if changes in machinery or project designs are introduced, by a suitably qualified person appointed specifically for the purpose. A method of noise measurement will be agreed prior to commencement of site works. If this is not specified, the method used should be one of those described in Annex G.
- e) On those parts of a site where high levels of noise are likely to be a hazard to persons working on the site, prominent warning notices will be displayed and, where necessary, ear protectors will be provided (see also Clause 5).

- 8.0.5 When potential noise problems have been identified, or when problems have already occurred, consideration will be given to the implementation of practicable measures to avoid or minimize those problems. Local authorities, consulting with developers and their professional advisers or with site operators, will need to consider the extent of noise control measures necessary to prevent the occurrence of significant problems, and will also need to consider whether the implementation of those measures will be practicable. Local authorities might wish to consider whether to specify quantified limits on site noise and whether, additionally or instead, to lay down requirements relating to work programmes, plant to be used, siting of plant, periods of use, working hours, access points, etc. The latter approach will often be preferable in that it facilitates the monitoring of formally or informally specified requirements, both for the authorities and for the site operators.
- 8.0.6 Although not exhaustive, The Code of Construction Practice lists the following items considered to be BPM:
- 8.0.7 In relation to best practicable means, the contractor will employ appropriate measures which may include:
- 8.0.8 Appropriate selection of plant, construction methods and programming, including appropriate scheduling of noisier activities within the permitted working hours. Only plant conforming with or better than relevant national or international standards, directives or recommendations on noise and vibration emissions will be used. Construction plant will be maintained in good condition with regard to minimising noise output and workers' exposure to harmful noise and vibration.
- In addition to minimising noise and vibration at source or adverse effects through other mitigation measures, the contractor will demonstrate in its planning and assessments that it has considered undertaking works in those hours that minimise potential disturbance.
 - Construction plant will be operated and maintained appropriately, having regard to the manufacturer's written recommendations or using other appropriate operation and maintenance programmes which reduce noise and vibration emissions. All vehicles and plant will be switched off when not in use.
 - Design and use of site hoardings and screens, where necessary, to provide acoustic screening at the earliest opportunity, including appropriate screening of the haul road to be constructed from the site compound to the west of South Queensferry to Society Road. Where practicable, doors and gates will not be located opposite occupied noise-sensitive buildings. The mechanisms and procedures for opening and closing doors/gates will minimise noise, as far as reasonably practicable.
 - Erection of operational noise barriers as early as practicable in the construction process to provide additional protection against construction noise.
 - Choice of routes and programming for the transport of construction materials, spoil and personnel to reduce the risk of increased noise and vibration impacts due to the construction of the Project.
 - The positioning of construction plant and activities to minimise noise at sensitive locations.
 - The use of mufflers on pneumatic tools.
 - The use of non-reciprocating constructional plant.
 - The use, where necessary, of effective sound reducing enclosures.
- 8.0.9 Piling works and blasting works will be kept to the minimum practicable taking consideration of the requirements of the design and programme requirements for construction of the Project and the commitment in the Environmental Statement not to undertake percussive piling at night.

APPENDIX B

NOISE AND VIBRATION STAFF COMPETENCY MATRIX

9. APPENDIX B: NOISE AND VIBRATION STAFF COMPETENCY MATRIX

The completed matrix will be submitted to the employer at the start of the contract and at any time thereafter where there is a change in role or staff name. The following provides an example only.

Role	Staff Name	Technical Qualifications	Professional Qualifications	Relevant Experience
Noise Specialist	Dr Raymond Browne	B.Eng (Hons) PhD	MIOA	<p>Ray has been working in the field of acoustics for over 16 years specialising in noise measurement and prediction methods. He has a strong technical background in all aspects of noise assessment having worked in both the research and environmental sectors on a range of challenging projects for MOD and commercial clients.</p> <p>He joined Gifford in 2008 and is currently the acoustics associate for the Environmental Development and Planning centre of excellence. He has experience of a wide range of projects within the transport, infrastructure, energy, residential, retail and commercial sectors.</p>
Assistant noise specialist	TBC			
Site based noise consultant	TBC			
Noise Clerk of works	Clark Riddick	BSc (Hons) Chemistry MSc Environmental Science	None	<p>Clark Riddick is responsible for environmental issues that arise within Civil Engineering Scotland activities. He has 3 years experience in the construction industry and 2 years experience in environmental consultancy including contaminated land and remediation works, desk studies, site investigation and environmental sampling. Clark has been responsible for noise and vibration monitoring on the M74 contract.</p>

APPENDIX C

PLANT NOISE SOURCE LEVEL DATABASE

10. APPENDIX C: PLANT NOISE SOURCE LEVEL DATABASE

Most Appropriate Sound Level Date For Use in Modelling ¹⁾										Initial Measurement of Sound Level on Site ²⁾				Repeat measurements ³⁾					
Reference No	Plant Description	Type	Size	Power	Manufacturers Data?	Compliant with EC Directive?	BS5228 Ref	Octave Band SPL	SWL	SPL at 10m	Date	Octave Band SPL	SWL	SPL at 10m	Date	Octave Band SPL	SWL	SPL at 10m	

Note 1 – These fields will contain the most relevant noise levels for use within the noise prediction modelling and will be updated as data becomes available.

Note 2 – These fields will contain the noise levels as measured for the plant when it first arrives on site.

Note 3 – These fields will contain the repeat measurements for the plant to ensure the noise levels are not higher than those being modelled.

APPENDIX D
LIST OF LOCATIONS OF FIXED NOISE MONITORS AND
MICRO-SITING DRAWINGS

Identifier	Noise	Vibration	Under water	Description
M1	✓	✓	✗	Located at a property in or around Whinnyhill Crescent or at a proxy location in the carpark south of Whinny Hill Crescent.
M2	✓	✓	✗	Located either at Castleandhill House or at the boundary of the north compound.
M3	✓	✓	✗	Located at Tigh-na-grian or the Queensferry Hotel
M4	✓	✗	✓	Located near to Long Craig Island either on the north existing bridge leg or on the breakwater Quay to the east of Long Craig Island. In-air and underwater monitoring.
M5	✗	✗	✓	Hydrophone mounted on Beamer Rock
M6	✓	✗	✓	Located on the Port Edgar break water monitoring in air and underwater noise levels. In-air monitor located at the closest point to the Tern Roost tyre raft. The underwater monitor located in appropriate depth of water at the northern end of the breakwater.
M7	✓	✓	✗	Located at Butlaw Fisheries
M8	✗	✓	✗	A vibration monitor located at the corners of the nearest buildings in Port Edgar Barracks to the west of the works.
M9	✗	✓	✗	A vibration monitor located at the corners of the nearest buildings in Port Edgar Barracks to the east of the works.
M10	✓	✓	✗	Located in the grounds of Inchgarvie Lodge.
M11	✓	✓	✗	A single noise monitor located within the general area of Linn Mill, not necessarily on a property (eg lighting pole).
M12	✓	✓	✗	Located at a property in Clufflatt.
M13	✓	✓	✗	Located at a property in Clufflat Brae.
M14	✓	✓	✗	Located along the edges of Sringfield and Echline
M15	✓	✓	✗	Located in the vicinity of 1 & 2 Echline, likely to be on a property as other options are limited.
M16	✓	✓	✗	Located at a property on Scotstoun Park adjacent to the B800.
M17	✓	✓	✗	Located in the general area of Dundas Home Farm
M18	✓	✓	✗	Located in Newton adjacent to properties and the main road.

MICRO-SITING DRAWINGS OF FIXED NOISE MONITORS

APPENDIX E

INVENTORY OF NOISE AND VIBRATION MONITORING EQUIPMENT

11. APPENDIX D: INVENTORY OF NOISE AND VIBRATION MONITORING EQUIPMENT

Unique Reference	Location	Type	Description	Serial Number	Date Last Calibrated	Date of Next Calibration
Permanent equipment						
00001	Field calibrator 1	Calibrator				
00002	Field calibrator 2	Calibrator				
00003	NM1	SLM				
00004		Microphone				
00005		Preamplifier				

00007	NM4	Hydrophone				
		Amplifier				
		SLM				
		preamp				
.
Portable equipment						
00023	PM1	SLM				
		Microphone				
		preamp				

Example

APPENDIX F

NOISE MONITORING LOCATIONS NORTH OF FORTH

APPENDIX G

NOISE MONITORING LOCATIONS SOUTH OF FORTH

APPENDIX H

INVENTORY OF NOISE AND VIBRATION MITIGATION MEASURES

12. APPENDIX G: INVENTORY OF NOISE AND VIBRATION MITIGATION MEASURES

INVENTORY OF NOISE AND VIBRATION MITIGATION MEASURES						
Mitigation Item	ES Mitigation Item Number	Description	Location	Specification	Date Last Inspected	Next Inspection Date
0001	DC24	Site barrier/hording	Main construction compound	5m high bund/barrier along Eastern boundary of main construction compound		

APPENDIX I
SENSITIVE RECEPTORS

13. APPENDIX H: SENSITIVE RECEPTORS

The following table shows the noise sensitive receptors likely to be impacted by noise and vibration from the main crossing construction works. In addition to these receptors additional receptors will be identified in the PCNVs which are considered to be the most affected by any of the specific works detailed in the respective PCNV.

Main Crossing Receptor Locations
Admiralty House
Queensferry Hotel
Tigh-na-grian
Craigdhu Cottage
19 Ferry Road
Butlaw Cottages
Inchgarvie House
89 Society Road
Inchgarvie Lodge / Clufflat Brae
4 Rose Lane
40 Shore Road
58 High Street
17 Ferry Barns Court
St Margaret's Hope Lodge

The following table shows the sensitive receptors likely to be impacted by noise and vibration from the network connection construction works of the principle contract.

Principal Contract Network Connection Receptor Locations		
15 Provost Milne Grove	104 Echline Drive	Admiralty House
16 The Glebe	120 Echline Drive	Queensferry Hotel E
45 Scotstoun Park	48 Echline Drive	Queensferry Hotel N
124 & 125 South Scotstoun	17 Springfield Terrace	St Margaret's Hope Lodge
103 Provost Milne Grove	17 Springfield Place	N Queensferry Community
73 Provost Milne Grove	60 Springfield Crescent	2 Shamrock Terrace
54 Provost Milne Grove	25 Springfield Lea	33 Ferryhills Road

Principal Contract Network Connection Receptor Locations		
63 South Scotstoun	22 Clufflat Brae	East Scotland Contracts
Scotstoun Cottage	4 Clufflat Brae	84 Hope Street
46 Scotstoun Park	Inchgarvie Lodge	22 Whinnyhill Crescent
68 South Scotstoun	Inchgarvie House	42 Whinnyhill Crescent
66 Echline Drive	13 Linnmill	16 Whinnyhill Crescent
3 - 4 Echline	26 Linnmill	2 Glebe Terrace
9 Echline	6 Linnmill	Newbigging Lodge
21 Echline	Port Edgar (free field)	3 Dundas Home Farm

APPENDIX J
PCNV PROFORMA

14. APPENDIX I: PCNV PROFORMA

FORTH REPLACEMENT CROSSING PRINCIPAL CONTRACT

*Plan for the Control of Noise & Vibration (PCNV)
APPLICATION FORM FOR PCNV APPROVAL*

Reference No : * (See Note 1)	PCNV.....
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Works within Normal Working hours ¹ only and predicted noise levels are below the noise insulation trigger levels ¹	
Works outside of normal working hours and / or noise levels are predicted to exceed the noise insulation trigger levels	

Please check as appropriate (see Note 3)

We hereby submit this PCNV covering the construction activities / works listed below in accordance with Appendix 1/9 to the Specification and certify that the methods, plant and steps to minimise noise (including vibration) are best practicable means in accordance with section 72 of the *Control of Pollution Act 1974* and section 79(9) of the *Environmental Protection Act 1990* and are fully in accordance with the Contract.

Construction activities / works covered by PCNV	
--	--

Signed: Firm: *
CONTRACTOR (Contractor's Representative)
Name: Date: *
(Block Capitals)

¹ as defined in the Code of Construction Practice

(Note: Supplementary sheets should be used for fuller descriptions and additional information as required)

1. Address or location of proposed works *	
2. Name and address of main Contractor (See Note 4) * Telephone No. *	
3. Particulars of works to be carried out (See Note 5) *	
4. Methods to be used in each stage of development (See Note 6)	
5. Hours of work (See Note 7) *	
6. Number, type and make of plant and machinery (including heavy vehicles) stating Sound Power Levels (See Note 8) *	
7. Proposed steps to minimise noise and vibration (See Note 9) *	
8. Predicted Noise Levels (See Note 10) *	
9. Predicted vibration levels	
10. Approximate duration of works (See Note 11) *	
11. Site Plan (Attached, yes/no) (See Note 12)	
12. Other Information (See Note 13)	
13. List of Plans and documents attached (See Note 14)	

Employers approval for Plan (See Note 15)	Authorised Signatory: Signed: Date:
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Notes for completing the form:

* Indicates fields that should be completed as a minimum.

Note 1 – To be completed by the Contractor.

Note 2 – Not used

Note 3 – To be completed by the Contractor. See Note 7 and 10.

Note 4 – The relevant contact name and telephone contact numbers should be provided for any public enquiries and complaints.

Note 5 – Outline the scope of the application and the main elements of the construction works that are proposed. A programme of works to include proposed activities and timescales shall be included.

Note 6 – Outline the construction methods to be used for the works outlined above. Additionally if the “Works outside of normal working hours and / or noise levels are predicted to exceed the noise insulation trigger levels” box is checked on the front cover (see Note 3), then a detailed description shall be provided of possible quieter alternative methods with a full justification of why they do not constitute best practicable means. For works proposed to be undertaken outside of normal working hours, full justification for why these works cannot be completed within normal working hours shall be included.

Note 7 – Hours of work. Any anticipated phases of the Works that will require construction activity outside the normal working hours as defined in the CoCP (in particular night and weekend work) shall be covered by a separate PCNV application. If works are required outside of normal working hours then the “Works outside of normal working hours and / or noise levels are predicted to exceed the noise insulation trigger levels” box should be checked on the front cover (see Note 3). Intended start-up and close-down times must be included in the application.

Note 8 – Construction plant should be listed and BS 5228 or appropriate alternative data should be referenced for the sound power levels of the plant. In addition, confirm that the construction equipment details meet the relevant EC Directive.

Note 9 – All measures proposed to mitigate noise and vibration should be included. This should include general measures, such as the use of site screening as listed in CoCP and specific measures. Additionally if the “Works outside of normal working hours and / or noise levels are predicted to exceed the noise insulation trigger levels” box is checked on the front cover (see Note 3), then particular emphasis should be given to the consideration of specific mitigation measures and their benefit.

The proposed noise / vibration monitoring programme shall be defined and of any specific public liaison to be undertaken by the Contractor shall also be defined.

Note 10 – Predict noise levels for the works at noise sensitive receivers agreed with the Employer as part of the Contractors’ Noise & Vibration Management Plan. Prediction should identify any properties / facades that qualify for noise insulation or occupants who are eligible for temporary rehousing. If predicted noise levels indicate that the works will result in noise levels that exceed the noise insulation trigger levels then the “Works outside of normal

working hours and / or noise levels are predicted to exceed the noise insulation trigger levels” box should be checked on the front cover (see Note 3). If required by the Employer, provide an estimation of the predicted vibration levels at agreed points. The Contractor shall cover the cost of such assessments and any mitigation and / or monitoring required

Note 11 – State the dates of the proposed works and the requested dates for the PCNV consent.

Note 12 – Show proposed positions of plant and machinery and any noise sensitive facades or sensitive vibration receptors if known. Show mitigation (e.g. screening) if used or available.

Note 13 – Any further relevant information should be included, such as interaction with other work locations in the adjacent area where PCNV agreements are in place, noise monitoring arrangements, contact name, address and telephone number.

Note 14 – Provide a list of plans and any documents attached with the application form.

Note 15 – Construction works are not to proceed until signed written approval of the plan is received.

APPENDIX K

NOISE THRESHOLDS AND MAXIMUM LEVELS

15. APPENDIX J: NOISE THRESHOLDS AND MAXIMUM LEVELS

Table 6.1: Construction Noise Impact Criteria – Main Crossing

Period	Assessment Time	Assessment Category					
		A		B		C	
		$L_{Aeq,T}$	L_{Amax}	$L_{Aeq,T}$	L_{Amax}	$L_{Aeq,T}$	L_{Amax}
Night	1hr	45	65	50	70	55	70
Evening	1 hr	55	75	60	80	65	85
Day ¹⁾	12hr	65	85	70	90	75	95

1)Percussive piling permitted where it is shown to be best practicable means. A criterion of 96 dB L_{Amax} will apply for percussive piling in all daytime Assessment Categories. Duration of piling operations may need to be controlled in accordance with the relevant $L_{Aeq,T}$ criterion.

Table 6.2: Construction Noise Impact Criteria - Road Connections

Period	Assessment Time	Assessment Category					
		A		B		C	
		$L_{Aeq,T}$	L_{Amax}	$L_{Aeq,T}$	L_{Amax}	$L_{Aeq,T}$	L_{Amax}
Night	1hr	45	65	50	70	55	70
Evening	1 hr	55	75	60	80	65	85
Weekday	11hr	65	85	70	90	75	95
Saturday	10hr	65	85	70	90	75	95

- Category A: are threshold values to use when ambient noise levels (rounded to the nearest 5 dB) are less than the category A L_{Aeq} values.
- Category B: are values to use when ambient noise levels (rounded to the nearest 5 dB) are the same as category A L_{Aeq} values.
- Category C: are values to use when ambient noise levels (rounded to the nearest 5 dB) are higher than category A L_{Aeq} values.
- Criteria in the FRC Environmental Statement to identify noise impacts and significant adverse noise effects.
- All L_{Amax} noise levels are $L_{Amax,F}$ (Fast time response),
- Measured exceedance of maximum noise level thresholds triggers additional review of Best Practicable Means as defined in this Annex.
- All noise levels are measured 1m from windows in the façade of a noise sensitive receptor facing the construction works.

APPENDIX L
VIBRATION THRESHOLDS

16. APPENDIX K: VIBRATION THRESHOLDS

Table of vibration thresholds

Building Type	Period	VDV ($\text{ms}^{-1.75}$)
Eligible Dwellings ¹	07:00 to 23:00	0.4
	23:00 to 07:00	0.2
Education establishments, offices and similar ²	Over normal daily period of use	0.4
Commercial ³	Over normal daily period of use	0.8

Notes:

- 1) Measured on a normally-loaded floor of any bedroom or living room. For this purpose, eligible dwellings include dwelling houses, residential institutions, hotels, and residential hostels.
- 2) Measured on a normally-loaded floor of areas where people normally work. This category of receiver will include all areas where clerical work, meetings and consultations are regularly carried out e.g. Doctors' surgeries, day-care centres but not shop floors of industrial premises.
- 3) Measured on a normally-loaded floor of areas where people normally work. Commercial premises include retail and wholesale shops.

APPENDIX M

SCHEDULE OF ENVIRONMENTAL COMMITMENTS RELATING TO NOISE AND VIBRATION

17. APPENDIX L: SCHEDULE OF ENVIRONMENTAL COMMITMENTS RELATING TO NOISE AND VIBRATION

TE41	Ch1700-4300.	Construction/ Operation	Badger proof fencing will be provided. Note at certain locations integrated with noise barriers refer to Table 23.6.
EE7	Beamer Rock	Construction	<p>Reasonable precautions will be undertaken to avoid/reduce noise disturbance from blasting including:</p> <ul style="list-style-type: none"> • Consider undertaking explosive excavation in intertidal zones during low water periods to restrict underwater noise (i.e. when area is exposed). • Consider undertaking explosive excavation within Beamer Rock so that edges of the Rock act as noise buffers reducing emissions to water. • Incorporation of non-explosive techniques for fracturing rock, where constructionally effective. • Use acoustic deterrents at appropriate frequency during key construction periods and bubble curtains if appropriate, to attenuate sound waves. An equipment maintenance programme will be required. • Use a string of explosions milliseconds apart to reduce the peak emission rather than one explosion that will reach a higher peak emission (JNCC, 2008). • The dBht (salmon) should not exceed the maximum tolerance exposure for this species across 50% of the river, thus enabling migrating salmon to pass the construction area. The remaining 50% would be permitted to experience levels above this, provided all other mitigation listed here is implemented.
EE8	At piling locations in the Firth of Forth	Construction	<p>Reasonable precautions to be undertaken to avoid/reduce noise disturbance from piling including:</p> <ul style="list-style-type: none"> • Use acoustic deterrents at appropriate frequency during key construction periods and bubble curtains if appropriate, to attenuate sound waves. An equipment maintenance programme will be required. • Soft-start approach or ramp-up approach to piling to allow any receptors in the vicinity to leave the area, procedure to follow JNCC guidelines (JNCC, 2009). • Consider using a low noise alternative to impact piling. • Best practice piling procedures to be followed with guidance taken from JNCC procedures.
EE9	Beamer Rock and piling locations in the Firth of Forth	Construction	<ul style="list-style-type: none"> • A trained Marine Mammal Observer (MMO) will be present when blasts occur and for the periods of inactivity following cessation of piling and blasting before these activities restart. If cetaceans are present, blasting and piling activities will be delayed until the cetacean/group of cetaceans have passed beyond a threshold distance. This exclusion zone will be set dependant on predicted noise levels. • Passive Acoustic Monitoring (PAM) will be used by a trained operative to identify mammals within the mitigation zone prior to piling. Piling will not commence if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual or acoustic detection. The PAM operative will follow JNCC guidance (JNCC, 2008 and JNCC, 2009).
EE10	Beamer Rock	Construction	<ul style="list-style-type: none"> • There will be no explosive blasting on Beamer Rock between 01 May and 15 August to avoid the risk of impacts on breeding terns on Long Craig Island.
EE11	Firth of Forth	Construction	<ul style="list-style-type: none"> • Noisy activities will be avoided at night (between 1 hour before dusk and 1 hour after dawn) during the post-breeding/ passage period for terns (between 15 August and 31 October). If it is unavoidable that noise limits will be breached between 15 August and 31 October, then Port Edgar and Long Craig Island will not be simultaneously impacted as one can be used as a refuge for roosting terns if the other is disturbed. • The Contractor will employ a 'soft-start' to all noisy activities (see definition above). Each time the activity is started up after a period of inactivity, the noise levels will be gradually increased over a period of 30 minutes to allow birds (and other animals) relocate. This will apply year round. For the first seven days after the commencement of each noisy activity, the soft-start must be applied each time the machinery is stopped, even if this is only for very short periods. The duration of periods of inactivity requiring a soft start will be increased incrementally over this seven day period. Subject to assessment of bird responses to the activity, after seven days a soft start will only be required

			overnight or after an extended period of inactivity.
EE12	Firth of Forth	Construction	<ul style="list-style-type: none"> Best practicable means will be made to maintain noise levels below 75 dBLAeq day and night: at: (i) Long Craig Island at all times of day and night during the tern breeding season (01 May until 15 August in a given year) and (ii) Long Craig Island and the Port Edgar tern roost site at night (between 1 hour before dusk and 1 hour after dawn) during the post-breeding/ passage period for terns (between 15 August and 31 October in a given year).
EE13	Long Craig Island and Port Edgar	Construction	<ul style="list-style-type: none"> Monitoring of noise levels from construction activities will be undertaken at Long Craig Island during the breeding season for terns (May to mid-August) and at Long Craig Island and Port Edgar tyre raft from 1 hour before sunset until sunrise between mid-August and October. The ECoW will identify and assess the significance of these levels on the tern population. Monitoring of bird responses to construction activities will be undertaken. Assessment of the significance of these activities on estuarine birds will be undertaken.
L4	Throughout scheme	Scheme design / Construction	Noise barriers, as determined by the noise assessment, will be provided in the form of barriers and false cuttings.
L28	ch3760-4450 n/b ch3800-4514 s/b	Scheme design / Construction	Noise barriers in the form of false cuttings and/or barriers as per mitigation items N1-N7 will provide visual screening and noise mitigation.
L38	ch3094-3350	Scheme design / Construction	Noise barrier in the form of false cutting will be provided as per mitigation item N9.
L52	ch2550-3904 w/b ch1861-2364 w/b	Scheme design / Construction	Noise barriers in the form of false cuttings and barriers as per mitigation items N8 and N10 will provide visual screening and noise mitigation.
L53	ch1750-1861 w/b	Scheme design / Construction	Noise barrier in the form of false cutting will be provided as per mitigation item N11.
L56	M9 ch980-1150 s/b	Scheme design / Construction	Scrub woodland planting will be provided to screen embankment and noise barrier.
L58	M9 ch1014-1290 s/b	Scheme design / Construction	Noise barrier will be provided as per mitigation items N12 and N13.
CH3	Inchgarvie House Port Edgar Barracks Complex St. Margaret's Hope (Admiralty House)	Construction	Vibration monitoring will be carried out on a weekly basis during works that may create a risk of vibration damage to protect buildings from risk of physical damage.
CH10	Throughout scheme	Construction/ Operation	Planting proposed as part of the landscape/ecology mitigation measures (refer to Table 23.6 and Figure 12.4) and noise barriers (refer to Table 23.10) will be provided to reduce impacts on setting.

N1	South Queensferry (ch4310 - 4515)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 2.8m x 180m barrier on viaduct and a 2.8m x~25m barrier on road will be provided.
N2	South Queensferry (ch4260 - 4310)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 4m x ~50m barrier will be provided.
N3	South Queensferry (ch4110 - 4260)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 3m x ~150m barrier will be provided.
N4	South Queensferry (ch4030 - 4110)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 3m x ~80m bund will be provided.
N5	Linn Mill (ch4310 - 4450)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 2.8m x ~115m barrier on viaduct and a 2.8m x ~25m barrier on road will be provided.
N6	Linn Mill (ch4000 - 4310)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 4m x ~310m barrier will be provided.
N7	West Dundas (ch2550 - 3095)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 4m x ~545m barrier will be provided.
N8	East Dundas (ch1860 - 2365)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 4m x ~505m barrier will be provided.
N9	Kirkliston M9 (ch1015 - 1260)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 2.5m x ~245m barrier will be provided.
N10	Kirkliston M9 (ch1260- 1290)	Construction/ Operation	Noise barrier to achieve residual impact identified in Chapter 16 (Noise and Vibration). It is envisaged that a 2m x ~30m barrier will be provided.
DC12	Construction compounds	Construction	Dust and noise will be kept to a minimum through the provision of mitigation measures DC13-24.
DC18	n/a	Pre-construction/ Construction	The Contractor will implement the CoCP.
DC19	n/a	Pre-construction/ Construction	The Contractor will be required to develop and implement a Noise and Vibration Management Plan which will include noise and vibration monitoring.
DC20	n/a	Construction	Best Practicable Means as defined in Section 72 of the Control of Pollution Act will be used to minimise noise (including vibration) during construction.
DC21	n/a	Construction	Best Practicable Means will be employed to minimise construction activities undertaken outside of 07:00 to 19:00 Monday to Saturday.
DC22	'Tigh-na-grian' (2 properties)	Pre-construction /Construction	Should the Contractor identify that works are required that will exceed the threshold levels as defined in the CoCP, then he will seek prior approval from the local authority under Section 61 of the Control of Pollution Act and will carry out or provide a grant in respect of noise insulation to the affected properties. Any noise insulation work will be provided in accordance with the Noise (Insulation) Scotland Regulations 1975.

DC23	Throughout scheme	Construction	No impact piling will be undertaken at night.
DC24	Main construction compound, South Queensferry	Pre-construction/ Construction	A bund/barrier, to a height of approximately 5m, will be constructed on the eastern-side of the main construction compound to screen adjacent receptors on the west side of South Queensferry.
D25	Throughout scheme	Pre-construction/ Construction	Solid site hoardings will be provided where necessary and reasonably practicable between worksites and noise sensitive receptors to a height sufficient to break line of sight from the windows of habitable rooms to significant construction noise sources.
D26	Throughout scheme		Mitigation (permanent or temporary) will be installed as early as possible to afford the maximum benefit to the receptor.
DC31	Throughout scheme	Construction	Best practicable means will be employed to avoid the creation of statutory nuisance associated with noise, dust and air pollution (refer to mitigation measures DC13-24).

APPENDIX N

SUMMARY OF MITIGATION MEASURES TO ADDRESS POTENTIAL ADVERSE EFFECTS OF THE FRC FOR THE FORTH ISLANDS AND IMPERIAL DOCK LOCK, LEITH SPAS

18. APPENDIX M: SUMMARY OF MITIGATION MEASURES TO ADDRESS POTENTIAL ADVERSE EFFECTS OF THE FRC FOR THE FORTH ISLANDS AND IMPERIAL DOCK LOCK, LEITH SPAS

<p>Noise levels from construction activities will be maintained below 75dBL_{Aeq} at: (i) Long Craig Island at all times of day and night during the tern breeding season (1 May until 15 August in a given year); and (ii) Long Craig Island and the Port Edgar tern roost sites at night (between 1 hour before dusk and 1 hour after dawn) during the post-breeding/ passage period for terns (between 15 August and 31 October in a given year. If it is unavoidable that noise limits will be breached between 15 August and 31 October, then Port Edgar and Long Craig Island should not be simultaneously impacted as one can be used as a refuge for roosting terns if the other is disturbed.</p>	<p>Disturbance: noise</p>	<p>Common tern Roseate tern Sandwich tern</p>	
<p>The Contractor will employ a 'soft-start' to all noisy activities, defined as any construction activity resulting in an increase of $\geq 3\text{dB(A)}$ in the ambient noise level (dBL_{Aeq}) at Long Craig Island and/or the Port Edgar tern roost site. For the first seven days after the commencement of each noisy activity, the soft-start must be applied each time the machinery is stopped, even if this is only for very short periods. The duration of periods of inactivity requiring a soft start will be increased incrementally over this seven day period. Subject to assessment of bird responses to the activity, after seven days a soft start will only be required overnight or after an extended period of inactivity.</p>	<p>Disturbance: noise</p>	<p>Common tern Roseate tern Sandwich tern</p>	<p>This will apply year round, for the purposes of minimising the risk of disturbance to breeding and roosting terns and also other qualifying species of the Forth Islands SPA using the Forth estuary in the vicinity of the FRC throughout the year.</p>
<p>There will be no explosive excavation of Beamer Rock from 1 May until 15 August in a given year to avoid the risk of impacts on breeding terns on Long Craig Island.</p>	<p>Disturbance: noise</p>	<p>Common tern Roseate tern Sandwich tern</p>	
<p>Monitoring of noise levels will be carried out at Long Craig Island and Port Edgar tyre raft in advance of works starting and during construction works. The ECoW will identify and assess the significance of these levels on receptor species in consultation with Jacobs Arup. Monitoring will be linked to an agreed management system to ensure works are modified as required if significant disturbance is identified.</p>	<p>Disturbance: noise</p>	<p>Common tern Roseate tern Sandwich tern</p>	<p>Noise monitors will measure the combined levels of noise from construction activities and other ambient noise. This will be used to assess whether absolute noise limits for Port Edgar and Long Craig Islands during the breeding/roosting periods are being met, and also to identify noisy activities year round.</p>
<p>Monitoring of disturbance and bird activity will be undertaken by Jacobs Arup during construction to assess responses of estuarine birds in particular terns. Monitoring will be linked to an agreed management system to ensure works are modified as required if significant disturbance is identified.</p>	<p>Disturbance: noise</p>	<p>Common tern Roseate tern Sandwich tern</p>	
<p>A working group including Scottish Natural Heritage will be established to finalise the detailed methodologies to be adopted by the project and its contractors with respect to</p>	<p>Disturbance: noise</p>	<p>Common tern Roseate</p>	

noise levels, in advance of the works being undertaken.		tern Sandwich tern	
<p>The Code of Construction Practice (CoCP) for the project will provide a framework for the application of all reasonable and practicable measures to minimise noise that in rank order of application will include: reduction of noise at source, screening the receptor from the noise source and lastly protecting the receptor from noise. The CoCP requires that Best Practicable Means (BPM) as defined within Control of Pollution Act (HMSO, 1974) will be employed to minimise construction noise and vibration disturbance. The contractor will undertake an assessment of the likely noise and vibration levels associated with construction of the Project as part of assuring the implementation of best practicable means to minimise noise (including vibration).</p>	Disturbance: noise	Common tern Roseate tern Sandwich tern	<p>In relation to best practicable means, the contractor will employ appropriate measures which may include:</p> <ul style="list-style-type: none"> • Appropriate selection of plant, construction methods and programming. Only plant conforming with or better than relevant national or international standards, directives or recommendations on noise and vibration emissions will be used. Construction plant will be maintained in good condition with regard to minimising noise output and workers exposure to harmful noise and vibration. • Construction plant will be operated and maintained appropriately, having regard to the manufacturer's written recommendations or using other appropriate operation and maintenance programmes which reduce noise and vibration emissions. All vehicles and plant will be switched off when not in use. • The positioning of construction plant and activities to minimise noise at sensitive locations. • The use of mufflers on pneumatic tools. <p>The use of non-reciprocating constructional plant</p>
<p>The contractor will comply with the requirements in relation to the control of noise and vibration set out in all the RIAAs and Environmental Statement for any works associated with the construction the main crossing and approach viaducts over the Firth of Forth. To the extent that their proposals differ from those assumed by the Environmental Statement and the RIAAs, the contractor will consult with SNH, Marine Scotland and SEPA regarding the construction methods to be used and mitigation measures to be implemented to comply with the Appropriate Assessments.</p>	Disturbance: Noise	(All qualifying species)	

APPENDIX O

SUMMARY OF MITIGATION MEASURES TO ADDRESS POTENTIAL ADVERSE EFFECTS OF THE FRC FOR THE FIRTH OF FORTH SPA

19. APPENDIX N: SUMMARY OF MITIGATION MEASURES TO ADDRESS POTENTIAL ADVERSE EFFECTS OF THE FRC FOR THE FIRTH OF FORTH SPA

<p>Relocation of sewage outfall, to be carried out as advance works, to avoid period between 15 August and 31 October during night-time (between one hour before dusk and one hour after dawn the next morning). During this period no works to take place at night within 200m and in direct view of the Port Edgar floating breakwater.</p>	<p>Disturbance: human intrusion / noise / disturbance to roosting terns at Port Edgar</p>	<p>Sandwich tern</p>	
<p>Noise levels from construction activities will be maintained below 75dBL_{Aeq} at Sandwich tern roost sites at Long Craig Island and Port Edgar at night (between one hour before dusk and one hour after dawn) during the post-breeding/ passage period for terns (between 15 August and 31 October in a given year). If it is unavoidable that noise limits will be breached between 15 August and 31 October, then Port Edgar and Long Craig Island should not be simultaneously impacted as one can be used as a refuge for roosting terns if the other is disturbed.</p>	<p>Disturbance: noise</p>	<p>Sandwich tern</p>	<p>In addition to the mitigation for roost sites, mitigation proposed in relation to the Forth Islands SPA (Jacobs Arup 2009e) requires noise levels at Long Craig Island to be maintained below 75 dBL_{Aeq} day and night between 1 May and 15 August each year, to avoid disturbance to breeding terns. During this period Long Craig Island is also used as a daytime loafing area and night-time roost site for Sandwich terns and will provide an alternative to the Port Edgar floating breakwater should terns be disturbed from there. Monitoring of noise levels from construction activities to be undertaken at Long Craig Island and Port Edgar floating breakwater from 60 minutes before sunset until sunrise between mid-August and October. The ECoW will identify and assess the significance of these levels on the tern population. Monitoring of bird responses to construction activities to be undertaken. Assessment of the significance of these activities on estuarine birds will be undertaken.</p>
<p>There will be no explosive excavation of Beamer Rock from 1 May until 15 August in a given year to avoid the risk of impacts on breeding terns on Long Craig Island</p>	<p>Disturbance: noise</p>	<p>Sandwich tern</p>	
<p>Maximum noise levels have been set at 75dBL_{Aeq}, equivalent to published daytime noise limits for people and based on the fact that noise levels which potentially cause limits to birds are similar to thresholds set for humans.</p>	<p>Disturbance: noise</p>	<p>All qualifying species</p>	
<p>The Contractor will employ a 'soft-start' to all noisy activities, defined as any construction activity resulting in an increase of $\geq 3\text{dB(A)}$ in the ambient noise level (dBL_{Aeq}) at Long Craig Island and/or the Port Edgar tern roost site. For the first seven days after the commencement of each noisy activity, the soft-start must be applied each time the machinery is stopped, even if this is only for very short periods. The duration of periods of inactivity requiring a soft start will be increased incrementally over this seven day period. Subject to assessment of bird responses to the activity, after seven days a soft start will only be required overnight or after an extended period of inactivity.</p>	<p>Disturbance: noise</p>	<p>All qualifying species</p>	<p>This will apply year round, for the purposes of minimising the risk of disturbance Firth of Forth SPA using the Forth estuary in the vicinity of the FRC throughout the year.</p>

Monitoring of noise levels will be carried out at Long Craig Island and Port Edgar floating breakwater in advance of works starting and during construction works. The ECoW will identify and assess the significance of these levels on receptor species in consultation with Jacobs Arup. Monitoring will be linked to an agreed management system to ensure works are modified as required if significant disturbance is identified.	Disturbance: noise	All qualifying species	Although not mitigation per se noise monitors will measure the combined levels of noise from construction activities and other ambient noise. This will be used to assess whether absolute noise limits for Port Edgar and Long Craig Islands during the breeding/roosting periods are being met, and also to identify noisy activities year round.
A working group including Scottish Natural Heritage will be established to finalise the detailed methodologies to be adopted by the project and its contractors with respect to noise levels, in advance of the works being undertaken.	Disturbance: noise	All qualifying species	
The Code of Construction Practice (CoCP) for the project will provide a framework for the application of all reasonable and practicable measures to minimise noise that in rank order of application will include: reduction of noise at source, screening the receptor from the noise source and lastly protecting the receptor from noise. The CoCP requires that Best Practicable Means (BPM) as defined within Control of Pollution Act (HMSO, 1974) will be employed to minimise construction noise and vibration disturbance.	Disturbance: Noise	All qualifying species	
The contractor will comply with the requirements in relation to the control of noise and vibration set out in all the RIAAs and Environmental Statement for any works associated with the construction the main crossing and approach viaducts over the Firth of Forth. To the extent that their proposals differ from those assumed by the Environmental Statement and the RIAAs, the contractor will consult with SNH, Marine Scotland and SEPA regarding the construction methods to be used and mitigation measures to be implemented to comply with the Appropriate Assessments.	Disturbance: Noise	All qualifying species	In relation to best practicable means, the contractor will employ appropriate measures which may include: <ul style="list-style-type: none"> • Appropriate selection of plant, construction methods and programming. Only plant conforming with or better than relevant national or international standards, directives or recommendations on noise and vibration emissions will be used. Construction plant will be maintained in good condition with regard to minimising noise output and workers exposure to harmful noise and vibration. • Construction plant will be operated and maintained appropriately, having regard to the manufacturer's written recommendations or using other appropriate operation and maintenance programmes which reduce noise and vibration emissions. All vehicles and plant will be switched off when not in use. • The positioning of construction plant and activities to minimise noise at sensitive locations. • The use of mufflers on pneumatic tools. • The use of non-reciprocating constructional plant
The contractor will comply with the requirements in relation to the control of noise and vibration set out in all the RIAAs and Environmental Statement for any works associated with the construction the main crossing and approach viaducts over the Firth of Forth. To the extent that their	Disturbance: Noise	All qualifying species	

<p>proposals differ from those assumed by the Environmental Statement and the RIAAs, the contractor will consult with SNH, Marine Scotland and SEPA regarding the construction methods to be used and mitigation measures to be implemented to comply with the Appropriate Assessments.</p>			
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APPENDIX P

**SUMMARY OF MITIGATION MEASURES TO ADDRESS POTENTIAL ADVERSE EFFECTS OF THE
FRC FOR THE RIVER TEITH SAC**

20. APPENDIX O: SUMMARY OF MITIGATION MEASURES TO ADDRESS POTENTIAL ADVERSE EFFECTS OF THE FRC FOR THE RIVER TEITH SAC

<p>Noise and vibration from construction activities (in particular piling and excavation of foundation for the central tower on Beamer Rock)</p>	<p>Atlantic salmon</p>	<p>Excavation work to be carried out to avoid night-time (between 1 hour before dusk and 1 hour after dawn). During actual excavation work, fish deterrent (FD) equipment will be used to encourage fish to avoid the area within the effective range of explosive or piling related work by inducing a natural evasion response. Such deterrents would be from a selection of techniques such as bubble curtains surrounding shallow, intertidal areas during the standing water period between tidal states or the controlled emission of noise at the appropriate level to deter Atlantic salmon without causing harm.</p> <p>Atlantic salmon are sensitive to noise and vibration construction activities and these will be maintained below +90dBht for 50% of the estuary width. Provided other mitigation measures are in place (i.e. acoustic fish deterrents) the remaining 50% of the estuary width would be permitted to experience levels above this.</p> <p>The Contractor will employ a 'soft-start' to all construction activities that result in an increase of $\geq 3\text{dB(A)}$ in the ambient noise level (dBLAeq).</p> <p>Monitoring will be carried out of noise levels during construction works.</p> <p>Regular monitoring of the FD equipment, underwater noise and vibration levels produced by excavation and piling activities.</p> <p>The ECoW will assess the significance of noise levels and disturbance reactions.</p> <p>Lamprey, which are considered to have poor auditory perception may not be mitigated with the current mitigation proposed therefore alternative non-explosive excavation processes will be more suitable. If this is not possible, conducting the excavations and piling activities during low tide and during daylight hours will be necessary as this will limit the presence of lamprey within the work area.</p> <p>The Construction Environment Management Plan (CoCP) for the project will provide a framework for the application of all reasonable and practicable measures to minimise noise and pollution. The CoCP requires that Best Practicable Means (BPM) as defined within Control of Pollution Act (HMSO, 1974) will be employed to minimise construction noise, vibration and pollution.</p>	<p>A review of the scientific literature with respect to the noise levels that disturb fish suggests that increase in noise above ambient levels has the potential to delay the passage of migrating salmon. Lamprey, however, are devoid of a swim bladder which means that they only have rudimentary sound perception and will not be adversely affected by noise and vibration emissions at the site.</p> <p>Maximum noise levels at specific sites during sensitive periods have been set at 90dBht, equivalent to published strong avoidance threshold (Nedwell et al., 2003, 2005).</p> <p>CoCP is a dynamic document and as such will be subject to changes and updating as it is developed.</p>
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APPENDIX Q

NOISE INSULATION/TEMPORARY RE-HOUSING INVENTORY: SUMMARY

21. APPENDIX P: NOISE INSULATION/TEMPORARY RE-HOUSING INVENTORY: SUMMARY

Rec. No.	Max. No. of Days in Any Consec. 15		Triggered?		Max. No. of Days in Any 6 Months		Triggered?	
	for NI	for TR	NI	TR	for NI	for TR	NI	TR

NI or TR	Qualifying Property	Listed Building?	Conservation		Additional Consent		Status of Installation
			Area?		Required?	Obtained?	

APPENDIX R

NOISE INSULATION/TEMPORARY RE-HOUSING INVENTORY: RECEPTOR LOG

22. APPENDIX Q: NOISE INSULATION/TEMPORARY RE-HOUSING INVENTORY: RECEPTOR LOG

Receptor No.:																		
Receptor Name:																		
Predicted Noise Levels										Measured Noise Levels								
S61	Month	Noise Insulation			Temporary Re-housing			Date of	Measured Exceedance	Day or Night	Ambient	S61	Exceedance?	NI or	Rolling Count:			
Ref.		No. of	In Any	Rolling	No. of	In Any	Rolling	Measured			Level	Level		TR?	15 Day		6	
		Days NI	Consec.	6 Month	Days	Consec.	6 Month	Level							NI	TR	NI	TR
		Exc.	15 days	Count	TR Exc.	15 days	Count											

APPENDIX S

NOISE INFORMATION REQUIREMENTS FOR PREPARATION OF A PLAN FOR CONTROL OF NOISE AND VIBRATION (PCNV)

23. APPENDIX R: NOISE INFORMATION REQUIREMENTS FOR PREPARATION OF A PLAN FOR CONTROL OF NOISE AND VIBRATION (PCNV)

Note: A PCNV can take a minimum of 77 days to be approved and works cannot commence until a valid PCNV is in place. (see contract document A2 App1/9 page 233 para 1.10 - extract below)

1	Reference:	PCNV/00001	Notes
2	Title:	Land-based Geo-technical Investigations 2011	Provide a brief title we can use that described the works
3	Description of the works proposed:		Full description of the works
4	Locations of the works (append plan if necessary):		A plan showing the locations of the plant which will be operating. Where there is multiple plant operating indicate the number and the type.
5	Intended start date of works	Employer requires proposed start date	A PCNV can take a minimum of 77 days to be approved. Works cannot commence until a valid PCNV is in place
6	Duration of the works	Employer requires proposed end date	How long will the works last? Identify any contingency period separately. Works will not be covered by a valid PCNV if they overrun beyond the stated period and will be stopped.
7	Proposed working days and hours:	Employer requires confirmation of which days of the week and what hours are proposed. Note info in bold in "Notes" column.	Which days of the week will be worked? What are the intended working hours? Are there any circumstances where the works could occur outside of these stated days/hours? Note that if works do overrun beyond the stated hours, they will not be covered by a valid PCNV and will be stopped.
8	Method statement describing how the works will be undertaken (append if necessary):	Employer requires a method statement.	A method statement describing the working methods
9	Table of equipment which will be used during each phase or location of the works (use additional sheet if necessary):		A full list of all the equipment to be used at each location

Item No	Description	Quantity	Type	Power Rating	Specific Operating Parameters	Operating cycle
1						
2						
3						
4						
5						
6						

10	Items of plant operating at the same location concurrently:			Identify in the table or if easier on a plan, the plant, type and number which are operating at each location concurrently
	Location (From plan identified in 4)	Plant items (Item 9)	Notes	
EXAMPLE:				
	Location (From plan identified in 4)	Plant items (Item 9)	Notes	
	1	2,3,5	Mornings 08:00 – 11:00	Provide notes indicating when the plant is operating
	4,5,6	1,4,6	evenings and weekends 19:00 – 23:00	

11	Source noise levels		
	Does plant comply with the relevant EC noise Directive? (2000/14/EC Outdoor Noise Directive)	Y / N	Check equipment complies with this or any other relevant directive.
	Does the plant have a specification sheets from the manufacturer indicating the noise levels?	Y / N	Provide a copy of the specification sheet.
12	Provide a description of why this is the most appropriate plant for the works.	Employer requires this	Justify the plant selected for this work
13	What other equipment could be used to perform the same function	Employer requires this	State if other plant is available.
14	If other plant is available is it potentially quieter in operation?	Employer requires this	Do all of the works have to be done with the same plant. Can some of it be done with other quieter plant?
15	If other plant or techniques are possible and are potentially quieter, what are the reasons for not using them?	Employer requires this	Cost can be the reason but should not be the only reason, consider increased duration, availability, safety etc
A2 App1/9 page 233 para 1.10			
<p>The Contractor shall not commence any construction activity until the Contractor has consulted the NLG regarding the NVMP and the relevant PCNV, as appropriate, in accordance with this Appendix and has then secured the Employer's approval to the same plans in accordance with the Review Procedure, as required by this Appendix, and, where additional local authority consent is necessary in accordance with the CoCP, such consent has been granted. The Employer will only grant approval without full acceptance of the Contractor's plans by the NLG in Exceptional Circumstances. The procedure that shall be followed in accordance with this Appendix is shown in Figure 1 of this Appendix.</p>			

16	If exceptional circumstances apply then please describe in full these circumstances		To invoke this clause will require considerable justification and is not likely to result in approval for general works unless a full justified and reasoned argument for not producing a PCNV is supplied. Health and Safety reasons may be one reason this could be invoked.
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