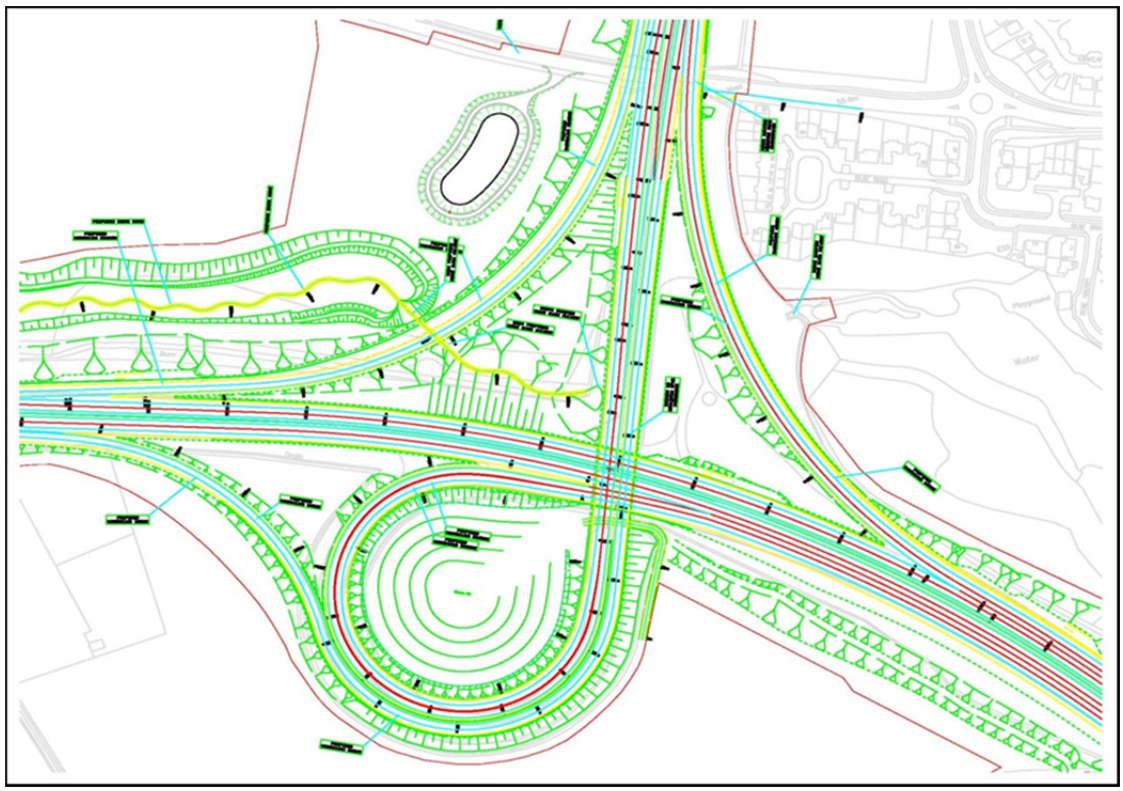
SRB Civil Engineering Limited
ROADBRIDGE
CIVIL ENGINEERING & BUILDING CONTRACTORS
BUILDERS SISK CONTRACTORS Established 1859
Gifford

FORTH REPLACEMENT CROSSING
M9 Junction 1a – Project Quality Plan: Volume 4
NOISE AND VIBRATION MANAGEMENT PLAN



TRANSPORT SCOTLAND

Submission: 14th September , 2011

FORTH REPLACEMENT CROSSING M9 Junction A1

SRB NOISE AND VIBRATION MANAGEMENT PLAN

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1	22nd August	RT	Comments on Draft incorporated	MB	SOB
1	14th September	RT	Further Comments on Draft	MB	SOB

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NOISE AND VIBRATION MANAGEMENT PLAN
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Note: Appendices are live documents and are included here as examples. The live versions will be maintained on the proposed project extranet.

1.0 INTRODUCTION

1.1 Purpose of NVMP Plan

This Noise and Vibration Management Plan (NVMP) describes the management process, procedures and measures that will be employed to control, mitigate and monitor noise & 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.

1.2 Specific Contract Requirements

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 2011
- Forth Crossing Bill Commitments and Undertakings
- Code of Construction Practice (CoCP), Revision 5, December 2010
- SRB Outline Construction Environmental Management Plan (CEMP), Revision Draft
- Employers Requirements, contract issue, Part A2: Specification, Appendix 1/9: Control of Construction Noise and Vibration;
- Environmental Statement (ES) 2009

1.3 Noise and Vibration Commitments

The Environmental Statement Commitments relating to noise and vibration emissions occurring as a result of construction activities are reproduced in Appendix J.

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.

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 documents is shown in *Figure 1.1* below.

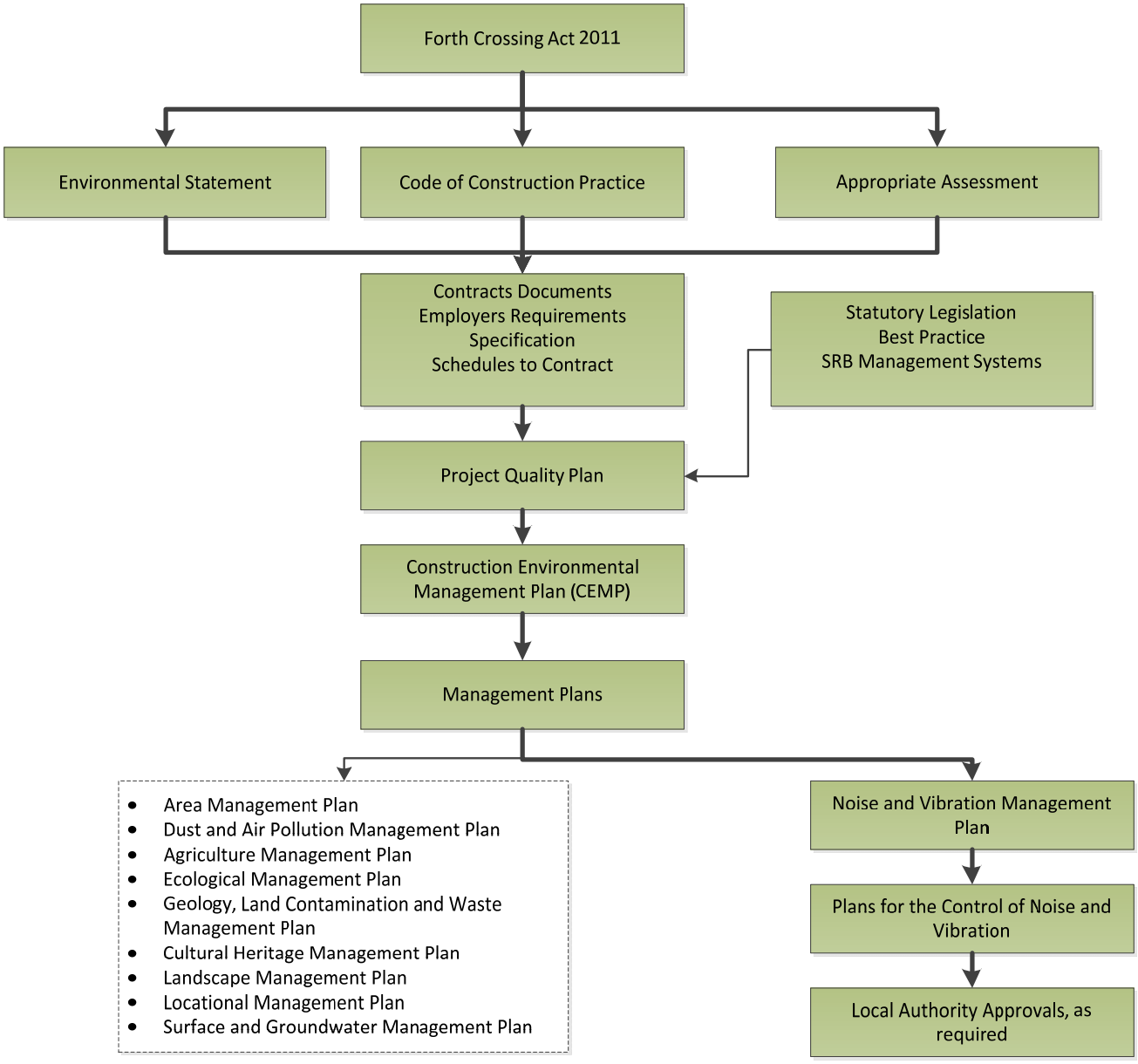


Figure 1.1 Flowchart Showing the Structure and Hierarchy of Documents

The hierarchy and development of the NVMP within the SRB Project Quality Plan for the M9Junction 1a Project is outlined in *Figure 1.2*.

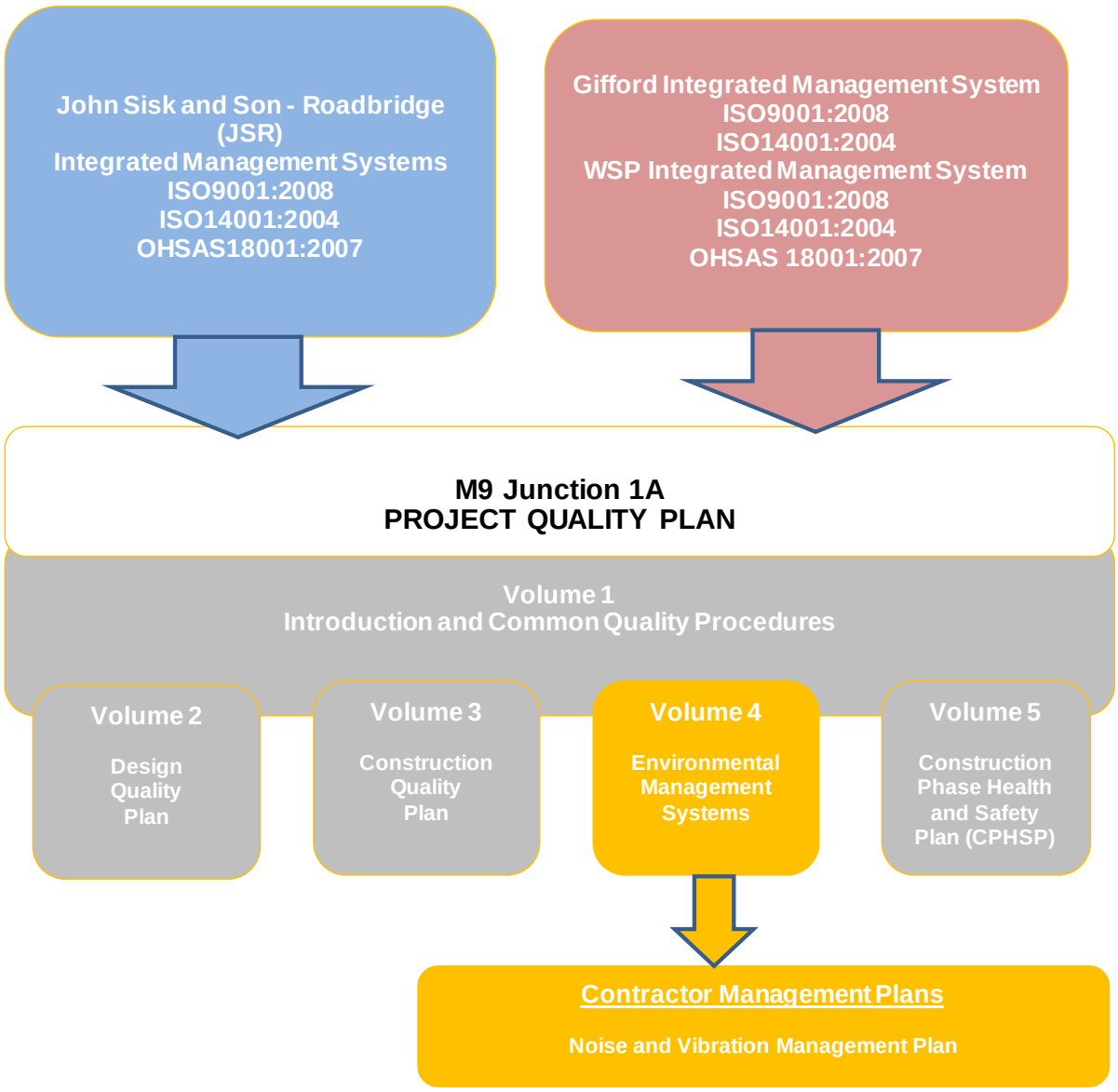


Figure 1.2 Flowchart Showing the Structure and Hierarchy of Documents within the SRB Management System for the Project

2.0 SRB POLICY ON NOISE MANAGEMENT AND MITIGATION FOR THE M9 JUNCTION 1a PROJECT

SRB are fully aware of the requirements of the M9 Junction 1a Contract and the sensitivities and concerns of local communities to the potential for noise and vibration pollution from the construction and operation of the works. We are also aware of the commitments undertaken within the Environmental Statement and the Code of Construction Practice and made law through the Forth Crossing Act (2011).

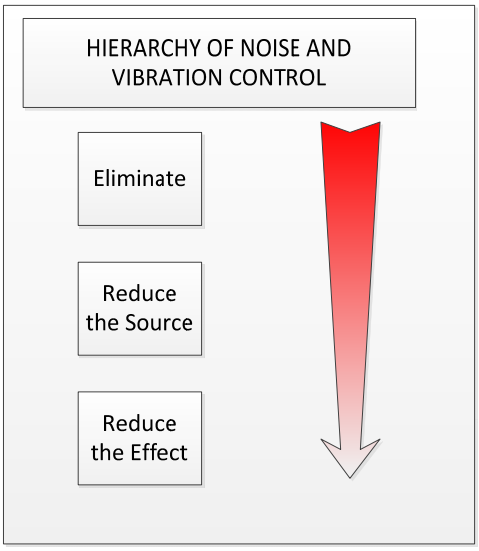
SRB are committed to the design and construction the works with the highest degree of sensitivity to the local community and the potential effects of our operations on the general public through the following means:

SRB will consult and comply with all required stakeholders regarding potential noise and pollution sources through the Noise Liaison Group forum and Community Group Consultation Process. Submission dates for documents to the NLG will be adhered to. SRB will submit 3 month look-ahead programmes to the NLG to ensure a steady flow of documentation of consistently high quality through the Project.

Works will be designed and executed using best practicable means, as outlined in the Control of Pollution Act 1974, to minimise construction noise and vibration and operational noise and vibration.

SRB will comply with all the requirements of the Plans for Control of Noise and Vibration process. All construction activities, regardless of whether they generate noise and vibration, will be assessed through the use of PCNV Plans. The PCNV's will be developed and reviewed in accordance with Appendix 1/9. Each PCNV will be of appropriate detail to ensure all activities are assessed. As the contract progresses, a database will be maintained of information gained from site measurements of actual plant operations. This will ensure the accuracy of the prediction process is continually improved through the life of the Project.

SRB will endeavour to implement the following hierarchy of control regarding noise and vibration:



Step 1 Eliminate the Source – Construct the element using alternative means or methods of work to eliminate the potential for noise and vibration pollution

Step 2 Mitigate and Reduce the Source – Reduce the noise and vibration from source through plant selection, screening, enclosed machinery and methods of work

Step 3 Mitigate and Reduce the Source and/or the Receptor – Reduce the effect on the surrounding community through suitable hours of work and phasing or acceleration of localised works to minimise duration of exceedences. Also, through provision of noise insulation or temporary alternative accommodation to mitigate at noise receptor locations.

SRB will aim to reduce **all** noise and vibration emissions, regardless of the threshold limits in particular areas to levels as low as reasonably practicable. This will minimise the effect on the surrounding community. SRB will try to ensure that cumulative effects of multiple operations will not result in unacceptable noise and vibration levels.

Where noise and vibration levels are unavoidably high and cannot be reduced or mitigate by as far as practicable, SRB will seek the necessary approval from the Local Authority and Employer.

SRB will assign appropriately qualified and experience personnel to oversee the monitoring of the noise and pollution control of the works. These staff shall have sufficient authority to stop works as required where noise and vibration levels vary significantly from predicted and agreed levels or where complaints have been received.

The SRB Construction Team will be fully involved and aware of the requirements of this Noise and vibration Management Plan, the creation of the PCNV's and their role in ensuring contract compliance.

3.0 KEY NOISE AND VIBRATION ISSUES

3.1 Best Practicable Means

All construction works will be carried out using the Best Practicable Means (BPM) as defined in the Control of Pollution Act 1974[1] 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.

Guidance on Best Practicable Means is outlined in BS 5228 and these measures are given in *Appendix A*. These include the following:

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. This shall be enforced through site rules and communicated to the workforce during site inductions and regular toolbox talks
- Design and use of site hoardings and screens, where necessary, to provide acoustic screening at the earliest opportunity. 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 as far as practicable
- The use, where necessary, of effective sound reducing enclosures.

[1] 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

Piling 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. SRB do not intend to use blasting as a means of rock excavation, due to the proximity of properties and live carriageway to the works area.

4.0 NOISE AND VIBRATION MANAGEMENT PROCESS

4.1 Reporting and Responsibilities

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 specialist, Senior Engineer and the Noise and Vibration Clerk of Works can be found in Appendix B.

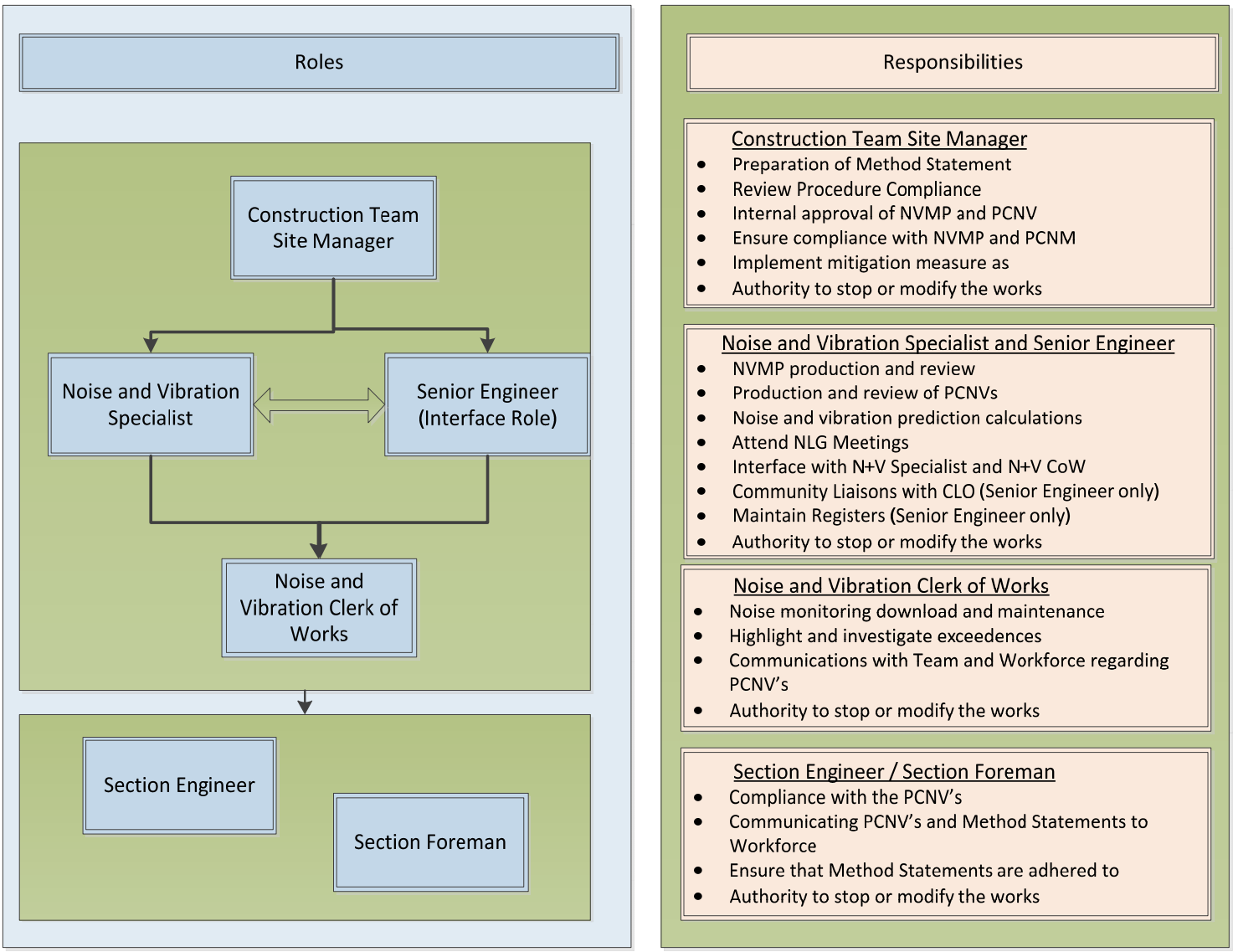


Figure 4.1 Flowchart showing Roles and Responsibilities

The Senior Engineer will be full-time on site. The Noise and Vibration Clerk of Works will monitor the permanent station readings off-site and will come to site to carry out mobile noise and vibration readings as required.

4.2 Process for the Execution of the Works

Works will not proceed until the relevant PCNV has been accepted by the Employer. PCNV's will be developed in conjunction with specific Method Statements for associated works so that the two documents may inform each other. A **HOLD** Point will be inserted into each Method Statement to ensure that a PCNV has been prepared and approved for each activity. Works will not proceed without the signed approvals in place.

The PCNV and Method Statements will be communicated to the workforce (including sub-contractors and suppliers, through the following methods to ensure that all personnel are aware of the controls applicable to the activity and the potential noise and vibration impacts of the works:

- Site Induction and Site Environmental Rules
- Regular Toolbox Talks
- Specific Pre-task briefings prior to commencing each element

4.3 PCNV Development

Figure 4.2 shows the interaction between the contract team and the processes involved in the development of compliant PCNV's that are appropriately detailed for the Works.

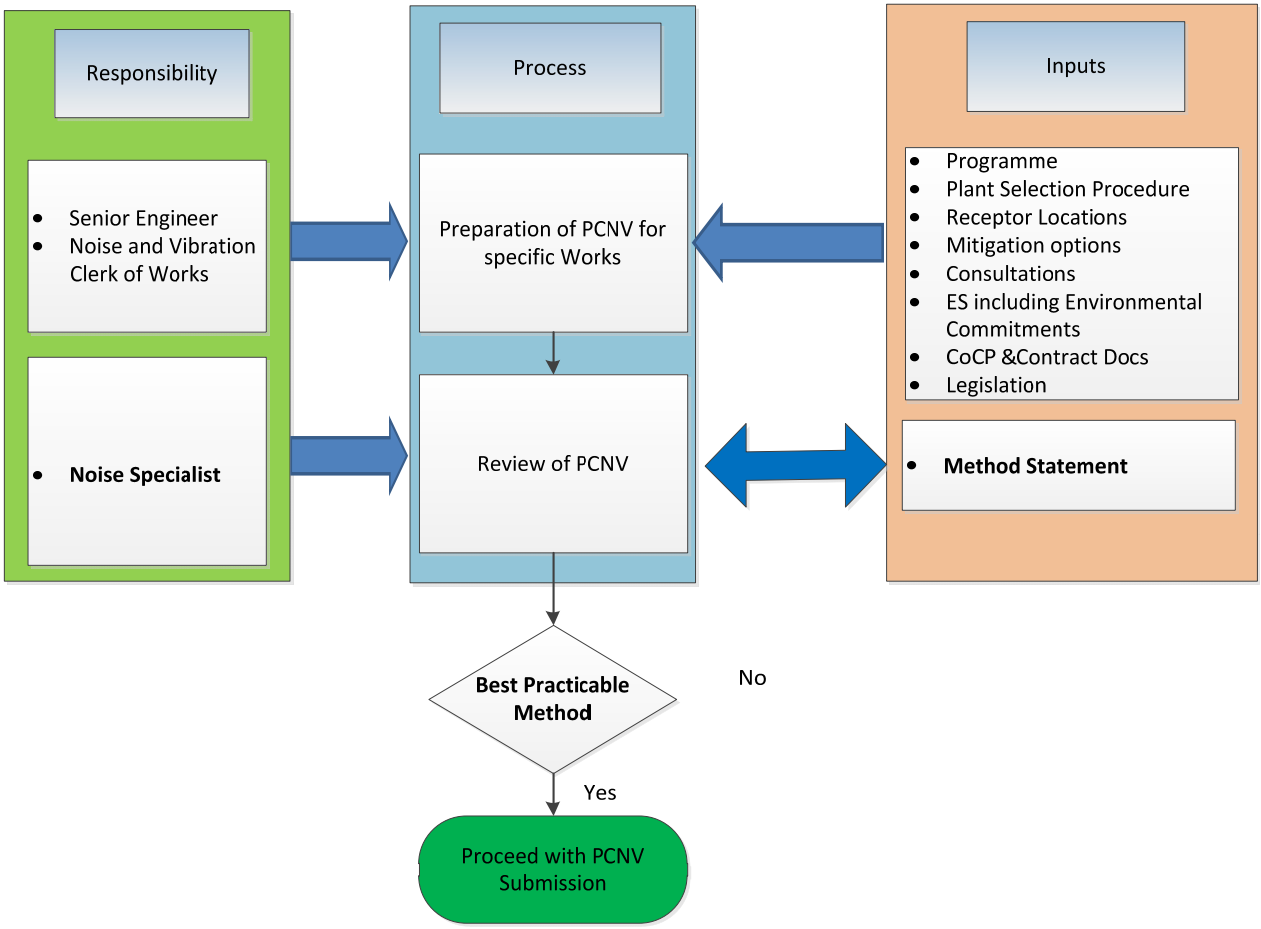


Figure 4.2 Flowchart showing the developmental process and personnel involved in preparing a PCNV

4.4 PCNV input to Method Statement Development

The Noise Team will work closely together to ensure that the control and management of noise and vibration informs emerging method statements for the works. The proposed methodology for the development and approvals of Method Statements within the SRB Project Team is shown in *Figure 4.3* below.

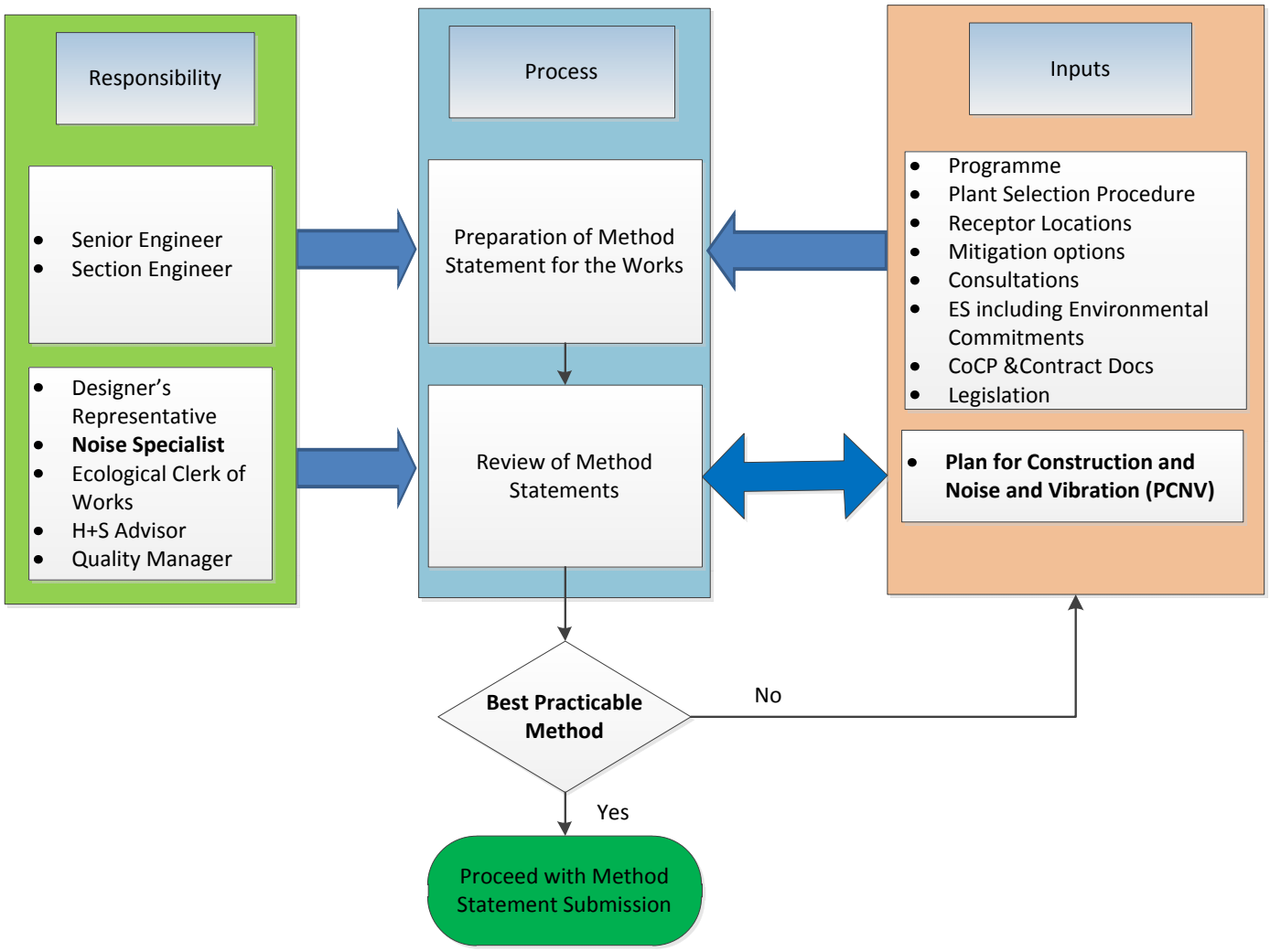


Figure 4.3 Flowchart showing team interactions in the determination of best practicable means prior to submission of a Method Statement

The mechanism to collect information and method statements from the construction team is presented in *Appendix L*. This information request pro-forma 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.

4.5 Noise Liaison Group

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

- Transport Scotland

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

Monthly meetings are initially expected with additional meetings as and when required. The NLG will meet at least every two months or more frequently as required. 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.

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.

4.6 NVMP Approval

Construction activities will not commence until this NVMP and each activity-specific PCNV is approved. The following approval process, as shown in *Figure 4.4* below (*extract from Appendix 1/9, Figure 1*), will apply to the NVMP

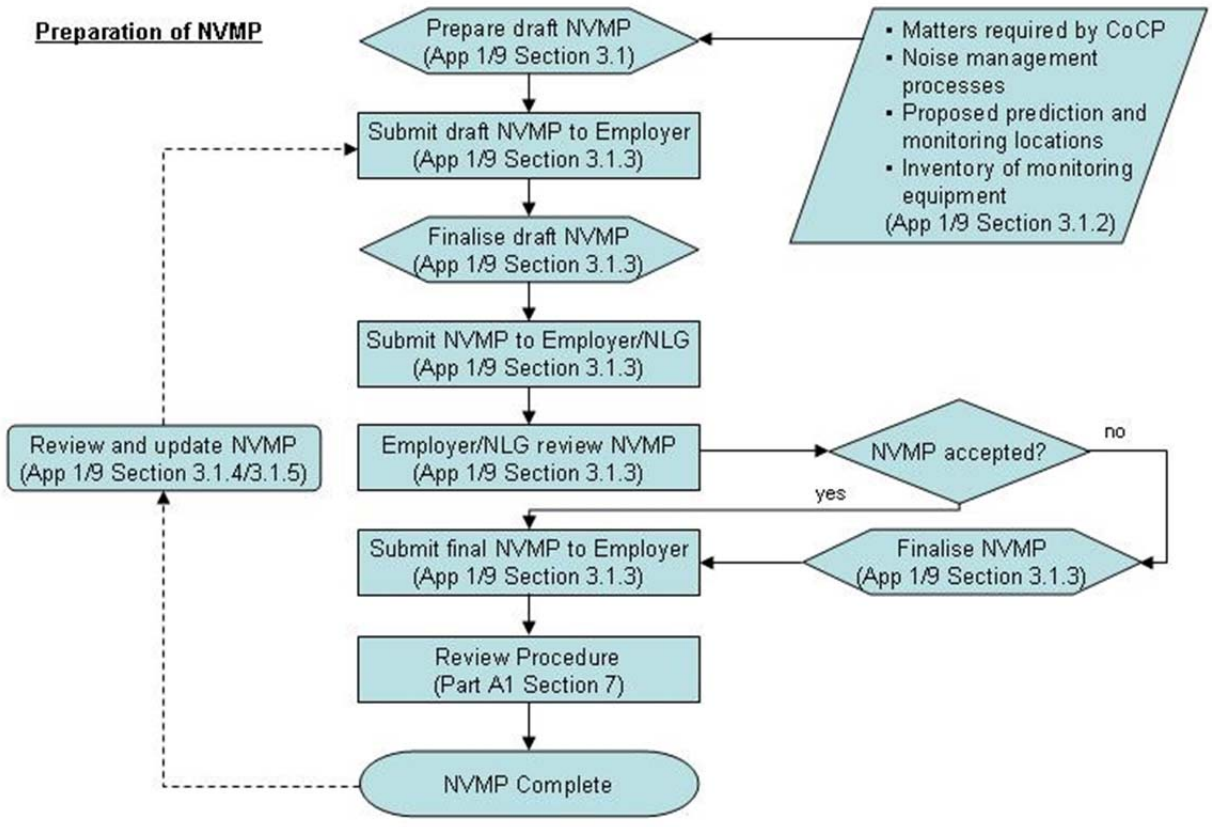


Figure 4.4 Flowchart for the approval and review of the Noise and Vibration Management Plan

Within the appendices of this document are a number of example profromas, 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. The latest revisions of all relevant documents will be located on the Project Extranet. Superceded Revisions will be archived in a separate folder with read only access.

4.7 PCNV Approval Process

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 4.5*, unless otherwise agreed with the Employer. 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.

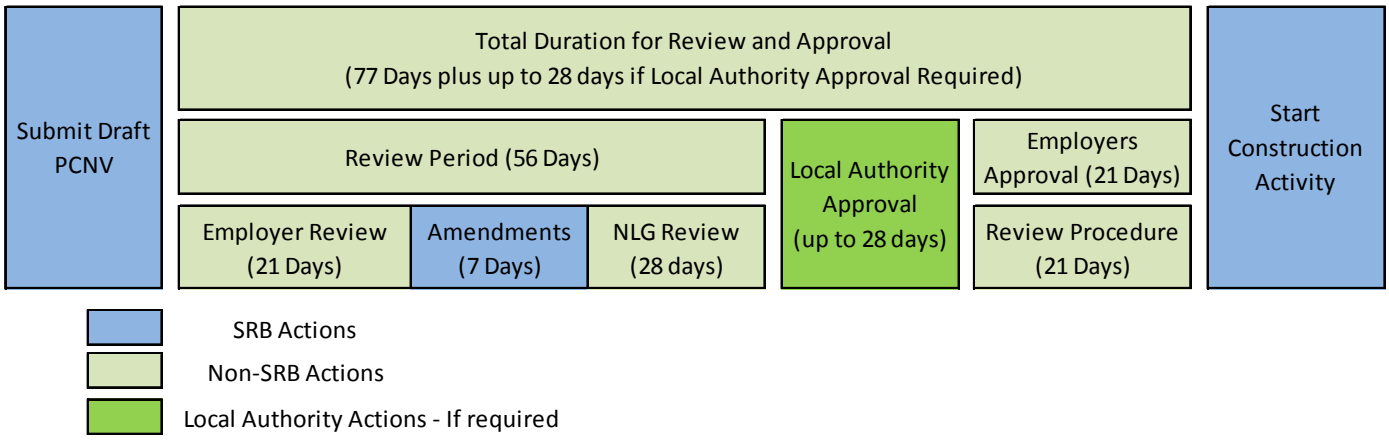


Figure 4.5: Timeline for PCNV Approvals

The flow diagram showing the detailed approval process for PCNV's is presented in *Figure 4.6* below (*extract from Appendix 1/9, Figure 1*).

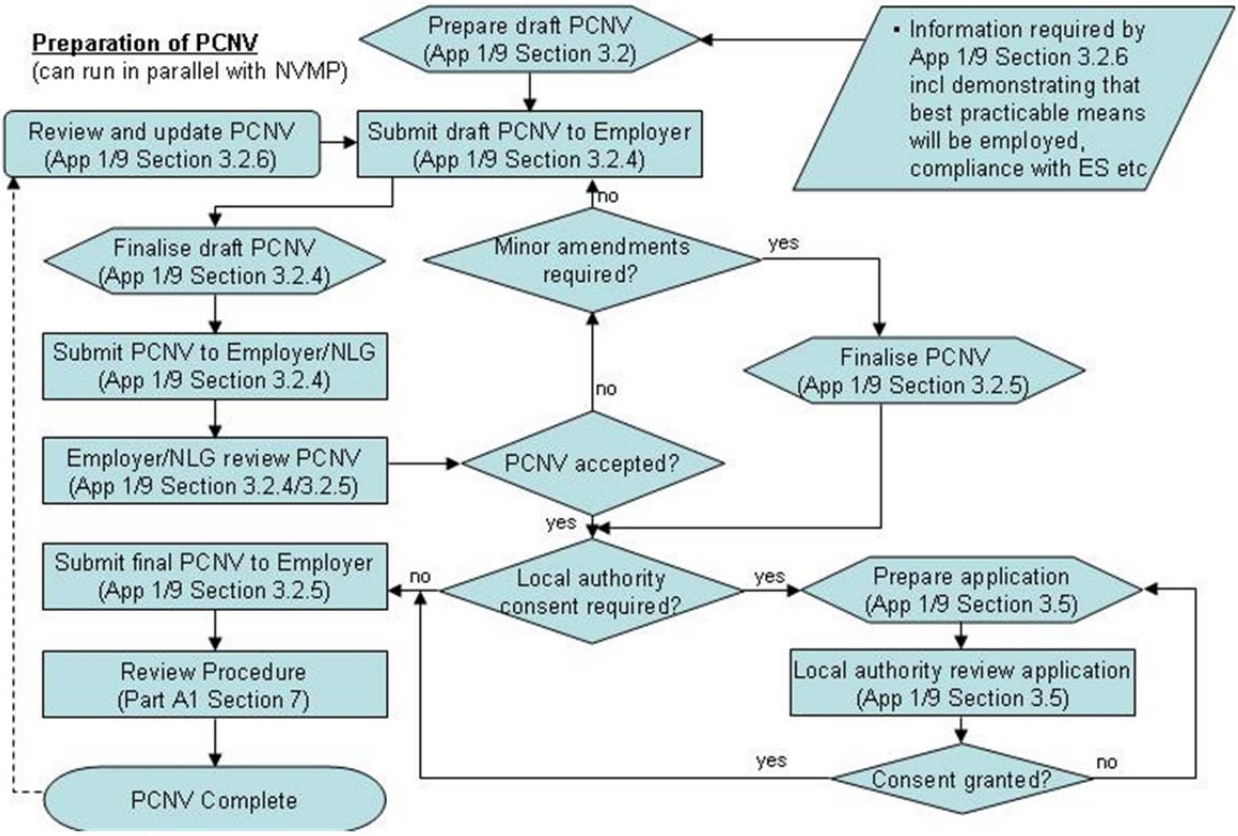


Figure 4.6 Flow Diagram for Approval of Plans for Control of Noise and Vibration (PCNV)

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.

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.

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.

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.

4.8 Noise and Vibration Staff

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*.

In a co-ordination role, the Senior Engineer will be the main focus for day to day enquiries and to ensure the PCNVs are implemented in accordance with the approvals. He will arrange for liaisons with both the Designer's Noise and Vibration Specialist and the Contractor's Environmental Specialist as per *Figure 4.1*.

4.9 Construction Plant Source Levels

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..

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, then a full review and the pollution incidence procedure outlined in Section 5.4 will be instigated. Noise levels at the closest receptors will be checked against the predicted values in the PCNV.

Following the initial measurement, a monthly monitoring 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. The monthly monitoring programme will be overseen by the Noise Specialist and conducted by the Noise and Vibration Clerk of Works.

Maximum noise levels (L_{Afmax}) 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*. In addition, prior to arriving on site, where practicable, noise and vibration surveys will be carried out on plant at other sites in order to provide as much advance data as possible regarding plant LAEQ and LMAX outputs.

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.

4.10 Noise Insulation and Temporary Re-Housing Inventory

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 K*.

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 0800 – 1900 1900 – 2200	1 hour 11 hours 1 hour	70 75 65	80 85 75
Saturdays	0700 – 0800 0800 – 1900 1900 – 2200	1 hour 10 hours 1 hour	70 75 65	80 85 75
Sundays and Public Holidays	0700 – 2200	1 hour	65	75
Any Day	2200 – 0700	1 hour	55	65

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

Dwellings where the predicted noise levels are expected to exceed 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. The inventory will also identify if the dwellings are listed buildings or are situated in a conservation area.

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 exceedences and the activity causing the exceedence.

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. Should the owner or occupier propose a reasonable alternative then this will be submitted to the Employer for approval.

In the case of exceptional circumstances outlined in 5.2.18 of the CoCP, reasonable expenses incurred by the occupier in providing suitable alternative residential accommodation in accordance with the provisions of the 1973 Act may be paid. Considerations in relation to temporary rehousing will be based on the SRB programme, proposed method of working and any predicted noise effects likely to occur. Any requests in relation to this aspect will be considered on an individual basis and will take consideration of the circumstances of the individual making the application.

4.11 Exposure of Workers to Noise

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. SRB will maintain two number Model 22A-TH

dosemeters on site for this purpose. A schedule of monitoring will be created to ensure all works activities are monitored at regular intervals.

The co-ordination of the SRB approach to occupational noise will be detailed within the Construction Phase Health and Safety Plan (Volume 5 of the Project Quality Plan) and will be in full compliance with the Noise at Work Regulations 2005.

4.12 Details of Included Mitigation and Maintenance Schedule

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 J* of this NVMP, and include items N9 to N10.

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 E*.

4.13 Details of Additional Mitigation and Maintenance Schedule

The need for additional physical mitigation, such as site hoardings, screens or bunds, will be identified and detailed in PCNVs for individual works.

Subject to Employer approval and Health and Safety Considerations, non-tonal alarms will be employed on plant in areas adjacent to sensitive receptor locations. In addition, traffic management and haul routes will be designed to minimise the amount of reversing and resultant activation of the reversing alarms on all plant.

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 E*.

4.14 Community Engagement

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).

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.

SRB will actively seek to engage with local groups adjacent to the Project. In particular, we will seek to meet affected residents of Kirklands Park Close, Buie Rigg and Cotlaws / King Edwards Way at the earliest possible stage to discuss the proposed works and determine ways to ensure they have the minimum impact practicable on these communities.

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.

4.15 Respite Periods and Hierarchy for Extended Working Hours

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.

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.

Potential Additional Noise Impact	Preference	Extended Working Hours	
		Areas with low ambient noise†	Areas with high ambient noise
Lowest ⇩	Most 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
Highest	Least preferred	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

Table 4.2 Extended Working Hours Hierarchy

5.0 PLANS FOR THE CONTROL OF NOISE AND VIBRATION (PCNV'S)

5.1 Number and Scope of PCNV Submissions

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

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.

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 a high level of disturbance both for residential and ecological receptors

5.2 Demonstration of Compliance with ES

Noise, vibration 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 *Appendix J*.

5.3 Procedure in the Event of Likely Exceedences

Where the noise and vibration monitoring of the construction activities show that the noise and vibration thresholds or predicted noise and vibration levels have been exceeded, corrective actions will be employed to carry out a root cause investigation and attempt to avoid any repetition. These corrective actions will be actioned through the Non-conformance and corrective action reporting procedure by the Quality Manager. This ensures that all non-conforming PCNVs and site operations, with regard to noise and vibration levels are recorded and reported to the Employer, actioned through to closeout and fully auditable and traceable. If there are any additional mitigation measures, changes to working practices or other appropriate measures to be instigated, as a result of this process, (e.g. securing local authority consent in accordance with the CoCP) these measures will be submitted to the NLG for approval..

5.4 Procedure for Dealing with a Noise and Vibration Pollution Incident

If noise or vibration predicted levels exceed the levels that are predicted within the PCNV's, or if plant not covered by the PCNV are used, then an immediate review will take place between the Noise and Vibration Clerk of Works, the Senior Engineer and the Noise and Vibration Specialist.

If noise or vibration triggers, *Appendices H & I*, are exceeded on any of the fixed monitors or temporary monitors, the triggers being initially set lower than the assessment thresholds, an automatic alert will be sent to the Noise and Vibration Clerk of Works in real time as they happen and will be investigated. Should the source of the exceedence 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. *Figure 5.1* details the management process

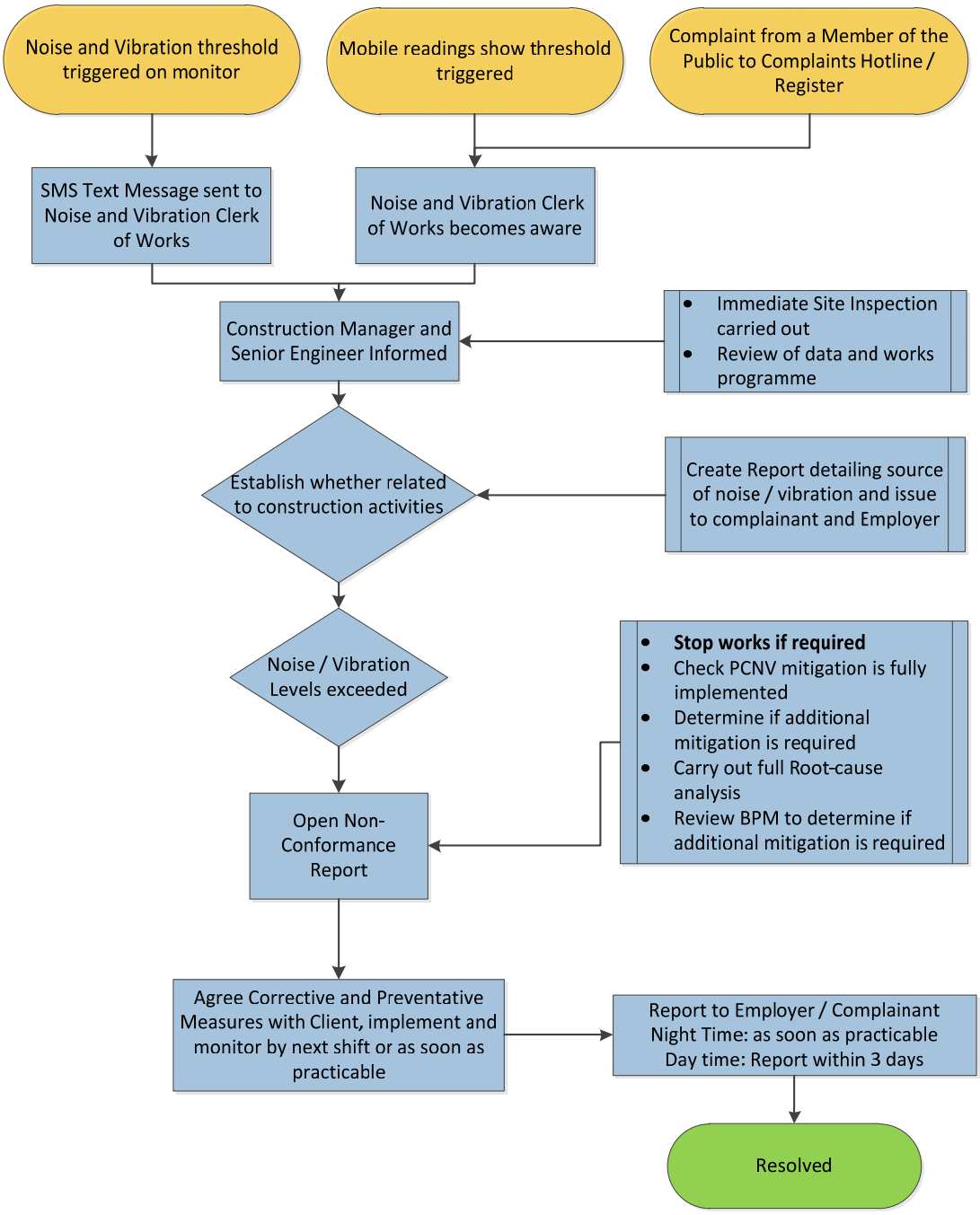


Figure 5.1 Flow Diagram for dealing with Noise and Vibration Pollution Incident

Note that noise triggers will be set at 5dB below the threshold limits initially. The trigger will relate to the 10minute value. The thresholds vary by location and by period (daytime, evening, night-time). For instance King Edwards Way is 75dB LAeq,11hr for daytime, Buie Rigg and Kirklands Park Grove are 70dB LAeq,11hr for daytime. The maximum thresholds (LAFmax) set out in the Employer's Requirements (Part A2, Appendix 1/9, paragraph 3.2.6(q)) are 5dB below those set out in the CoCP, i.e. 90dB for King Edwards Way, and 85dB for the other two monitoring locations.

Noise event recording will be used at the most sensitive receptor locations (2CNV and 16CNV) to clarify whether triggers are caused by construction activities. Elsewhere, close recording of site activities in the site diary combined with attended monitoring will provide evidence.

In addition, SRB will raise a Non-Conformance Report for the incident. This will ensure that a root-cause analysis is carried out on each incident and that appropriate corrective and preventative action measures are agreed with all parties and implemented in a timely fashion.

5.5 Procedure for Obtaining Local Authority Consent

Should the Plans for Control of Vibration or the monitoring data indicate that the noise level thresholds may or have been exceeded then alternative methods and mitigation will be considered in accordance with Best Practical Means (BPM). Should exceedences still remain after this process, then applications will be prepared and submitted for local authority consent at the earliest opportunity in accordance with the process outlined in *Figure 4.6* and the timescales outlined in *Figure 4.5*.

5.6 Conditions under which provision of additional mitigation at buildings or other sensitive receptors

Provision of mitigation at locations where, after application of Best Practicable Means, predicted threshold readings will still exceed the limits as set out in the contract documents, will be determined by the Project Team in line with the requirements of the Contract Documents including T4.1, above.

The provisions will follow the hierarchy of control of noise and vibration as detailed in Section 2.

5.7 Details of site hoardings, screens or bunds to provide acoustic screening during construction including inspection and maintenance schedule.

Where hoardings, screens or bunds are used to provide screening, their dimensions (length and heigth) will be recorded on a suitable plan drawings around the activity, the noise of which, they are intended to mitigate. Their acoustic properties, including a material datasheet, construction methodology and other details, as required will be recorded on a register to be uploaded to the Project Extranet – “Four Projects”. Weekly inspections shall be carried out by the Senior Engineer to ensure that erected noise mitigation measures are maintained properly and still provide adequate noise screening. Where defects are found, these will be actioned within one working day of being uncovered.

5.8 Process to be employed in respect of measuring and reviewing maximum noise levels

Where measured levels are identified as exceeding, or being likely to exceed, the relevant maximum noise level criterion from Table 5.4.1b in the CoCP adjusted by -5dB (as required in paragraph 3.2.6(q) of Appendix 1/9 of Part A2 of the Employer’s Requirements) and it is confirmed that the works being undertaken as part of the scheme are the source of the noise, then SRB will be required to undertake a further review of the best practicable means employed for the activity to minimise noise. At night, the SRB Noise and Vibration Clerk of Works or Senior Engineer will be required to investigate the exceedence or likely exceedence immediately, report this and the findings of the review to the Employer’s Representative and relevant local authority and implement any further mitigation identified as being necessary as soon as is reasonably practicable. At other times, the same actions will be taken by the SRB Noise and Vibration Clerk of Works or Senior Engineer except that the review will be reported within 3 days. Where the exceedence coincides with a noise complaint, then the Senior Engineer assisted by the Site Operations Manager will implement any additional mitigation identified by the investigation before the next shift when the relevant

activity will be undertaken again (e.g. if the maximum level exceedence and complaint occur at night then the additional mitigation will be implemented by the SRB Senior Engineer assisted by the Site Operations Manager before the same works can be undertaken at night again).

Whilst undertaking the investigations, SRB will be permitted to continue construction works provided the relevant criterion in Table 5.4.1a or Table 5.4.1b of the CoCP (adjusted by -5dB as required in paragraph 3.2.6(q) of Appendix 1/9 of Part A2 of the Employer's Requirements) is not exceeded by more than 5dB(A) unless instructed otherwise by the Employer's Representative. The Employer's Representative will consider whether best practicable means are being used to minimise noise and take appropriate consideration of any advice provided by the Noise Liaison Group in making his determination.

The Employer's Representative will consider the report provided by SRB on the investigation of any exceedence or likely exceedence of the relevant maximum noise levels, including taking appropriate consideration of any advice provided by the Noise Liaison Group. Where it is accepted by the Employer's Representative following this consideration that:

- an activity will significantly exceed the Category C maximum noise levels;
- the resulting maximum noise levels would seriously affect the enjoyment of property for a substantial period of time; and
- there is no additional best practicable means mitigation that could be implemented at source to avoid an ongoing exceedence.

then SRB will be required to consider additional mitigation at the receptor consistent with the measures set out in this CoCP (e.g. provision of noise insulation or temporary re-housing) and provide such mitigation if agreed with the owner and occupier of the receptor.

5.9 Classification of PCNVs (RAG Traffic Light Risk Assessment)

It is proposed to utilise a Red Amber Green Traffic Light Risk Assessment and each PCNV will be categorised to reflect the liklihood of noise disturbance (*Figure 5.2*). This will guide the level of detail for each PCNV and will take into account matters such as scale of the works, proximity to noise / vibration sensitive receptors and hours of work.

TRAFFIC LIGHT SYSTEM	
	Low Likelihood of Noise Disturbance
	Medium Likelihood of temporary disturbance
	High Likelihood of Significant Disturbance

Figure 5.2 RAG Traffic Light Noise Risk Assessment

6.0 NOISE AND VIBRATION PREDICTION AND MONITORING

6.1 Sensitive Receptors

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. The receptors presented in *Appendix F* include all of the identified receptors for the M9J1a Contract, within the ES Appendix 19.2. SRB have identified a further three receptors (18-20 CNV) that have been added for assessment. Additional receptors will be added to this list as they are identified and assessments undertaken for those locations as appropriate. Baseline monitoring shall be undertaken at all sensitive locations prior to works commencing in order to verify existing ambient noise data.

6.2 Calculation Methodologies

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 a spread sheet model in a format similar to F4 and F5 of BS5228:2009. 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.

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, manufacturer's data or from on-site measurements of the specific activity.

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 Ground borne Vibration": 1993.
3) BS5228: Part 2: 2009
4) Transport Research Laboratories Report 429 'Ground borne vibration caused by mechanised construction works'
5) Transport Research Laboratories Report 53 'Ground vibration caused by civil engineering works

6.3 Noise and Vibration Monitoring Locations

Permanent noise and vibration monitoring stations are proposed at the following locations:

No	Receptor Address	Daytime Ambient Noise Level $L_{AEQ,\ 12\ hr}$ [dB]*	Ambient to the nearest 5dB*	Daytime Assessment Level (AL) [dB]**	Evening Assessment Level (AL) [dB]**	Nightime Assessment Level (AL) [dB]**
2CNV	93 King Edwards Way	72	70	75	55	45
7CNV	15-17 Buie Rigg	67	65	70	55	45
16CNV	10 Kirklands Park Grove	67	65	70	55	45

*****From Stage 3 Environmental Statement, Appendix A19.2, Table 2.1: Predicted Daytime Noise Impacts*

***From T5.3.3 Category A Construction Noise Impact Criteria, Code of Construction Practice*

Note: There are no night-time ambient or maximum noise levels available for the M9J1a Section, therefore the lowest category (A) in Table 5.3.3 and T5.4.1b of The Code of Construction Practice will be used, adjusted by -5dB as required in paragraph 3.2.6(q) of Appendix 1/9 of Part A2 of the Employer's Requirements.

No	Receptor Address	Max. Daytime Noise Levels LAmax dB(A)*	Max. Evening Noise Levels LAmax dB(A)*	Max. Nightime Noise Levels LAmax dB(A)*	Easting	Northing
2CNV	93 King Edwards Way	90	70	60	311905	674111
7CNV	15-17 Buie Rigg	85	70	60	311641	674646
16CNV	10 Kirklands Park Grove	85	70	60	311801	674967

**From T5.4.1b Category A Maximum Noise Levels – Road Sections, Code of Construction Practice*

These locations are subject to the agreement of the Employer and the property owner. Initial walkover survey and noise and vibration calculations have indicated that permanent monitoring of these properties will provide correlative information that contract compliance is being maintained; due to their proximity to the works and the type of works proposed at these locations. These monitors will be remotely monitored. Trigger alarms will be activated should noise and vibration levels exceed the contract limits as per *Section 5.3* of this document.

In addition, SRB will provide a mobile noise and vibration monitor that will be deployed to the other locations listed within *Appendix F* when works are being carried out near to these locations. The frequency and type of monitoring will be detailed within the PCNV for each activity.

All Monitoring will be carried out in compliance with Section 2.7 of Appendix 1/7: Site Extent and Limitations To Use, of the Specification

6.4 Micro-siting of Fixed Monitors

Micro-siting will be determined through consultation with the land/property owner and will need to consider access, security, powering constraints and any hindrance to the land owner. All locations will be chosen with agreement by the Employer and the Noise Liaison Group. Proposed monitoring site including a map are included in *Appendix F*.

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 (normally closest to the works). Monitoring locations will be agreed with the NLG.

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

Vibration monitoring equipment will be capable of recording both PPV (and VDV- as required) and will conform to the requirements of BS7482, BS6472 and BS6841. Fixed monitor locations will be continuously recorded and logged to a central server location which can be accessed by the Noise and Vibration Clerk of Works. It will be determined within each PCNV whether VDV readings are likely to be of concern. Where this is the case, monitoring equipment, capable of measuring VDV readings, will be deployed at sensitive receptor locations near to the vibration source.

SRB will deploy a MinimatePro4 (with VDV capabilities) at CNV 16 for a two week period, prior to works commencing to gather baseline VDV readings. We will then rotate the Pro4 to CNV 2 for a further 2 week period. These readings will serve as baseline VDV readings for these locations. Afterwards, the Minimate III units will be deployed permanently at these locations.

During the course of the works, for activities that are highlighted as being of specific risk (through the PCNVs process) SRB will deploy the Pro 4 unit to site at the nearest sensitive receptor (dependant on property owner approval) for the duration of the activity in the area in order to measure VDV readings for the activity.

In addition to the fixed monitors one noise and vibration monitor capable of being installed in environmental housings for additional monitoring points will be available on site. This 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.

SRB will undertake a monthly review of the adequacy of our noise and vibration monitoring regime. Inputs to this review will include:

- Noise Liaison Group Feedback
- Client Feedback
- Noise and Vibration Results
- Environmental Complaints and Non-conformances
- Internal and External Environmental Audits

Should additional noise and vibration monitoring or equipment be required, SRB will undertake to provide the necessary resources to further demonstrate contract compliance.

6.5 Measurement, Review and Reporting of Noise and Vibration Monitoring Results

Daily Noise level data will be available for viewing by the Noise and Vibration 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.

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 exceedence and their respective source.

6.6 Inventory of Noise and Vibration Monitoring Equipment

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 D*. 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. The live document will be located on the Project Extranet.

6.7 Monitoring

The SRB will undertake such monitoring as is necessary to facilitate compliance with the Environmental Statement and the other requirements of the CoCP, including any monitoring which may be required by the Noise Liaison Group.

SRB will undertake noise and vibration monitoring during activities for which consent is requested from local authorities as set out in Section 5.6 of the CoCP and will include a description of the monitoring proposed in the consent application. Specific monitoring requirements and frequency will be detailed within Appendix D of each PCNV.

As a minimum, attended monitoring by competent acoustic specialists will be undertaken at the start of each new phase of work. This is to confirm that any noise generated is in line with the assessment approved by the Employer's Representative (or local authority consent where relevant). Monitoring will then be undertaken by a mixture of continuous unattended monitoring and further short term attended monitoring over the duration of the construction activity to assure ongoing compliance with the approved assessment / consent where relevant.

Monitoring reports on noise and vibration will be prepared covering periods of not more than one month and will be published on the project website, in accordance with paragraph 1.8.11 of the CoCP, no later than the end of the subsequent monitoring period.

Individual measurements will be of sufficient duration to ensure that a representative noise or vibration level is obtained, e.g. for continuous or steady noises, the measurements will be at least 10 minutes in duration; for intermittent sources or sources of a cyclical nature, the measurements will be at least 30 minutes in duration or over three operational cycles, as appropriate.

Monitoring results will be in accordance with measurement practice as detailed within BS4142:1997. All information required by those standards will be reported.

7.0 REVIEW SCHEDULE

7.1 Review on monitoring

SRB will undertake a monthly review of the adequacy of our noise and vibration monitoring regime. Inputs to this review will include:

- Noise Liaison Group Feedback
- Client Feedback
- Noise and Vibration Results
- Environmental Complaints and Non-conformances
- Internal and External Environmental Audits

Should additional noise and vibration monitoring or equipment be required, SRB will undertake to provide the necessary resources to further demonstrate contract compliance.

The review will be led by the Project Manager and the Noise Specialist with input from the Senior Engineer and the Noise and Vibration Clerk of Works. Section Agents for Roads and Structures will also input to the process as required.

The Senior Engineer will liaise with the Noise and Vibration Clerk of Works and Section Agents to implement any actions from this process.

The review will be submitted to the Employer.

7.2 NVMP Review

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.

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.

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.

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.

For dispensations, modifications and overruns the respective pro-forma in Appendix 1/9 Annex A will be used to apply for authorisation to continue.

Appendix A: Best Practicable Means

APPENDIX A: BEST PRACTICABLE MEANS

1.0.1 Control of Pollution Act 1974

1.0.2 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.

1.0.3 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.

1.0.4 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**).

1.0.5 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.

1.0.6 Although not exhaustive, The Code of Construction Practice lists the following items considered to be BPM:

1.0.7 In relation to best practicable means, the contractor will employ appropriate measures which may include:

1.0.8 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.

1.0.9 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

2. 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	Mike Brownstone	B.Eng (Hons) Engineering Noise and Vibration	MIOA	See CV attached
Noise Specialist (Note that Ray will stand-in for Mike Brownstone during leave periods)	Dr Raymond Browne	B.Eng (Hons) PhD	MIOA	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. 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.
Senior Engineer (Interface Role- full time on site)	Roland Tarrant	BEng Civil. HDip. Highways Dip. PM	CEng, MIEI MCIHT	Roland has extensive experience as Environmental Manager on two major motorway schemes (>20KM long). Roland and carried out and overseen the noise and vibration monitoring and compliance with contract requirements on both schemes including preparing post construction noise reports for submission to the Client.
Noise and Vibration Clerk of Works (Part-time on site, full-time availability as required)	Chriss Reidy	B.E. Civil MSc in Environmental Protection IRCA EMS Auditor BER Assessor	CEng MIEI	Chriss Reidy is responsible for environmental issues that arise within SRB activities. He has 27 years' experience in the construction industry and 6 years' experience in environmental management including environmental auditing, sampling and systems management. Chriss has been responsible for noise and vibration management on five major road schemes (including 4 motorways) and a gas interconnector pipeline

Note: Roland Tarrant and Chriss Reidy will undertake the IOA Environmental Noise Course and entrance exam in mid-October 2011.

Mike Brownstone BEng, MIOA
Director, Resound Acoustics Limited

Pen Portrait

An experienced acoustics consultant, specialising in the assessment of noise and vibration impacts of waste, energy, road, rail, air and construction sources, the preparation of Environmental Statements, planning submissions and Construction Environmental Management Plans, with Expert Witness and public consultation experience.

Qualifications and Memberships

BEng(Hons) Engineering Noise and Vibration, ISVR
Member of the Institute of Acoustics (MIOA)

Career Profile

2008 to present	Director, Resound Acoustics
2005 to 2008	Head of Acoustics, SLR Consulting Limited
2003 to 2005	Head of Acoustics, Halcrow Group Limited
1997 to 2003	Principal Acoustic Consultant, WSP Acoustics
1995 to 1997	Researcher, Environmental Resources Management Limited
1994 to 1995	Assistant Consultant, Travers Morgan (now Capita Symonds)
1992 to 1994	Self-Employed Acoustic Consultant

Key Project Experience

Bus Station, Hinckley: Assessment of proposed retail development on the site of the bus station at Hinckley in Leicestershire.

Archallagan, Isle of Man: Noise expert witness for planning inquiry for a proposed landfill on the Isle of Man.

Freshfields Lane, Sussex: Noise expert witness for planning inquiry into extension of clay extraction and disposal of inert waste at site in Sussex.

Waste Management, Various Sites: Noise and vibration assessments for a variety of sites associated with waste managements, including incinerators, anaerobic digestion, in-vessel composting, landfills, including gas engines, and household waste recycling centres.

Jubilee Line Extension, London: Long term secondment to London Underground Limited's Jubilee Line Extension Project (JLEP) covering several sites in East and Central London, where responsibilities included regular liaison meetings with Local Authorities and principal contractors concerned with prior consents, complaints and compliances, noise and vibration monitoring, dust monitoring and control, water quality checking. In addition, undertook the role of assessor during the third phase of JLEP's Environmental Award Scheme.

BREEAM and EcoHomes: Assessments under the BRE's environmental guidelines for a range of building uses, including hospitals, schools, offices, industrial installations and residential dwellings. The assessments included consideration of external and internal acoustics, including sound insulation testing, and building services plant.

Various Wind Farms: Managed and undertaken noise assessments for numerous wind farm schemes across the country, ranging from single turbine installations to multi-turbine large scale wind farms. The noise surveys and assessments were undertaken in accordance with the DTi ETSU-R97 guidance used in the UK. The wind farms assessed included:

> *Confidential site,* Powys (2009-2010), ongoing assessment of wind farm scheme in Powys; *Corriegarth* and *Bettyhill* (2007-8), large wind farms in the Scottish Highlands for North British Wind Power; *South Sharpley* (2007-8), a medium scale wind farm in County Durham (4 turbines) for Cornwall Light and Power; *Immingham, Scunthorpe, Brackmills, Falkirk, Wakefield, Skelmersdale,* and *Teesport* (2006-8), a series of MW scale turbines proposed on industrial sites in urban fringes for Green Peninsula; *Haswell* (2004-5), a medium scale wind farm in County Durham (5 turbines) for United Utilities.

DEFRA Noise Mapping England Project: Noise mapping expert managing the project on behalf of the main contractor, producing the regional noise map for the West Midlands and Coventry as part of DEFRA's Noise Mapping England Project, itself part of the EU's 2002 Noise Directive.

Coach House, Ferndown: Expert witness in litigation case concerning the sound insulation of two blocks of flats.

Caversham Road, Reading: Expert witness for planning appeal for a residential development in Reading.

Crane Hire Business, Stratford-upon-Avon: Expert witness for planning appeal and statutory nuisance prosecution.

Private dwelling, Telford: Expert witness for private nuisance action against noisy industrial premises.

DLR City Airport Extension, London: Managed the calculation, evaluation and mitigation of airborne noise and ground-borne vibration and re-radiated noise levels from elevated and trough structures on new light rail line between Canning Town and North Woolwich.

Proposed Helicopter Landing Site, Hampshire: Measurement, prediction and assessment of helicopter noise levels associated with a proposed helicopter landing site for military training purposes.

Proposed Airfield, Nigeria: The prediction and assessment of the noise impact from a proposed airfield in Nigeria, associated with an oil installation.

Various Distribution Depots: Noise and vibration assessments and preparation of Construction Environmental Management Plans for a leading developer of distribution depots across the UK.

A303 Stonehenge Improvement, Wiltshire: Managed the noise and vibration assessment for this landmark roadscheme, from the production of the Environmental Statement through to the Public Inquiry.

Alfred McAlpine Homes, Barratt Homes, Beazer Homes, Berkeley Homes, Bryant Homes, Crest Nicholson, Countrywide Homes, Croudace Homes, JJ Gallager, Locking Castle Limited, Persimmon Homes, Redrow Homes, Taylor Woodrow Developments Limited, Terence O'Rourke plc, Westbury Homes, Wilmott Dixon and Wimpey Homes: Detailed assessment of road and/or rail traffic noise at proposed residential developments and the investigation and assessment of mitigation measures. Technical reports were prepared and submitted that accompanied the planning application for each development. Where necessary, assessment of detailed building fabric materials was undertaken. Liaison with the relevant Planning Authorities through the planning process was also conducted.

Walkers Stadium, Leicester: Prediction and assessment of construction noise associated with the construction and use of Leicester City FC's new football ground. The findings formed part of the Environmental Statement submitted with the planning application.

M1, M50, M62, A1(M), A40 Noise Mitigation Schemes, UK: Detailed prediction and assessment of mitigation provision for a number of trunk roads that have not been assessed under the Land Compensation Act or Noise Insulation Regulations since their construction. Many of the schemes assessed have since progressed through to implementation. The assessments were undertaken for the Highways Agency.

Second Forth Road Crossing, Edinburgh: DMRB assessment of the proposed second road crossing of the Firth of Forth in Edinburgh. The study included assessment of various alignments of the northern and southern approaches.

Thames-side Guided Busway, Kent: Noise and vibration assessment of the potential impacts from the construction and operation of the Thames-side guided busway in Kent. The route covers some 20 miles and passes through both rural and urban areas.

Noise Assessment of an Oil and Gas Development, Peru: Investigating the potential noise impacts from an oil and gas development in the central Peruvian rain-forest, including an extensive survey of the ambient noise climate in the rain-forest and an investigation the noise propagation properties unique to the area. The study included the assessment of the potential impacts to the human environment and to the forest and aquatic fauna.

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: This register will be maintained live on the Proposed Project Extranet
Note 3 – These fields will contain the noise levels as measured for the plant when it first arrives on site.
Note 4– These fields will contain the repeat measurements for the plant to ensure the noise levels are not higher than those being modelled

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						
NM01	CNV	Larson Davis 812	Noise Monitor	0769	Tbc	
NM02	CNV	Larson Davis 831	Noise Monitor	TBC	Tbc	
NM03	CNV	Larson Davis 831	Noise Monitor	TBC	Tbc	
VM01		Instantel Minimate III	Vibration Monitor	BE12009	Tbc	.
VM02	.	Instantel Minimate III	Vibration Monitor	BE11914	Tbc	.
VM03	.	Instantel Minimate III	Vibration Monitor	BE12008	Tbc	.
Portable equipment						
NM04	Mobile	Larson Davis 824	Noise Monitor	824A3548	Tbc	
VM04	Mobile	Instantel Minimate III	Vibration Monitor	BE11915	Tbc	.
Dosemeters						
42264	Mobile	Model 22A-TH		TBC	Tbc	
42265	Mobile	Model 22A-TH		TBC	Tbc	

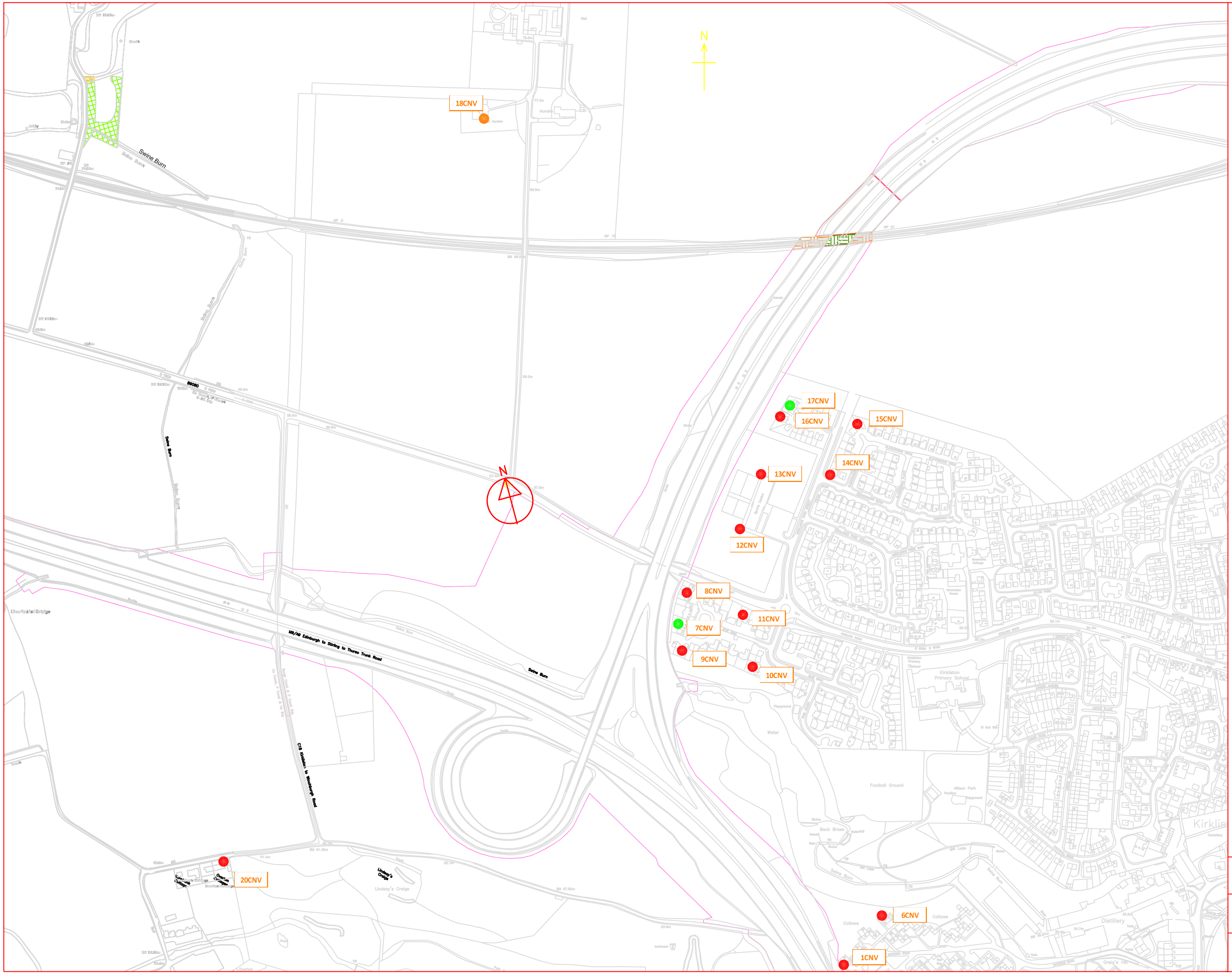
Note: This register will be maintained live on the Proposed Project Extranet

Appendix E: Inventory of Noise and Vibration Mitigation Measures

IINVENTORY OF NOISE AND VIBRATION MITIGATION MEASURES						
Mitigation Item	**ES Mitigation Item Number**	**Description**	**Location**	**Specification**	**Date Last Inspected**	**Next Inspection Date**
A-SWK	A-SWK	Typical Highway Noise Barrier (Fence)	M9 CH 1015-1260 (245m)	Tbc		

Note: This register will be maintained live on the Proposed Project Extranet

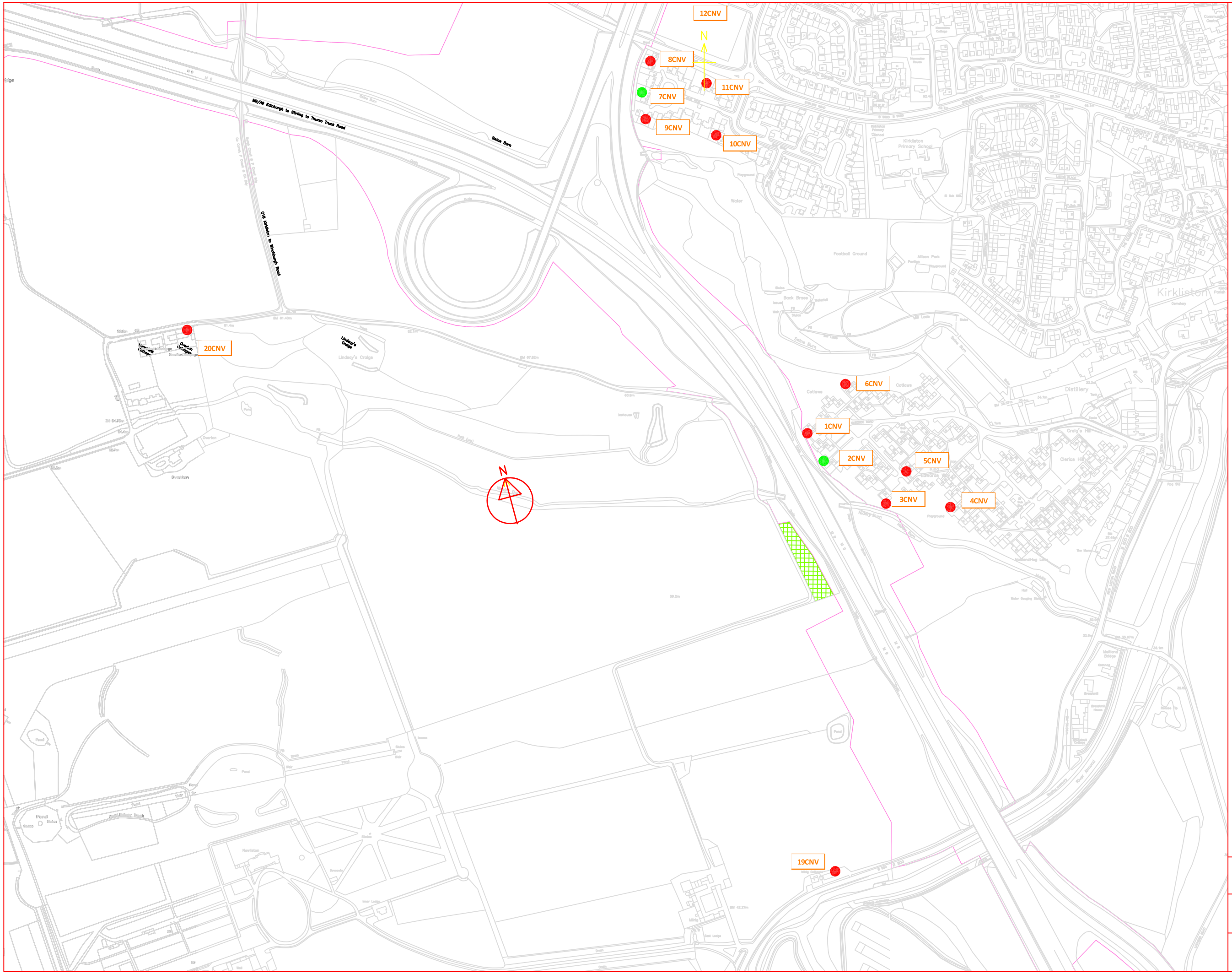
Appendix F: Sensitive Receptor Locations



Sensitive Receptor Locations for M9J1a Contract

Date: 21-08-11

SSK - SRL-01



Sensitive Receptor Locations for M9J1a Contract

Date: 22-08-11

SSK - SRL 002

The Table below lists the Sensitive Receptors that may be impacted by noise and vibration generated by the works. As more receptors may be identified in the PCNV's, they will be added to this list. This list will be maintained live on the proposed Project Extranet.

Number	Receptor Address	Daytime Ambient Noise Level $L_{AEQ, 12\ hr}$ [db]	Ambient to the nearest 5db	Daytime Assessment Level (AL) [db]	Evening Assessment Level (AL) [dB]**	Nightime Assessment Level (AL) [dB]**	Easting	Northing
1CNV	39 Cotlaws	72	70	75	55	45	311881	674153
2CNV	93/95 King Edwards Way	72	70	75	55	45	311905	674111
3CNV	55 King Edwards Way	72	70	75	55	45	311995	674052
4CNV	85 Maitland Hog Lane	72	70	75	55	45	312087	674047
5CNV	38 King Edwards Way	72	70	75	55	45	312024	674098
6CNV	26 Cotlaws	72	70	75	55	45	311936	674224
7CNV	15-17 Buie Rigg	67	65	70	55	45	311641	674646
8CNV	26 Buie Rigg	67	65	70	55	45	311654	674691
9CNV	8 Buie Rigg	67	65	70	55	45	311647	674607
10CNV	43 Buie Rigg	67	65	70	55	45	311749	674584
11CNV	34 Buie Rigg	67	65	70	55	45	311735	674659
12CNV	Kirkliston Sports Centre	67	65	70	55	45	311731	674783
13CNV	Kirkliston Sports Centre	67	65	70	55	45	311761	674862

14CNV	1 Glendinning Road	67	65	70	55	45	311861	674861
15CNV	11 Glendinning Road	67	65	70	55	45	311900	674934
16CNV	8 Kirklands Park Grove	67	65	70	55	45	311790	674945
17CNV	11 Kirklands Park Grove	67	65	70	55	45	311805	674967
18CNV®	Wester Humbie	Assumed***	65	70	55	45	311361	675376
19CNV®	Millrig Cottages	Assumed***	65	70	55	45	311921	673520
20CNV®	Overton Cottages	Assumed***	65	70	55	45	310984	674302

From Stage 3 Environmental Statement, Appendix A19.2, Table 2.1: Predicted Daytime Noise Impacts

From T5.3.3 Category A Construction Noise Impact Criteria, Code of Construction Practice

****These assumed threshold values will be confirmed prior to works commencing***

Number	Receptor Address	Max. Daytime Noise Levels LAmax dB(A)***	Max. Evening Noise Levels LAmax dB(A)***	Max. Nightime Noise Levels LAmax dB(A)***	Easting	Northing
1CNV	39 Cotlaws	90	70	60	311881	674153
2CNV	93/95 King Edwards Way	90	70	60	311905	674111
3CNV	55 King Edwards Way	90	70	60	311995	674052
4CNV	85 Maitland Hog Lane	90	70	60	312087	674047
5CNV	38 King Edwards Way	90	70	60	312024	674098
6CNV	26 Cotlaws	90	70	60	311936	674224

7CNV	15-17 Buie Rigg	85	70	60	311641	674646
8CNV	26 Buie Rigg	85	70	60	311654	674691
9CNV	8 Buie Rigg	85	70	60	311647	674607
10CNV	43 Buie Rigg	85	70	60	311749	674584
11CNV	34 Buie Rigg	85	70	60	311735	674659
12CNV	Kirkliston Sports Centre	85	70	60	311731	674783
13CNV	Kirkliston Sports Centre	85	70	60	311761	674862
14CNV	1 Glendinning Road	85	70	60	311861	674861
15CNV	11 Glendinning Road	85	70	60	311900	674934
16CNV	8 Kirklands Park Grove	85	70	60	311790	674945
17CNV	11 Kirklands Park Grove	85	70	60	311805	674967
18CNV®	Wester Humbie	85	70	60	311361	675376
19CNV®	Millrig Cottages	85	70	60	311921	673520
20CNV®	Overton Cottages	85	70	60	310984	674302

****From T5.4.1b Category A Maximum Noise Levels – Road Sections, Code of Construction Practice, adjusted by -5dB, as required in paragraph 3.2.6(q) of Appendix 1/9 of Part A2 of the Employer's Requirements*

CNV = Community Noise and Vibration Monitoring Point

Appendix G: PCNV Pro-forma

FORTH REPLACEMENT CROSSING PRINCIPAL CONTRACT

Plan for the Control of Noise & Vibration (PCNV)

APPLICATION FORM FOR PCNV APPROVAL

Reference No : * *(See Note 1)*	PCNV.....

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:

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

Appendix H: Noise Threshold's and Maximum Limits

(Extract from CoCP Section 5)

Table 5.4.1b: Construction Noise Impact Criteria – Road Sections

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**	**60**	**50**	**65**	**55**	**65**
Evening	**1 hr**	**55**	**70**	**60**	**75**	**65**	**80**
Weekday	**11hr**	**65**	**80**	**70**	**85**	**75**	**90**
Saturday	**10hr**	**65**	**80**	**70**	**85**	**75**	**90**

- Category A: are threshold values to usc 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), and are 5dB below the values in Table 5.4.1 of the CoCP, as required by paragraph 3.2.6(q) of Part A2 of Appendix 1/9 the Employer's Requirements
- Measured exceedence 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 I: Vibration Thresholds

(Extract from CoCP Section 5)

Table 5.3.7: Vibration Thresholds

Building Type	Period	VDV ($ms^{-1.75}$)
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.

COCP –Section 5.7.5

To protect against building damage the threshold for peak particle velocity generated by continuous construction of the Project will be 5mm/sec measured at the foundations of the property closest to the operations being carried out

Appendix J: Schedule of Environmental Commitments Relating to Noise and Vibration

Mitig. Item	Location	Timing of Measure	Description
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.
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.
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.
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.
DC23	Throughout scheme	Construction	No impact piling will be undertaken at night.

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 K: Noise Insulation / Temporary Re-Housing Inventory

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 Area?	Additional Consent Required?	Additional Consent Obtained?	Status of Installation

Appendix L: Guidelines for Noise Information Requirements for Preparation of a 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 Section 1.10 - extract below)

1	Reference:	PCNV/00001	**Notes**
2	Title:		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 /area where operations will take place. Where there is multiple plant operating indicate the number and the type if possible.
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 ology		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	

Provide notes indicating when the plant is operating

		4,5,6	1,4,6		
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.				Justify the plant selected for this work
13	What other equipment could be used to perform the same function				State if other plant is available.
14	If other plant is available is it potentially quieter in operation?				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?				Cost can be the reason but should not be the only reason, consider increased duration, availability, safety etc

A2 App1/9 Section 1.10

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.

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.