Aberdeen Harbour Expansion Project

Construction Environmental Management Document

11th May 2017

DRAGADOS

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Chapter 13
Noise and Vibration Management Plan

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13 Noise and Vibration Management Plan

13.1 Introduction

The Noise and Vibration Management Plan has been developed to manage airborne noise during the construction process of the Aberdeen Harbour Expansion Project (AHEP).

The requirements to produce the Noise and Vibration Management Plan is listed under Schedule 3.2.4, section a, of both the Marine Construction Licence, Marine Dredging Licence, and Schedule 2 of the Harbour Revision Order. This Plan is considered to fulfil these requirements.

13.2 Roles, Responsibilities and Cross-Referencing

Table 13.1 details the responsibilities of selected staff with regards to the management of construction noise and vibration levels.

Table 13.1 Roles and Responsibility Table

Job Title	Name	Responsibilities
Acoustician	TBC	Oversee all terrestrial noise and vibration monitoring and reporting.
Environmental Manager	Craig Hynd	Day-to-day responsibilities for noise and vibration compliance.

A suitably qualified Acoustician, who is a current member of the Institute of Acoustics, will be employed to oversee all terrestrial noise and vibration monitoring and reporting.

The Environmental Manager has day-to-day responsibilities for noise and vibration compliance.

13.2.1 Cross-Referencing

The Noise and Vibration Plan should be read in conjunction with the following CEMD's

- Construction Method Statement;
- Construction Traffic Management Plan;
- Dredging and Dredge Spoil Disposal Management and Monitoring Plan; and
- Piling Management Plan.

Underwater noise and vibration is covered within the Marine Mammal Mitigation Plan.

13.3 Legislation

All work is to conducted in a manner that demonstrates that 'Best Practicable Means' (BPM) as defined by Section 72 of the Control of Pollution Act 1974 are adopted at all times to minimise construction noise and vibration.

Guidance regarding the control of construction noise and vibration contained within the following documents shall be considered as part of the demonstration of BPM:

- BS5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites - Part 1: Noise
- BS5228-2:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration

13.4 Specific Requirements

Measures to be considered in implementing BPM is consistent with the recommendations of BS5228 and includes the following:

- Timing and scheduling of noisy activities should, as far as is practicable for certain operations, occur at times of the day that would cause least effect to receptors. Evening and night-time activities will be necessary during certain stages of the construction programme (dredging, marine dumping, rock and accropode placement and fabrication of caissons – see construction method statement for full details on night-time working requirements), however, these activities should be limited as far as is practicable to daytime only and leave night-time activities for essential works only;
- The quietest possible plant that can be reasonably practicably obtained would be used for each construction task. All equipment should be maintained in good mechanical order and should be fitted with appropriate silencers, mufflers or acoustic covers;
- Wherever practicable, stationary noise sources should be sited as far as possible from noise sensitive properties, and where necessary, acoustic barriers should be used to shield them. Such barriers may be purpose-made, or consist of site materials such as bricks or earth mounds;
- The use of enclosures and or perimeter hoarding/fencing to provide screening around permanent or particularly noisy activities. Site hoardings would be constructed as early as possible in the construction programme;
- Any piling should be carried out using a method which causes the minimum noise and vibration; (refer to Piling Management Plan for further information);
- Employees should be supervised to ensure compliance with any noise control measures;
- Use of radios or other sound systems or tannoys would not be permitted anywhere on the construction site;

- The layout of the site will take noise into consideration (e.g. use of cabins to screen receptors from noisy equipment); and
- Adherence to the guidance in BS 5228 part 1 and part 2.
- Details of how these measures will be applied to the AHEP project are provided in Section 13.8.

13.5 Monitoring, Checking and Remediation

Noise and vibration monitoring will be undertaken on a continuous basis by Dragados or their representative, throughout the construction phase of the project. Such monitoring requires specialist noise and vibration monitoring equipment as outlined in this section and will require the production of reports showing the results of the monitoring at least once per month.

13.5.1 Noise Sensitive Receptors

Noise sensitive receptors have been identified in the Environmental Statement (ES) for the Aberdeen Harbour Expansion Project (dated November 2015) and are highlighted in Figure 13.1.

Location 1 is representative of residential receptors on Greyhope Road / Balnagask Lighthouse Community. Location 2a is representative of residential receptors by St Fittick's Road and Location 2b is representative of residential receptors by Pentland Crescent and Balnagask Circle. Location 3 is representative of residential/farm on Coast Road (Doonies Farm).

Figure 13.1: Noise sensitive receptor

13.5.2 Monitoring

Dragados has appointed the following as the suitably-qualified person from the Site team to carry out and be responsible for all noise and vibration monitoring, following the requirements in Section 13.2.

Name	Role
TBC	TBC

Noise and vibration monitoring record sheets will be completed on a regular basis, at least once per month. Additional monitoring will be focused on the start of each new phase of work to allow any higher than expected noise or vibration levels to be identified and appropriate action taken as necessary.

Unattended continuous noise and / or vibration monitoring shall be undertaken at representative closest sensitive receptors in the locations defined in Section 13.5.1 subject to permission from landowners/tenants.

If necessary, attended measurements will be carried out in addition to the unattended measurements. More frequent monitoring shall occur during certain particularly noisy activities.

The minimum duration of each short-term reading shall be typically 5-15 minutes to represent the typical noise emission from the site, but the exact duration will depend on the nature and duration of the activity being measured.

Vibration monitoring will be limited to activities which result in appreciable vibration levels (such as blasting or piling) with the potential to cause disturbance where they are undertaken within 100m of vibration sensitive buildings or uses (see Section 13.7.2. The location of the vibration monitoring equipment will be agreed once information on blasting and piling becomes available. Noise and vibration monitoring shall be reported to ACC.

An example is presented in Appendix D.

Further discussion of monitoring locations is included in Section 13.8.2.

13.5.3 Monitoring Equipment

13.5.3.1 Noise

Measurements of noise levels shall be undertaken with sound level measuring equipment conforming to BS EN 61672-1 (IEC 61672-1), Type 1. The equipment will be calibrated before and after use with a calibrator complying with BS EN 60942: 2003, if the difference between the initial and end calibrations is greater than 0.5 dB the results will be recorded as abnormal and if practicable, repeated.

The sound level meter shall be capable of real time analysis. The following parameters shall be measured L_{Aeq} and L_{Amax}. The meter will be set to record on a fast time response, with random microphone correction.

The unattended noise monitoring equipment shall be able to provide text alerts to designated numbers when pre-set trigger values are exceeded. These trigger values will be different for different periods of the day / night and are discussed in Section 13.7. The monitor shall also need to be remotely downloadable.

The measurement duration shall be a minimum of 5 minutes, but typically 15 minutes, depending upon the nature of the source being measured. These levels will then be averaged out accordingly depending on the time of the day to allow a direct comparison against the trigger levels set out in Section 13.7.

The sound level meter and calibrator shall be calibrated using the procedure defined in BS 7580 Part 1: 1997, every two years and calibration certificates will be provided to the local authority on request.

13.5.3.2 Vibration

Measurements of vibration levels, where required, shall be undertaken with measuring equipment conforming to the guidance within BS EN ISO 8041:2005. The peak particle velocity PPV parameter shall be measured.

Attended measurement duration shall be at least 5 minutes, but typically 15 minutes, depending upon the nature of the source being measured.

The unattended vibration monitoring equipment shall be able to provide text alerts to 4 designated numbers when pre-set trigger values are exceeded. The monitor shall also need to be remotely downloadable.

13.5.3.3 Best Practicable Means (BPM) Monitoring

Dragados will complete a site BPM checklist at least once a week as part of their process of demonstrating compliance with the consent mitigation measures. Where mitigation measures are not being complied with, then corrective action shall be taken to amend the working practices so that they are compliant with those consented.

13.6 Action Register

A record of environmental management actions will be kept on site. The Environmental Manager will track the progress of all actions and communicate progress to the Project Director. These actions will be closed out, signed and dated by the appropriate person in the appropriate timeframe.

13.7 Trigger Levels

Noise and vibration trigger levels have been discussed with ACC and are proposed as set out below.

13.7.1 Noise Trigger Levels

Noise will be minimised and wherever practicable will aim not to exceed the thresholds presented in Table 13.2 below.

Table 13.2 Noise Trigger levels

Sensitive Receptor	Daytime threshold $dBL_{Aeq, 12hr}$	Evening threshold $dBL_{Aeq, 3hr}$	Night-time threshold $dBL_{Aeq, 1hr}$
Residential	75	65	55

Notes: 1. all noise as predicted or measured values, 1m from each noise sensitive façade. 2. The assessed noise levels will be averaged over a 12 hour period for the daytime, 3 hour period for the evening and 1 hour period for the night. See Appendix A for further detail of time periods and averaging times.

At the start of the construction works, the noise levels from each activity will be monitored and assessed to update the predictions of longer term noise impacts. Where, despite best practicable means, noise is expected to exceed the noise levels in Table 1 for at least ten days out of any period of fifteen consecutive days or alternatively forty days in any six month period or, for night-time working, if a level of 55dB is expected to be exceeded for any ten night-time periods, a scheme to provide noise insulation or temporary re-housing will be implemented as set out in Appendix A to this CEMP.

13.7.2 Vibration Trigger Levels

The ES undertook an assessment of vibration and defined 'Very Major Adverse' significance at values which fall above 3mm/s (this is assumed to be in terms of peak particle velocity (PPV), although no metric was included or where the level of vibration was incident). For the purposes of this plan, it is assumed that vibration is expressed in terms of PPV and the value is that 'incident at point of entry into the recipient' (ref: Table B.1 BS 5228-2: 2009 +A1: 2014).

Any unattended vibration monitoring equipment will however need to be sited at a suitable location external to properties and an assessment made where possible, of the likely transfer function from external to internal vibration levels. This would be achieved by initial concurrent manned internal and external measurements during activities producing high levels of vibration.

13.8 Mitigation Measures

13.8.1 General Mitigation Measures

In accordance with the 2015 Environmental Statement, the following measures to minimise construction noise and vibration effects will be implemented.

- The occupants of nearby residential properties potentially most affected by noise or vibration from on-site activities will receive weekly updates via letter drops and when specific noise and vibration activities are likely to take place which may cause additional disturbance. The properties are listed below:

  - Residential dwellings at Girdle Ness Lighthouse, Greyhope Road (Balnagask Lighthouse Community)
  - Residential dwellings by St Fittick's Road and between Girdleness Rd/Balnagask Rd and the construction works
  - Doonies Rare Breeds Farm by Coast Road
- Where possible, static items such as generators shall be sited away from sensitive receptors and, where practical, noise control means, such as barriers, enclosures or silencers, will be utilised to further reduce noise (See Section 13.8.2)
- Review construction techniques as required, especially in response to any complaints or exceedances of the Noise Trigger Levels presented in Table 1
- Regular communications held between the contractors, AHB and ACC officers
- Implementing specific mitigation measures such as:
  - Using efficient, well maintained plant and equipment
  - Switching-off plant and equipment when not in use

In addition, Contractors will be required to use Best Practicable Means (BPM) throughout the duration of the site works and will register with the Considerate Contractors Scheme.

A Construction Traffic Management Plan (CTMP) has been developed (see Chapter 6 of the CEMD) to minimise the temporary and intermittent adverse impacts that may arise from construction traffic.

13.8.2 Site Specific Mitigation Measures

Location 1 - Greyhope Road / Balnagask Lighthouse Community

There is potential for noise to arise from the northern compound area which may be used for daytime maintenance activities. Noise from the maintenance activities and from vehicles accessing the compound have the potential to cause increased noise levels at the Girdleness Lighthouse Community.

In order to control noise arising from the northern compound, a 3m high topsoil stockpile will be erected on the eastern perimeter fronting the receptors, as shown in Figure 13.2 below. An assessment of the likely impact of noise from the northern compound taking into account this mitigation measure is presented in Appendix B.

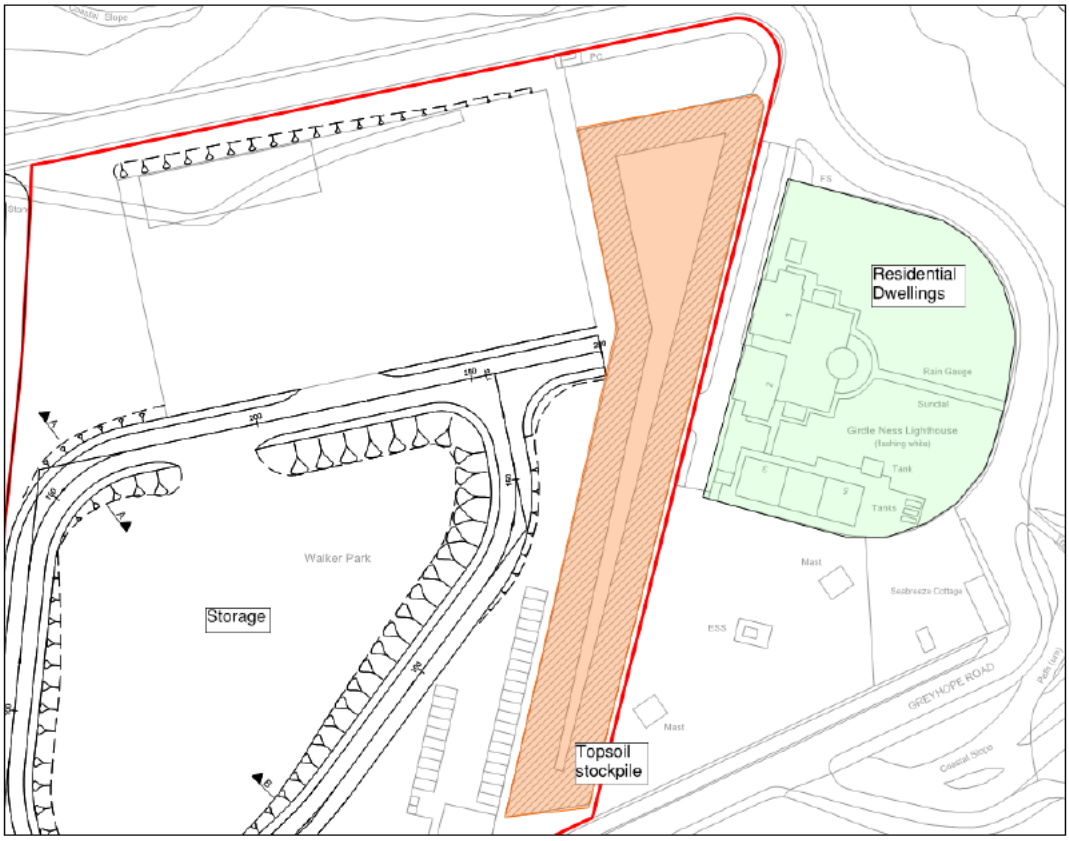


Figure 13.2 Proposed mitigation measures of the northern compound, drawing reference DRA-T-NOC-TW0001-DWG-010000-000

As established in the 2015 Environmental Statement, there are predicted to be major impacts during the day and very major during the evening and night (without mitigation measures), based on a worst case assessment of construction activities of the north breakwater.

The constructability and potential efficacy of fencing / hoarding along a section of the coastal road between the north breakwater construction area and the sensitive receptors adjacent to Girdleness Lighthouse will be considered prior to commencement of construction of the northern breakwater.

A banksman will be employed during night time works on breakwater construction to avoid the need for reversing alarms on vehicles.

The above specific measures will be carried out in conjunction with proposals detailed in 13.4 and 13.8.

One continuous monitoring meter will be located within the lighthouse community grounds. Subject to agreement with tenants/landowner, this should be located at a position dominated by noise from the northern breakwater construction activities ('Seabreeze Cottage' in Figure 13.2).

The measured noise levels will be compared against the criteria developed in Table 13.2 to enable an assessment of any additional required mitigation or management measures.

Location 2 - Pentland Crescent / Torry Community

The 2015 Environmental Statement, concluded that the Torry Community is at negligible risk from construction noise during the daytime due to the nature of anticipated activities and the large distance between source and receiver.

However, minor and major effects were identified during evening and night-time arising from dredging and percussive piling. It should be noted that it is not expected that impact piling will be required, and rotary piling methods and caisson solutions will be used instead (see Construction Method Statement, Chapter 3 of the CEMD), which will reduce noise levels from piling compared with those predicted in the ES. The worst case predicted noise level at Balnagask due to dredging was predicted to be 57dB L_{Aeq} in the ES.

It is unlikely that dredging could be avoided during the night-time however time periods and level of impacts would be reduced to the minimum feasible in line with the trigger levels given in 13.7.1. A line of topsoil stock pile will be erected to the west end of the site boundary as shown in Figure 13.3, and this will effectively reduce noise from construction for receptors located less than 300m away which include the St Fitticks Community Park and receptors by Pentland Crescent. It is noted however that the efficacy of this barrier is limited by the separating gaps between the stockpiles as shown in Figure 13.3, and therefore is recommended to have a continuous solid barrier.

The layout of the central compound will be designed such that the noise sources are screened effectively by the stockpile and other intervening structures relative to the sensitive receptors.

These measures will be carried out in conjunction with proposals detailed in Section 13.4 and 13.8.1.

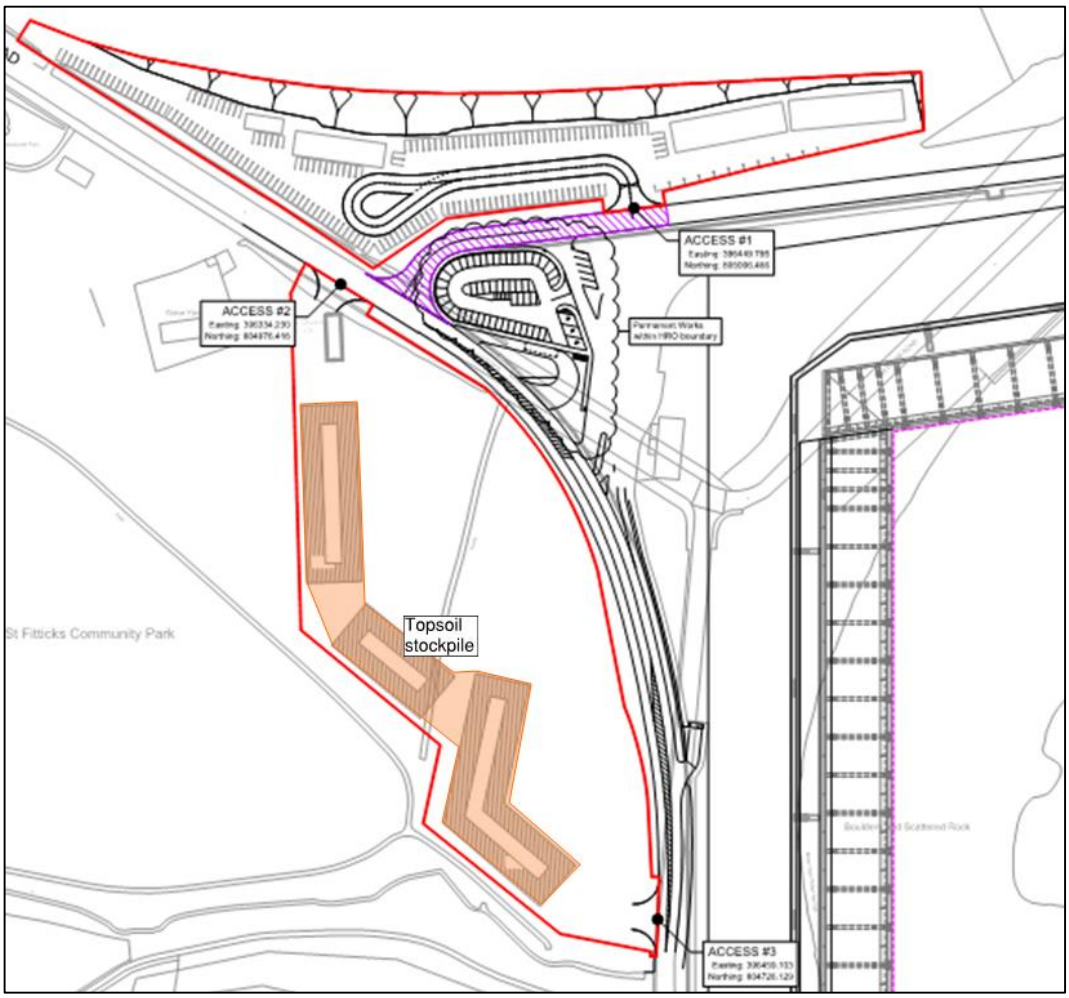


Figure 13.3 Central compound mitigation measures, drawing reference DRA-T-CEC-TW0001-DWG-000000-000

A continuous monitoring regime will be in place pre-construction phase. This will include two continuous monitoring meters placed strategically at the nearest points of the Torry community from the central compound or at a location representative of these receptors. This location is subject to equipment access and security.

The measured noise levels will be compared against the criteria developed in Table 13.2 to enable an assessment of any additional required mitigation or management measures.

Location 3 - Doonies Farm

The 2015 Environmental Statement stated that effects arising from construction noise are not significant at these receptors.

An early phase construction noise assessment will be carried out at the Doonies Farm receptor. This will present actual noise monitoring data to assist with noise management. One continuous noise monitor will also be installed at the Doonies

farmhouse or at a representative location suitable for the sound level meter, subject to agreement with tenant and security of the equipment.

An assessment of the potential impacts of the southern site compound has been undertaken and is presented in Appendix B.

13.9 Incidents / Complaints

A 24 hour contact telephone number and email address for the public has been established to allow identification of any noise problems and enabling concerns to be resolved at an early stage.

Project Hotline: 0800 4714829	**Email Address:** contactusAHEP@dragados.com

The contact number will be delivered within the letter drops to nearby residents. The number will also be placed on signage on the perimeter fencing of the project, furthermore it will be available on the AHEP and AHB websites. The project will also publish a quarterly newsletter available to the public. Attendance at the local Cove & Altens and Torry Community Council has also been agreed and the number will be distributed here also.

All environmental incidents or complaints, either internal or external to the construction team, will be recorded in the project complaints register. The Register will be maintained on site by a nominated member of the Environmental team and the Environmental Manager will be responsible for resolving noise issues at site. The Community Liaison Manager will be responsible for resolving the issues at the community level. Significant issues will be reported to ACC.

All complaints received from external sources and incidents must be reported to the Environmental Manager and, if necessary, escalated to the Project Director.

13.10 Suppliers and Subcontractors

All subcontractors will be required to work in accordance with this CEMP and BPM methods. Subcontractors will be required to demonstrate an environmental management system (or equivalent) to ensure that the details within this CEMP are cascaded through all works.

13.11 Environmental Compliance, Audit and Inspection

- Compliance with regulations will be evaluated through inspections, audits and regular site management meetings. Inspections and reviews of operations will be completed by the Clerk of Works and Environmental Manager (the Environmental Team) to ensure compliance with all regulations. Environmental and waste control measures will also be included as part of their weekly checklist and the Site Managers monthly inspection.

- An audit of the Noise and Vibration plan will be conducted every 2 months. Additional audits may be carried out at any time. The results of the audit will be given to the Environmental Manager, who is responsible for the updating of the plans and other associated documents. Non-conformances and corrective actions will be reviewed at the monthly environmental management meetings, ensuring responsibility for actions is clearly recorded along with delivery timescales.

13.12 Review Procedure

Following the audits, the implementation of the environmental management plans will be reviewed on a bimonthly basis via internal site meetings. These meetings will be attended by the Environmental Team and by personnel responsible for the implementation of the plans. During the meeting all aspects of the environmental management plan will be considered.

Changes may be made to work practices/management as required to achieve continual improvement in environmental performance.

Appendix A

Scheme for Noise Insulation or Temporary Rehousing

A1 Thresholds to Determine Eligibility for Noise Insulation or Temporary Re-Housing

Noise insulation and/or temporary rehousing, or the reasonable costs thereof, will be offered by Dragados, where applied for by owners or occupiers, where the construction of the development causes, or is expected to cause, a measured or predicted airborne construction noise level that exceeds the thresholds in Table A1 for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months, or, for night-time working, if a level of 55dB is expected to be exceeded for any ten night-time periods.

The predicted noise levels at the property will be as determined by Dragados, or their agents, based on a combination of site noise monitoring and prediction. All noise levels will be as predicted at a point 1m in front of the most exposed of any window or doors in any façade of an eligible dwelling.

Table A1 - Time periods, averaging times and noise levels for eligibility for noise insulation

Relevant time period	**Averaging time, T**	**Noise insulation trigger level, dB $L_{Aeq,T}$**
07:00 - 19:00	12 h	75
19:00 - 22:00	3 h	65
22:00 – 07:00	1 h	55

Appendix B

Compound Noise Impact Assessment

B1 Introduction

This appendix provides the construction activity assumptions and methodologies which form the basis of the noise impact assessment of the proposed north and south temporary compounds. The assessment is undertaken in accordance with relevant national policy and guidance, and should be read along with the Construction and Environmental Management Plan (CEMP) for the Aberdeen Harbour Expansion Project.

B2 Approach to Assessment

The approach to the assessment was discussed with Nick Glover (EHO) of Aberdeen City Council on 23rd March 2017. Suggested methodologies included WHO Guidelines[1] and BS 4142[2].

BS 4142 sets out in its scope in Section 1 that it is not intended for the assessment of construction and demolition noise and is felt to be overly onerous for an assessment of a temporary construction related noise source.

An alternative suggested approach would be to use the guidance contained in Planning Practice Guidance (PPG) for mineral operators[3] which is intended for use where works may be carried out for a number of years and take a pragmatic approach to not placing an undue burden on the site operator.

Reference is also made to the BS 5228 Part 1[4] 'ABC' methodology that was employed for the assessment of construction impacts in the Environmental Statement for the Aberdeen Harbour Expansion Project.

B3 Policy and guidance

B3.1 World Health Organization

The WHO Guidelines for Community Noise 1999 provide guidance on acceptable levels of noise in a variety of scenarios. Noise sources are identified as road, rail and air traffic, industries, construction and public work, and the neighbourhood.

For internal noise levels, WHO adopts an upper limit value of 35dB$L_{Aeq,16hr}$ during the day inside dwellings and 30dB$L_{Aeq,8hr}$ during the night inside bedrooms as an indicator of potential health effects.

[1] World Health Organization (1999); Guidelines for Community Noise; http://www.who.int/docstore/peh/noise/guidelines2.html; Accessed: 5 April 2016
[2] BS4142:2014; Method for rating and assessing industrial and commercial sound.
[3] Department for Communities and Local Government, March 2014; Planning Practice Guidance. https://www.gov.uk/guidance/minerals#Noise-emissions – accessed 05/04/2017.
[4] British Standard 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1 Noise.

B3.2 Planning Practice Guidance for mineral operators

Planning practice guidance sets out the following in terms of appropriate noise standards for mineral operators for normal operations:

"Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise sensitive property that does not exceed the background noise level ($LA_{90,1h}$) by more than 10dB(A) during normal working hours (0700 - 1900). Where it will be difficult not to exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55dB$L_{Aeq,1h}$ (free field). For operations during the evening (1900-2200) the noise limits should not exceed the background noise level ($L_{A90,1h}$) by more than 10dB(A) and should not exceed 55dB$L_{Aeq,1h}$ (free field). For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42dBL_{Aeq1h} (free field) at a noise sensitive property.

Where the site noise has a significant tonal element, it may be appropriate to set specific limits to control this aspect. Peak or impulsive noise, which may include some reversing bleepers, may also require separate limits that are independent of background noise (e.g. L_{max} in specific octave or third-octave frequency bands – and that should not be allowed to occur regularly at night).

Care should be taken, however, to avoid any of these suggested values being implemented as fixed thresholds as specific circumstances may justify some small variation being allowed".

B3.3 British Standard BS5228: Code of practice for noise and vibration control on construction and open sites: Parts 1 and 2

BS 5228-1:2009+A1:2014 provides guidance on the assessment and control of noise emissions from construction operations. The standard contains detailed information on noise reduction measures and promotes the BPM approach to controlling noise. Details of the 'ABC' method for determining potential significance of effect is presented in Table B1.

Table B1 Example thresholds of potential significant effect at dwellings

Assessment Category and Threshold Value Period (L_{Aeq})	Threshold Value, in Decibels (dB)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night-time (23.00-07.00)	45	50	55
Evenings and weekends[D)]	55	60	65
Daytime (07.00-19.00) and Saturdays (07.00-13.00)	65	70	75

Notes:

1. A **potential significant** effect **is indicated** if the site L_{AeqT} noise level, exceeds the threshold level for the Category appropriate to the ambient noise level.
2. If the ambient noise level exceeds the **Category C** threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a **potential** significant effect is **indicated** if the total L_{Aeq} noise level for the period increases by more than 3 dB due to **site noise**.
3. Applied to residential receptors only.

A). Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B). Category B: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

C). Category C: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D).19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays.

*(Source: BS 5228-1:2009**+A1:2014**, Page119*

B4 Temporary compounds assessment

The assessment is presented for the northern and southern compounds only. It is understood that the central compound will be used primarily for welfare facilities, project offices, car parking and storage and therefore, taking into account the distance between the central compound and residential areas, no noise impacts would be expected.

The sound power levels and percentage on-times of plant items are based on the information provided by Dragados and professional judgement. The percentage on-time of each item assumed for this assessment is an estimate of what would be employed during construction activities. Inevitably, some of these values may be greater or less than the assumptions, but overall, the assessment is considered to be robust and realistic.

B4.1 Northern Compound

The northern compound lies to the north of the proposed development, located immediately west of the Girdle Ness Lighthouse residential properties, as shown in Figure B1 below. It is understood that the northern compound will be used as a maintenance area with a shed facility and a number of traffic movements through the day. The northern compound will be operational only during the daytime (07:00-19:00).

No specific details about the noise sources on the site are available and it is likely that they will vary significantly throughout the works depending on need.

For the purposes of this assessment it has been assumed that the following vehicles and external items of plant may be on the site:

Table B2 Plant items assumed for northern compound assessment

Activity name	Source	Sound power dBL_{wA}	Number	On-time (%)
Outdoor activities				
Rigid road lorry	BS5228 Table C.6.23	108	1	30
Dumper (idling)	BS5228 Table C.4.8	84	1	30
Diesel generator (for pump)	BS5228 Table C.4.78	94	1	100
Water pump	BS5228 Table C.4.88	97	1	100

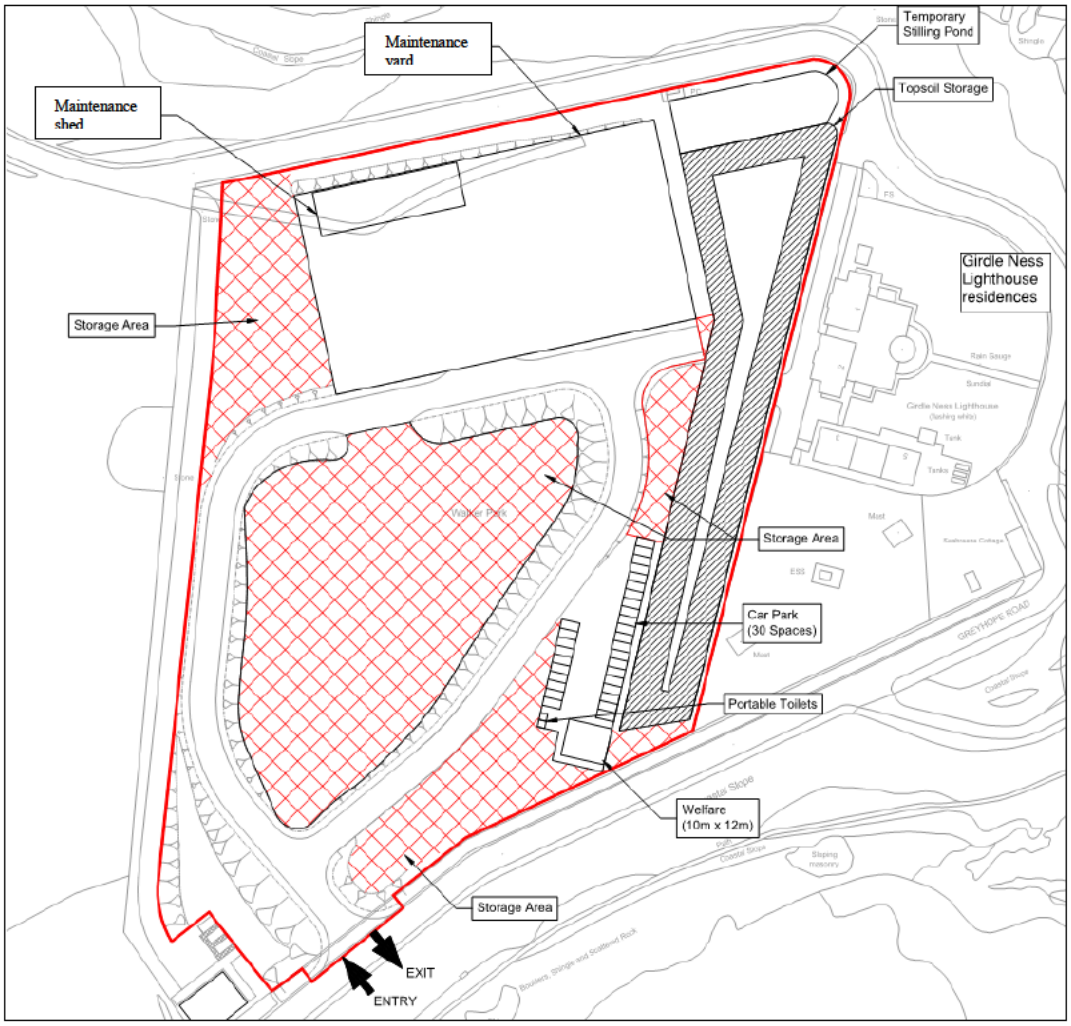
The maintenance shed will be used for maintaining vehicles and plant items. For the purposes of this assessment it has been assumed that maintenance activities in the shed may give rise to a reverberant noise level of 85 dB L_{pA}[5].

The maintenance shed is assumed to be comprised of a sandwich panel structure of 6m height, with a transmission loss performance of R_w25dB.

[5] In the absence of better information, this is equivalent to the upper action level of the Noise at Work Regulations. It is assumed that noise inside the shed will be mitigated/managed to be below this level over an 8 hour working day to protect workers.

The proposed topsoil stockpile to the east of the northern compound, is assumed to be 3m height.

Figure B1 Northern Compound Layout



Acoustic screening provided by the stockpile topsoil has been taken into account and predictions of its performance are presented below, for the different scenarios, based on the methodology of ISO 9613 Part 2[6]. It has been assumed that there is a rise in ground level of around 2m between the Lighthouse residences and the central areas of the site. For the shed it has been assumed that the noise source is concentrated at the highest point of the building i.e. 6m and that all surfaces of the building are radiating in the direction of the residences (worst case).

[6] ISO 9613-2:1996; Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

Table B3 Predicted acoustic attenuation performance of topsoil stockpile

Barrier scenario	Octave Band Centre Frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Screening afforded for shed (assuming 8m source height re: receptor height), dB	-4.8	-4.8	-4.9	-5.1	-5.6	-6.8	-8.5	-10.6
Screening afforded for outdoor activities (minimum distance = 35m from receptors), dB	-5.4	-6.0	-7.1	-9.0	-12.3	-16.1	-19.5	-22.6
Screening afforded for outdoor activities (average distance = 100m), dB	-5.0	-5.2	-5.6	-6.5	-8.4	-11.4	-14.4	-17.3

Taking into account the above attenuation corrections together with distance corrections, the predicted noise levels at the receptors are shown in Table B4 below.

Table B4 Predicted noise levels arising from northern compound.

Receptor	Distance to shed (m)	Predicted level $dBL_{Aeq,T}$
1-2 Girdle Ness Lighthouse – Noise arising from **maintenance shed**	100 (minimum distance)	30
	125 (average distance)	28
1-2 Girdle Ness Lighthouse – Noise arising from **outdoor activities**	35 (minimum distance)	56
	100 (average distance)	49

It should be noted that the assessment of the maintenance shed assumes that all doors and windows are closed. In the worst case where the east facing roller shutter door is assumed open, it is estimated that predicted noise levels may be up to 10 dB higher than predicted in Table B4 for the maintenance shed.

Only the worst case assessment where all outdoor plant and vehicles are assumed to be at the minimum distance from the Lighthouse residences results in a predicted temporary and insignificant increase above the PPG for mineral operators guideline value of 55 dB $L_{Aeq,1hr}$. Over the working day levels would be predicted to be below 55 dB $L_{Aeq,12hr}$.

Levels are also below the Category A threshold of potential significant effect using the 'ABC' method of BS 5228 Part 1.

A standard single glazed window would provide approximately 25dB attenuation factor when closed, meaning that the internal noise levels would be typically below $30dBL_{Aeq,16hr}$ and hence below the daytime criteria of $35dBL_{Aeq,16hr}$ set out in WHO. With a window partially open, an outside to inside noise reduction of around 15dB is likely resulting in internal noise levels of around 40dB L_{Aeq}. This would be acceptable where opening windows is desirable temporarily for ventilation.

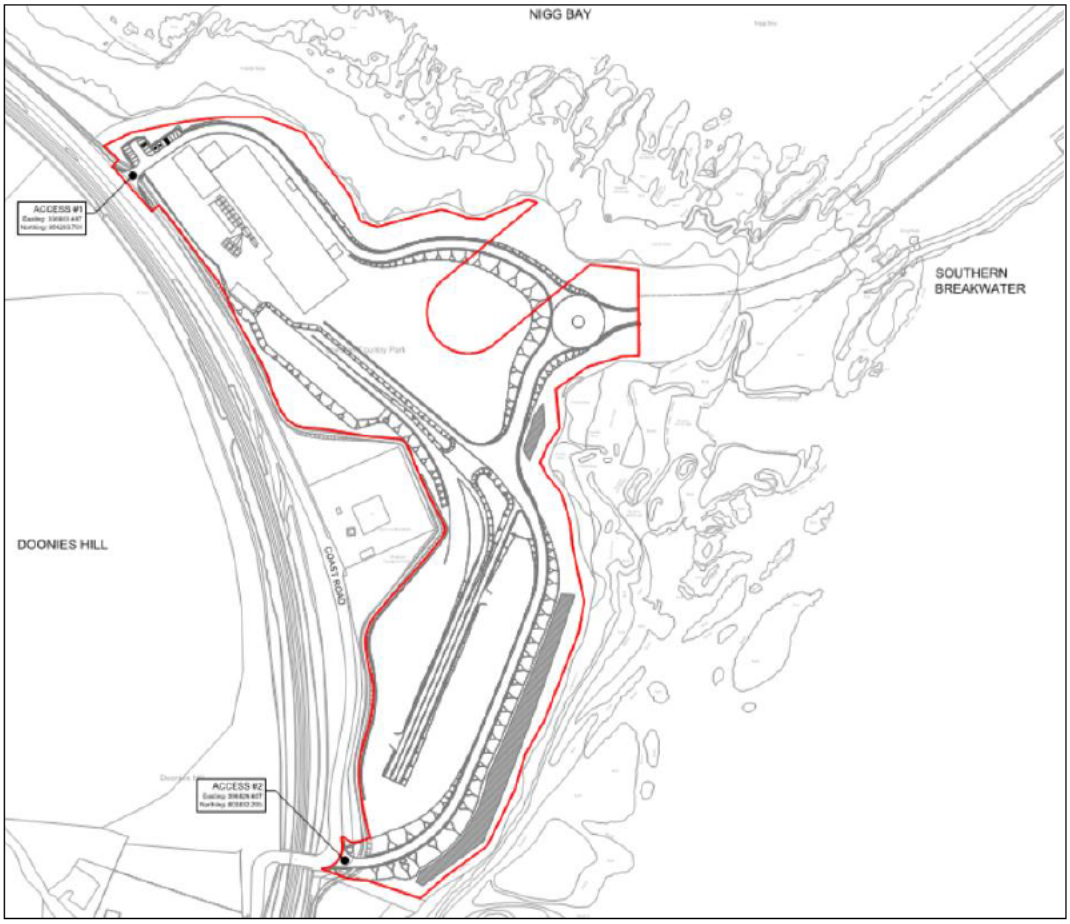
No evening or night-time activities are anticipated to be undertaken at the northern compound.

It is therefore concluded that no significant adverse impacts are expected for the lighthouse properties as a result of the operation of the northern compound.

B4.2 Southern Compound

The southern compound is located by the Coast Road south of the Nigg Bay , at approximately 500m from the closest receptor which is the Doonies Rare Breeds Farm. The land rises up southerly from the compound, and the receptor is screened by the intervening topography. The southern compound is anticipated to be operational during the night-time as it will serve for the construction of the south breakwater. The compound will be used mainly for the acropode fabrication, concrete batching and storage.

Figure B2 Southern Compound Layout



The following noise sources have been assumed for this assessment

Table B5 Plant items assumed for northern compound assessment

Activity name	Source	Sound power dBL_{wA}	Number	On-time (%)
Outdoor activities				
Dozer	BS5228 Table C.2.10	108	1	30
Tracked excavator	BS5228 Table C.2.14	107	1	30

Concrete pump and concrete mixer truck (discharging)	BS5228 Table C.4.24	96	1	80
Concrete pump and concrete mixer truck (idling)	BS5228 Table C.4.26	103	1	80
Rigid road lorry	BS5228 Table C.4.23	109	1	60

The minimum distance from the compound to the receptor is approximately 450m. Topography information has been taken from ordnancesurvey.co.uk and implemented in a SoundPlan® model. This model accounts also for ground absorption.

The predicted noise level outside the Doonies Rare Breeds Farm is 41dB$L_{Aeq,T}$. The night-time criteria of 42dB (from PPG mineral operators) is therefore not expected to be exceeded.

The predicted noise level from the southern compound is predicted to be below the Category A threshold of potential significant effect from BS 5228.

A partially open window would offer approximately 15dB noise attenuation factor meaning that the internal levels would be around 26dB. This is below the WHO criteria of 30dB$L_{Aeq,T}$ for the night-time. With windows closed, the predicted internal noise levels would be below 20dB. Therefore, impacts arising from the southern compound are assessed as not significant.

B5 Cumulative Impacts

The site compounds will be in operation concurrently with the main site works and as such have the potential to give rise to cumulative impacts.

Northern Compound

Where noise levels from breakwater construction etc. are predicted to be much higher than noise levels from the northern compound, these will mask noise from the compound and noise from the compound would not contribute to the noise level.

During quieter activities at the main site (50 to 55dB L_{Aeq} predicted at receptor), the combination of the two sources may give rise to temporary noises levels of up to 3dB higher than this. The use of the northern compound will also introduce noise on the other side of the properties to the main site. As the compound will not be operational in the evening and night-time and predicted noise levels in the daytime are below significance thresholds, it is not considered that this will produce a significant cumulative effect where one does not already exist from the main site works.

Southern Compound

Predicted noise levels from the main site works ranged from 37 to 51dB $L_{Aeq,1hr}$. The majority of activities were predicted to produce noise levels of around 45dB $L_{Aeq,1hr}$ at Doonies Rare Breeds Farm. There is therefore the potential that the operation of the southern compound would cause a cumulative noise level of around 47dB $L_{Aeq,1hr}$ during some activities. These activities would be undertaken

during the daytime and therefore the cumulative noise levels would not exceed daytime significance thresholds. During the higher noise level activities such as construction of the breakwaters and dredging (which will be undertaken at night), noise from the southern compound would not be predicted to contribute to the overall noise level. It is therefore not considered that the operation of the southern compound will contribute towards a significant cumulative effect.

B6 Conclusion

A noise impact assessment has been undertaken for the proposed northern and southern compound of the Aberdeen Harbour Expansion Project. The desktop assessment concluded that the noise impact of the northern compound at the closest sensitive receptors is unlikely to be significant, taking into account the 3m height stockpile topsoil as proposed.

The impacts arising from the southern compound have also been assessed as not significant given the large distance between the works and the closest sensitive receptors.

Appendix C

Attended Noise Monitoring Form

C1 Attended Noise Monitoring Form

Worksite: Contract ref.: Plan of Monitoring Location attached: YES/NO			Weather Conditions:			Date:
Survey Location (free-field/facade) Start Time: Finish Time:			Sound Level Meter Type: Serial Number: Time Response: Fast/Slow			Calibration Reading: Start: Finish:
Time	Activity/Equipment	Measurement Distance [m]	Measurement Duration [min]	L_{Aeq} [dB]	L_{Amax} [dB]	Comments/Events

Compliance with Section 61: YES/NO

If NO, ACTIONS REQUIRED:

Signed (Surveyor): ……PRINT NAME: …… Date: ……

Appendix D

Attended Vibration Monitoring Form

D1 Attended Vibration Monitoring Form

Worksite: CTRL Contract: Plan of Monitoring Location attached: YES/NO			Vibration Meter Type: Serial Number: Date last Calibrated:						
Date	Detailed Location	Activity /Equipment	Measurement Distance [m]	Measurement Duration [min]	Vibration Level				Comments/Events
					VDV / eVDV [$m/s^{1.75}$]	PPV [mm/s]			
						X	Y	Z	

Compliance with Section 61: YES/NO

If NO, ACTIONS REQUIRED:

Signed (Surveyor): …… PRINT NAME: …… Date: ……

Appendix E

BPM Checklist Example

E1 BPM Checklist Example

Note: This checklist will need to be updated upon receipt of detailed information on construction noise. This appendix is presented as an example

Generic	Comment
All vehicles and plant will be switched off when not in use.	
All plant being used is included within application	
Plant is being operated in a manner which minimises noise and vibration (i.e. engine covers closed, air-lines not leaking, joints suitably lubricated)	
Plant is maintained in a good condition	
Good house-keeping on site	
Site operatives suitably informed of the consent requirements, their responsibilities to minimise noise and vibration, and the approved working hours.	
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.	
Specific	
The use of mufflers on pneumatic tools.	
Rubber protection matting within the jack up working area to eliminate metal on metal impact noise	
Rubber sheath on jack up CR2 mast (cable percussive marine mast) to reduce cable noise	
Marine power pack not used on full throttle and idled/ switched of whenever possible between drilling tasks	

Compliance with Section 61: YES/NO

If NO, ACTIONS REQUIRED:

Signed (Surveyor): ……...……

PRINT NAME: ……Date: ……