



ABERDEEN HARBOUR  
EXPANSION PROJECT  
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Appendices*

## APPENDIX 20-B **BASELINE NOISE SURVEY**



## **20-B BASELINE NOISE SURVEY**

### **Noise Sensitive Receptors**

A desk-based study and site walkover was carried out to identify existing sensitive receptors (SRs) that could potentially be affected by noise and vibration arising from the construction works and the operation of the proposed development.

There are no extensive residential areas directly adjacent to the site although there are several isolated properties. Several dwellings are located near to Girdle Ness Lighthouse, being approximately 60 m to 80 m north of the site boundary. Doonies Rare Breed Farm is located approximately 800 m south-west of the site boundary and approximately 30 m to the west of the Coast Road. The residential area of Balnagask, which is bound by St Fitticks Road to the north, is approximately 300 m west of the site boundary.

Those SRs identified as being potentially affected by noise and vibration created during either construction or operation of the development are summarised in Table 20B.1 below and indicated on Figure 20B.1.

**Table 20B.1: Potential sensitive receptors**

<b>Sensitive Receptors</b>	<b>Description</b>	<b>Approximate Distance From Site Boundary [m]</b>
SR A	Doonies Rare Breed Farm, Coast Road	800 m south-west
SRs B	Residential dwellings at Girdle Ness Lighthouse, Greyhope Road	60 to 80 m north
SRs C	Balnagask residential area, St Fittick's Road	300 m west

### **Noise Survey Procedure and Results**

A baseline noise survey was undertaken between Wednesday, 11 June and Monday, 15 June 2015 to establish the prevailing noise climate within the vicinity of the Sensitive Receptors (SRs). This was supplemented by an additional survey conducted on Saturday, 27 June 2015.

The baseline strategy, which was agreed in advance with Aberdeen City Council, included unattended long-term noise measurements at SR A (location ST1) and SR B (location ST2), with attended noise measurements at SR C (locations ST1 and ST2). At SR C, during the daytime period, the CRTN shortened measurement procedure was followed, consisting of a 3 hour continuous measurement between 1000 to 1700 adjacent to St Fittick's and a 1 hour attended noise measurement on the eastern boundary of Balnagask residential area at a central location facing the development area. Attended 30 minute noise measurements were undertaken at these locations during the quiet night-time period (0100-0400) to provide an indication of the prevailing night-time noise.

The selected noise monitoring locations are described in Table 20B.2 and illustrated as Figure 20B.1.

**Table 20B.2: Noise monitoring locations**

Monitoring Location	Description	Observations and Predominant Noise Sources
LT1	Doonies Rare Breeds Farm (SR A)	Noise climate dominated by road traffic noise. Other noise noted during set up and take down was helicopter noise.
LT2	Residential properties Girdleness Lighthouse (SR B)	Noise climate dominated by road traffic noise and from the sea (wave noise). Other noise noted during set up and take down was helicopter noise.
ST 1	Balnagask Residential Area, St Fitticks Road	Noise climate dominated by road traffic noise.
ST 2	Balnagask Residential Area, central location on eastern boundary	Noise climate dominated by road traffic noise with contribution from human activity.

The parameters logged throughout the survey period were LAeq, LAm<sub>ax</sub>, L<sub>A01</sub>, LA90 and LA10. The LAeq level is the equivalent continuous sound pressure level over the measurement period; LAm<sub>ax</sub> is an indicator of the highest sound level during the measurement period; LA90 is used as a descriptor of background noise levels and LA10 is the noise level which is exceeded for 10% of the monitoring period and is often used to describe road traffic noise.

A noise survey was also conducted at Aberdeen Harbour of the key noise sources (plant and operations) on Monday, 15 June 2015. This is to inform the assessment of operational noise from the proposed development.

The sound level meters were field calibrated at the start and on completion of the survey at each noise monitoring location with no drift in the calibration level. Table 20B.3 presents details of the equipment used.

**Table 20B.3: Equipment details**

Location	Type	Serial Number
LT1	Rion NL-32 sound level meter	00503263
LT2/ST1/ST2	Rion NL-32 sound level meter	00413527
Aberdeen Harbour	Rion NA-28 sound level meter	01170649
All	Rion NC-74 acoustic calibrator	34536108

Figure 20B.1 and Figure 20B.2 present the time history plots for LT1 (Doonies Rare Breed Farm SR A) and LT2 (Residential Properties Girdleness Lighthouse).

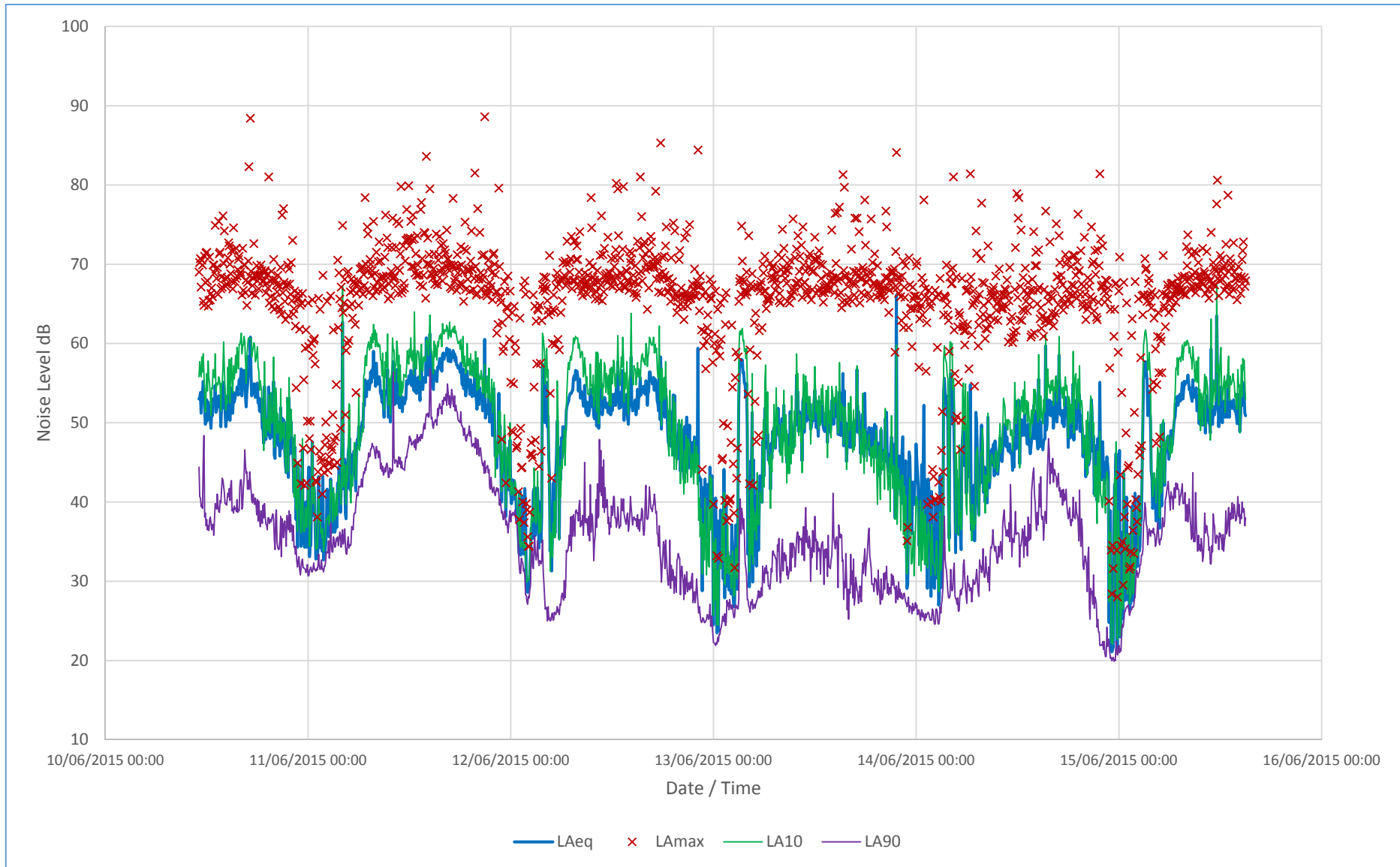
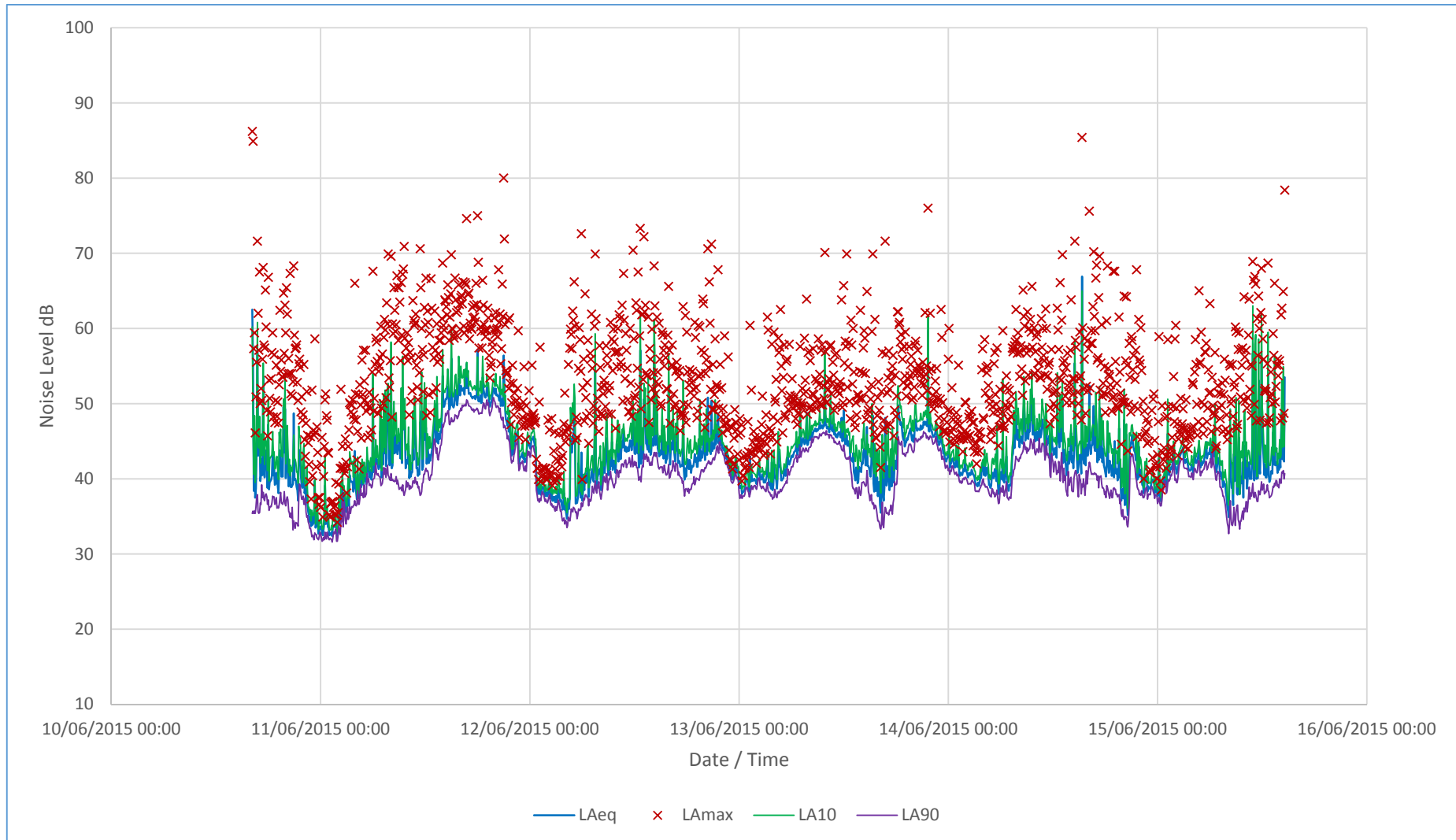


Figure 20B.1: Time history plot LT1 – Doonies Rare Breed Farm (SR A)



**Figure 20B.2: Time history plot – residential properties Girdleness Lighthouse (SR B)**



Photograph 20B.1 and Photograph 20B.2 present the noise monitoring locations of LT1 and LT2 respectively.



**Photograph 20B. 1: LT1 Noise monitoring location**



**Photograph 20B.2: LT2 Noise monitoring location**

The weather conditions were monitored remotely, weather station Ruthrieston ISCOTLAN60, during the long-term unattended survey. Predominantly weather conditions were appropriate for noise measurements, with average wind speed  $\leq 5$  m/s and no heavy rain. Data sets not meeting these requirements were removed from subsequent data analysis. Table 20B.4 presents the short-term attended noise measurements at ST1 (CRTN St Fittick's Road). The dominant noise source was road traffic noise. The noise monitoring location was approximately 3 metres from the nearside carriageway edge.

**Table 20B.4: ST1 CRTN noise measurement**

Date/Time	L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A10</sub>	L <sub>A90</sub>	L <sub>A1</sub>
10/06/2015 11:30	64.8	82.0	67.0	52.2	77.1
10/06/2015 11:35	68.5	89.3	68.4	53.8	81.7
10/06/2015 11:40	66.4	80.8	70.7	53.0	76.6
10/06/2015 11:45	63.8	79.2	68.4	48.8	74.7
10/06/2015 11:50	68.8	93.5	68.3	46.4	78.0
10/06/2015 11:55	66.1	82.5	69.5	52.7	77.3
10/06/2015 12:00	65.4	80.3	70.2	43.5	76.2
10/06/2015 12:05	65.4	87.4	68.6	43.8	77.7
10/06/2015 12:10	66.1	87.3	70.5	41.4	77.2
10/06/2015 12:15	64.8	79.0	69.3	45.0	75.5
10/06/2015 12:20	64.7	77.3	69.1	45.0	75.0
10/06/2015 12:25	63.6	77.0	68.5	48.9	73.4
10/06/2015 12:30	65.5	84.0	68.3	49.2	78.1
10/06/2015 12:35	64.2	78.9	68.4	50.7	74.3
10/06/2015 12:40	66.3	82.6	69.7	53.5	76.8
10/06/2015 12:45	65.5	79.9	68.9	54.7	76.3
10/06/2015 12:50	65.0	78.8	69.5	52.4	75.0
10/06/2015 12:55	66.7	78.6	70.5	56.7	75.5
10/06/2015 13:00	66.9	79.8	70.2	53.0	77.9
10/06/2015 13:05	66.4	85.2	69.8	51.9	76.8
10/06/2015 13:10	66.1	83.2	69.9	50.7	77.7
10/06/2015 13:15	65.1	82.6	69.0	48.3	76.1
10/06/2015 13:20	64.3	80.8	69.1	48.6	74.4
10/06/2015 13:25	67.3	86.1	70.4	48.4	78.6
10/06/2015 13:30	64.6	83.5	68.3	45.3	76.7
10/06/2015 13:35	64.9	82.2	68.0	45.4	77.4
10/06/2015 13:40	64.6	80.2	69.0	44.0	75.9
10/06/2015 13:45	63.6	82.7	67.7	45.3	74.4
10/06/2015 13:50	66.7	80.0	70.5	51.4	77.5
10/06/2015 13:55	64.7	81.7	68.3	49.2	76.6
10/06/2015 14:00	64.9	82.0	68.5	50.1	76.8
10/06/2015 14:05	65.7	81.0	70.0	51.4	77.0
10/06/2015 14:10	65.0	79.2	68.8	51.3	75.9



**Table 20B.4: ST1 CRTN noise measurement continued**

Date/Time	L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A10</sub>	L <sub>A90</sub>	L <sub>A1</sub>
10/06/2015 14:15	63.5	85.2	65.6	47.4	76.0
10/06/2015 14:20	63.8	78.3	68.8	47.3	74.0
10/06/2015 14:25	63.9	82.6	68.3	48.2	75.0
<b>Average</b>	<b>65<sup>[1]</sup></b>	<b>87<sup>[2]</sup></b>	<b>69<sup>[3]</sup></b>	<b>49<sup>[3]</sup></b>	<b>73<sup>[3]</sup></b>
CRTN LA10,3h			69		
CRTN LA10,18h			68		
TRL Day	66				
TRL Evening	63				
TRL Night	57				
<b>Notes:</b>					
[1] Logarithmic Average					
[2] 90 <sup>th</sup> Percentile					
[3] Arithmetic Average					
Transport Research Laboratory – Conversion equations from L <sub>A10,18h</sub> to L <sub>Aeq</sub> parameter.					
For non-motorway roads:-					
$L_{day} = 0.95 \times L_{A10,18h} + 1.44 \text{ dB}$					
$L_{evening} = 0.97 \times L_{A10,18h} - 2.87 \text{ dB}$					
$L_{night} = 0.90 \times L_{A10,18h} - 3.77 \text{ dB}$					
$L_{den} = 0.92 \times L_{A10,18h} + 4.20 \text{ dB}$					

Table 20B.5 presents the noise measurements at ST1 (road-side St Fittick’s Road) for the night-time period. The dominant noise source was noted to be distant road traffic noise. Seagull noise was also noted during the last two data sets.

**Table 20B.5: ST1 night-time noise measurement**

Date/Time	L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A10</sub>	L <sub>A90</sub>	L <sub>A1</sub>
27/06/2015 01:35:00	40.6	50.4	42.4	38.6	45.5
27/06/2015 01:40:00	41.7	51.9	43.6	39.6	47.1
27/06/2015 02:45:00	43.8	60.1	45.7	41.0	51.8
27/06/2015 02:50:00	44.5	56.7	46.8	41.4	50.0
27/06/2015 02:55:00	47.2	61.1	49.4	44.0	53.8
27/06/2015 03:00:00	51.4	73.8	48.6	42.8	65.0
<b>Average</b>	<b>47<sup>[1]</sup></b>	<b>67<sup>[2]</sup></b>	<b>46<sup>[3]</sup></b>	<b>41<sup>[3]</sup></b>	<b>52<sup>[3]</sup></b>
<b>Notes:</b>					
[1] Logarithmic Average					
[2] 90 <sup>th</sup> Percentile					
[3] Arithmetic Average					

Table 20B.6 present the noise measurements at ST2 (central location Balnagask residential area) during the daytime period. The dominant noise source was road traffic noise from St Fittick’s Road although noise from roads located to the west of the site were also audible.

Noise from human activity also contributed to the noise climate during the daytime period. The noise monitoring location was approximately 185 m south of St Fittick's Road.

**Table 20B.6: ST2 daytime noise measurements**

Date/Time	L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A10</sub>	L <sub>A90</sub>	L <sub>A1</sub>
10/06/2015 14:50	48.3	68.4	49.9	43.2	57.7
10/06/2015 14:55	59.2	73.8	61.9	44.4	71.7
10/06/2015 15:00	52.9	73.0	52.9	43.6	66.2
10/06/2015 15:05	54.2	80.5	53.2	43.2	62.1
10/06/2015 15:10	49.5	63.7	53.1	42.1	59.4
10/06/2015 15:15	54.1	68.4	56.0	41.0	67.5
10/06/2015 15:20	53.5	69.8	57.3	41.4	65.3
10/06/2015 15:25	47.5	62.4	50.3	41.9	57.5
10/06/2015 15:30	44.9	61.0	47.5	40.4	53.0
10/06/2015 15:35	48.4	63.1	51.8	42.6	56.7
10/06/2015 15:40	49.3	66.4	52.1	42.9	58.3
10/06/2015 15:45	49.2	66.9	49.6	44.5	59.4
<b>Data set not included – considered to be atypical</b>					
<b>Average</b>	<b>51<sup>[1]</sup></b>	<b>73<sup>[2]</sup></b>	<b>52<sup>[3]</sup></b>	<b>42<sup>[3]</sup></b>	<b>53<sup>[3]</sup></b>
<b>Notes:</b> [1] Logarithmic Average [2] 90 <sup>th</sup> Percentile [3] Arithmetic Average					

Table 20B.7 presents the noise measurements at ST2 for the night-time period. The dominant noise source was noted to be distant road traffic noise.

**Table 20B.7: ST2 night-time noise measurements**

Date/Time	L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A10</sub>	L <sub>A90</sub>	L <sub>A1</sub>
27/06/2015 02:00:00	40.1	57.6	43.3	34.9	48.1
27/06/2015 02:05:00	40.1	58.2	42.1	35.4	51.3
27/06/2015 02:10:00	39.5	60.7	40.3	35.0	51.5
27/06/2015 02:15:00	38.2	52.8	40.3	34.9	46.7
27/06/2015 02:20:00	42.0	64.1	44.2	35.4	52.6
27/06/2015 02:25:00	39.0	56.1	40.9	35.5	45.7
<b>Average</b>	<b>40<sup>[1]</sup></b>	<b>62<sup>[2]</sup></b>	<b>42<sup>[3]</sup></b>	<b>35<sup>[3]</sup></b>	<b>49<sup>[3]</sup></b>
<b>Notes:</b> [1] Logarithmic Average [2] 90 <sup>th</sup> Percentile [3] Arithmetic Average					

Photographs 20B.3 and 20B.4 illustrate the noise monitoring locations for ST1 and ST2 respectively.



**Photograph 20B.1: Noise monitoring location ST1**



**Photograph 20B.2: ST2 noise monitoring location**



Table 20B.8 presents a summary of the measured noise levels at Aberdeen Harbour.

**Table 20B.8: Summary of source noise measurements at Aberdeen Harbour**

Operation	Measurement setup			LAeq	LAmx	LA1	LA10	LA90	LW (LAeq)	Tonal Frequencies	Notes
	Ref.	Dist. [m]	Time [sec.]								
Tank cleaning	1501	15	300	76.1	89.0	78.8	76.5	75.6	107.6	63Hz	
Cargo and chain handling	1502	15	300	75.9	98.7	88.9	76.8	67.3	93.4	-	Loading large pipes onto lorries via mobile forklift
	1512	20	300	72.5	94.9	79.9	75.8	62.9	106.5	-	Cargo unloading. Moving containers from boat
	1503	15	50	78.3	96.1	88.4	83.4	65.7	109.8	-	Forklift lifting pipes
	1504	20	97	68.5	79.9	74.6	72.0	65.0	102.5	-	Crane lifting pipes off boat including dismantling chains from pipes
	1505	15	15	71.0	80.5	75.8	73.3	69.0	102.5	800Hz, 1.25KHz	Forklift reverse beeper
	1507	15	19	74.9	84.9	79.8	78.0	71.4	106.4	-	Forklift reverse beeper
	1513	10	11	78.1	80.6	79.8	79.8	77.0	106.1	2500Hz, 10000Hz	Forklift reverse beeper
	1511	10	7	74.6	77.4	76.4	76.4	73.5	102.6	-	Large forklift reverse beeper
Mobile cranes	1506	20	91	70.6	86.7	81.2	73.9	64.3	104.6	-	Mobile crane lifting
	1508	40	60	76.5	82.8	81.0	78.8	73.8	116.5	800Hz, 1KHz, 1.6KHz, 2KHz	Large mobile crane moving
	1509	30	52	78.6	87.5	82.4	80.1	77.1	116.1	-	Large mobile crane moving (issues during measurement)
	1510	20	60	87.5	92.0	90.2	89.5	83.9	121.5	800Hz, 1KHz	Large mobile crane moving
Vessel generator	1514	25	50	67.9	81.6	75.8	70.1	63.8	103.9	-	
Grain elevator	1517	7	60	68.7	70.4	69.7	69.4	68.2	93.6	-	Generator only
Tugboat berthing and manoeuvring	1516	6	60	63.4	66.9	64.6	63.9	63.0	87.0	-	Waiting tugboat engine
	1515	10	300	66.4	71.9	70.3	68.8	62.3	94.4	-	Tugboat pulling away from dock