ACE AQUATEC

REIMAGINING SUSTAINABLE AQUACULTURE

ASR transmissions

Supporting information for Kames

Dr Jeffrey Lines 29th Aug 2021

Assessment of the acoustics implication of the use of an Ace Aquatec RT1 & US3 ASR to deter seals around Kames' farming sites

Ace Aquatec RT1 and US3 deterrent systems operated on Kames farms with number of transducers, tones and level settings identified are EPS compliant because they disturb fewer than 1.0 protected marine mammals of any species and present a low risk of PTS injury.

This assessment is based on the data, criteria and modelling approach recommended by Marine Scotland for the assessment of EPS licenses as described below.

Modelling method

The modelling method and data used is that recommended by Marine Scotland.

Marine mammal density is drawn from the SCANS III survey.

Species Present	Harbour Porpoise *(Phocoena phocoena)*	Bottlenose Dolphin *(Tursiops truncates)*	Minke Whale (*Balaenoptera acutorostrata)*
Animals in Zone G (Argyll) /km^2	**0.336**	**0.121**	**0.027**
Animals in Zone I (Minch) /km^2	**0.397**	**0.000**	**0.020**

Table 1: Marine Mammal Density for Zone G (Argyll) and Zone I (Minch) drawn from SCANS III survey. Note that Bottlenose Dolphin are not present in Zone I.

All current Kames sites are located in Zone G or Zone I.

Sound propagation is modelled using Received Level = Source Level - 18.3Log (Distance) and sea areas in the sound shadow of land are discounted from the total sea area.

Disturbance is considered possible where the unweighted sound pressure level exceeds 120 dB

Permanent Threshold Shift injury (PTS) is considered a risk

- for porpoise where the Very High Frequency weighted 24-hr SEL exceeds 173 dB
- for dolphin where the High Frequency weighted 24-hr SEL exceeds 198 dB
- for minke whale where the Low Frequency weighted 24-hr SEL exceeds 199 dB

Maximum RMS Sound pressure levels have been calculated on the basis of the SPL required to avoid disturbance. These are as given in Table 2.

			Below threshold (permitted)		Above threshold (not permitted)	
farm	location	Zone and permitted area	SPL and radius	Sea area	SPL and radius	Sea area
North Moine (FS/0356)	56° 9.338N 5° 32.113W	Zone G 2.98 km^2	**181 dB** 2154 m	1.63 km^2	n/a*	n/a
Shuna Castle (FS/0465)	56° 13.603N 5° 35.538W	Zone G 2.98 km^2	**176 dB** 1148 m	2.78 km^2	177 dB 1302 m	3.48 km^2
Kames Bay East (FS/0462)	56° 14.861N 5° 30.833W	Zone G 2.98 km^2	**181 dB** 2154 m	2.83 km^2	n/a *	n/a
Kames Bay West (FS/0271)	56° 14.979N 5° 31.283W	Zone G 2.98 km^2	**178 dB** 1477 m	2.97 km^2	n/a**	n/a**
Ardifuir (FS/1062)	56° 7.062N 5° 34.031W	Zone G 2.98 km^2	**177 dB** 1302 m	2.40 km^2	178 dB 1477 m	3.07 km^2
Pooltiel West (FS/1310)	57° 27.647N 6° 45.864W	Zone I 2.52 km^2	**175 dB** 1013 m	2.18 km^2	176 dB 1148 m	2.75 km^2

Table 2: Results of Ace Aquatec modelling work to determine the maximum allowable SPL at each farm site.

The disturbance impact is determined by the RMS sound pressure level of the ASR, and is independent of the numbers of devices used and of device type. However, the potential for PTS injury varies with both numbers of devices and device type. The number of animals potentially at risk of permanent threshold shift (PTS) has been calculated for each farm using the following combinations of devices.

- Three RT1s;
- One US3;
- Three RT1s and One 1 US3.

These devices are set to the SPL limit required to avoid disturbance as identified in Table 1. The device numbers have been used based on the number of devices Kames currently has rented from Ace Aquatec.

Table 3 shows the distance from the units at which the 24hr frequency weighted SEL drops below the potential injury threshold of 173 dB and the number of porpoises potentially at risk. Other animals have been excluded from this table because Harbour Porpoise are at the highest potential risk for injury. Full tables for all animals at potential risk can be found in the appendix

Farm	RMS SPL (dB) as given in Table 2	Number of Porpoise potentially disturbed	Number of Porpoise at potential risk using 3xRT1 devices	Number of Porpoise at potential risk using 1xUS3 device	Number of Porpoise at potential risk using 3xRT1 & 1xUS3 devices
North Moine (FS/0356)	**181**	**0.55**	**0.00003**	**0.015**	**0.015**
Kames Bay East (FS/0462)	**181**	**0.95**	**0.00003**	**0.015**	**0.015**
Kames Bay West (FS/0271)	**178**	**0.99**	**0.00002**	**0.007**	**0.007**
Ardifuir (FS/1062)	**177**	**0.8**	**0.00001**	**0.005**	**0.005**
Shuna Castle (FS/0465)	**176**	**0.94**	**0.00001**	**0.004**	**0.004**
Pooltiel West (FS/1310)	**175**	**0.86**	**0.00001**	**0.004**	**0.004**

Table 3: The number of Harbour Porpoise potentially disturbed by Ace Aquatec Acoustic Startle Devices (ASD) and the number at potential risk of injury based on different equipment configurations currently available to Kames farms

Tone and Level Settings for Sites in Zone G (Argyll)

Due to the different of acoustic properties between RT1 and US3 ASD, the tones and level of each type of device must be set according to the tables laid out below.
Tone and Level setting shaded green are allowable settings. Red shaded cells show settings that are **not** allowable. Allowable settings are site and device dependant and settings from one site or device type **MUST NOT** be applied at other sites or with other devices.

North Moine (FS/0356): Max SPL: 181dB
Tone and Level settings of **US3** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	181	178	176	176	178	176.5	174	176	176
level 8	180	177	175	175	177	175.5	173	175	175
level 7	179	176	174	174	176	174.5	172	174	174
level 6	177.5	174.5	172.5	172.5	174.5	173	170.5	172.5	172.5
level 5	176	173	171	171	173	171.5	169	171	171
level 4	174	171	169	169	171	169.5	167	169	169
level 3	171	168	166	166	168	166.5	164	166	166
level 2	168	165	163	163	165	163.5	161	163	163
level 1	162	159	157	157	159	157.5	155	157	157

Table 4: Tone and Level options for ASD systems using US3 at North Moine (FS/0356).

Tone and Level settings for **RT1** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	182	179	177	177	179	177.5	175	177	177
level 8	181	178	176	176	178	176.5	174	176	176
level 7	180	177	175	175	177	175.5	173	175	175
level 6	178.5	175.5	173.5	173.5	175.5	174	171.5	173.5	173.5
level 5	177	174	172	172	174	172.5	170	172	172
level 4	175	172	170	170	172	170.5	168	170	170
level 3	172	169	167	167	169	167.5	165	167	167
level 2	169	166	164	164	166	164.5	162	164	164
level 1	163	160	158	158	160	158.5	156	158	158

Table 5: Tone and Level options for ASD systems using RT1 at North Moine (FS/0356).

Kames Bay East (FS/0462): Max SPL: 181dB

Tone and Level settings of **US3** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	181	178	176	176	178	176.5	174	176	176
level 8	180	177	175	175	177	175.5	173	175	175
level 7	179	176	174	174	176	174.5	172	174	174
level 6	177.5	174.5	172.5	172.5	174.5	173	170.5	172.5	172.5
level 5	176	173	171	171	173	171.5	169	171	171
level 4	174	171	169	169	171	169.5	167	169	169
level 3	171	168	166	166	168	166.5	164	166	166
level 2	168	165	163	163	165	163.5	161	163	163
level 1	162	159	157	157	159	157.5	155	157	157

Table 6: Tone and Level options for ASD systems using US3 at Kames Bay East (FS/0462).

Tone and Level settings for **RT1** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	182	179	177	177	179	177.5	175	177	177
level 8	181	178	176	176	178	176.5	174	176	176
level 7	180	177	175	175	177	175.5	173	175	175
level 6	178.5	175.5	173.5	173.5	175.5	174	171.5	173.5	173.5
level 5	177	174	172	172	174	172.5	170	172	172
level 4	175	172	170	170	172	170.5	168	170	170
level 3	172	169	167	167	169	167.5	165	167	167
level 2	169	166	164	164	166	164.5	162	164	164
level 1	163	160	158	158	160	158.5	156	158	158

Table 7: Tone and Level options for ASD systems using RT1 at Kames Bay East (FS/0462).

Kames Bay West (FS/0271): Max SPL: 178dB

Tone and Level settings of **US3** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	181	178	176	176	178	176.5	174	176	176
level 8	180	177	175	175	177	175.5	173	175	175
level 7	179	176	174	174	176	174.5	172	174	174
level 6	177.5	174.5	172.5	172.5	174.5	173	170.5	172.5	172.5
level 5	176	173	171	171	173	171.5	169	171	171
level 4	174	171	169	169	171	169.5	167	169	169
level 3	171	168	166	166	168	166.5	164	166	166
level 2	168	165	163	163	165	163.5	161	163	163
level 1	162	159	157	157	159	157.5	155	157	157

Table 8: Tone and Level options for ASD systems using US3 at Kames Bay West (FS/0271).

Tone and Level settings for **RT1** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	182	179	177	177	179	177.5	175	177	177
level 8	181	178	176	176	178	176.5	174	176	176
level 7	180	177	175	175	177	175.5	173	175	175
level 6	178.5	175.5	173.5	173.5	175.5	174	171.5	173.5	173.5
level 5	177	174	172	172	174	172.5	170	172	172
level 4	175	172	170	170	172	170.5	168	170	170
level 3	172	169	167	167	169	167.5	165	167	167
level 2	169	166	164	164	166	164.5	162	164	164
level 1	163	160	158	158	160	158.5	156	158	158

Table 9: Tone and Level options for ASD systems using RT1 at Kames Bay West (FS/0271).

Ardifuir (FS/1062): Max SPL: 177dB

Tone and Level settings of **US3** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	181	178	176	176	178	176.5	174	176	176
level 8	180	177	175	175	177	175.5	173	175	175
level 7	179	176	174	174	176	174.5	172	174	174
level 6	177.5	174.5	172.5	172.5	174.5	173	170.5	172.5	172.5
level 5	176	173	171	171	173	171.5	169	171	171
level 4	174	171	169	169	171	169.5	167	169	169
level 3	171	168	166	166	168	166.5	164	166	166
level 2	168	165	163	163	165	163.5	161	163	163
level 1	162	159	157	157	159	157.5	155	157	157

Table 10: Tone and Level options for ASD systems using US3 at Ardifuir (FS/1062).

Tone and Level settings for **RT1** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	182	179	177	177	179	177.5	175	177	177
level 8	181	178	176	176	178	176.5	174	176	176
level 7	180	177	175	175	177	175.5	173	175	175
level 6	178.5	175.5	173.5	173.5	175.5	174	171.5	173.5	173.5
level 5	177	174	172	172	174	172.5	170	172	172
level 4	175	172	170	170	172	170.5	168	170	170
level 3	172	169	167	167	169	167.5	165	167	167
level 2	169	166	164	164	166	164.5	162	164	164
level 1	163	160	158	158	160	158.5	156	158	158

Table 11: Tone and Level options for ASD systems using RT1 at Ardifuir (FS/1062).

Shuna Castle (FS/0465): Max SPL: 181dB

Tone and Level settings of **US3** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	181	178	176	176	178	176.5	174	176	176
level 8	180	177	175	175	177	175.5	173	175	175
level 7	179	176	174	174	176	174.5	172	174	174
level 6	177.5	174.5	172.5	172.5	174.5	173	170.5	172.5	172.5
level 5	176	173	171	171	173	171.5	169	171	171
level 4	174	171	169	169	171	169.5	167	169	169
level 3	171	168	166	166	168	166.5	164	166	166
level 2	168	165	163	163	165	163.5	161	163	163
level 1	162	159	157	157	159	157.5	155	157	157

Table 12: Tone and Level options for ASD systems using US3 at Shuna Castle (FS/0465).

Tone and Level settings for **RT1** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	182	179	177	177	179	177.5	175	177	177
level 8	181	178	176	176	178	176.5	174	176	176
level 7	180	177	175	175	177	175.5	173	175	175
level 6	178.5	175.5	173.5	173.5	175.5	174	171.5	173.5	173.5
level 5	177	174	172	172	174	172.5	170	172	172
level 4	175	172	170	170	172	170.5	168	170	170
level 3	172	169	167	167	169	167.5	165	167	167
level 2	169	166	164	164	166	164.5	162	164	164
level 1	163	160	158	158	160	158.5	156	158	158

Table 13: Tone and Level options for ASD systems using RT1 at Shuna Castle (FS/0465).

Tone and Level Settings for Sites in Zone I (Minch)

Pooltiel West (FS/1310): Max SPL: 185dB

Tone and Level settings of **US3** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	181	178	176	176	178	176.5	174	176	176
level 8	180	177	175	175	177	175.5	173	175	175
level 7	179	176	174	174	176	174.5	172	174	174
level 6	177.5	174.5	172.5	172.5	174.5	173	170.5	172.5	172.5
level 5	176	173	171	171	173	171.5	169	171	171
level 4	174	171	169	169	171	169.5	167	169	169
level 3	171	168	166	166	168	166.5	164	166	166
level 2	168	165	163	163	165	163.5	161	163	163
level 1	162	159	157	157	159	157.5	155	157	157

Table 14: Tone and Level options for ASD systems using US3 at Pooltiel West (FS/1310).

Tone and Level settings for **RT1** devices

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	182	179	177	177	179	177.5	175	177	177
level 8	181	178	176	176	178	176.5	174	176	176
level 7	180	177	175	175	177	175.5	173	175	175
level 6	178.5	175.5	173.5	173.5	175.5	174	171.5	173.5	173.5
level 5	177	174	172	172	174	172.5	170	172	172
level 4	175	172	170	170	172	170.5	168	170	170
level 3	172	169	167	167	169	167.5	165	167	167
level 2	169	166	164	164	166	164.5	162	164	164
level 1	163	160	158	158	160	158.5	156	158	158

Table 15: Tone and Level options for ASD systems using RT1 at Pooltiel West (FS/1310).

Appendix 1:

Disturbance

Farm	SCANS III Zone	Max SPL (dB)	Ensonnified Sea Area (km^2)
North Moine (FS/0356)	G	181	1.63
Shuna Castle (FS/0465)	G	176	2.78
Kames Bay East (FS/0462)	G	181	2.83
Kames Bay West (FS/0271)	G	178	2.97
Ardifuir (FS/1062)	G	177	2.4
Pooltiel West (FS/1310)	I	175	2.18

Table A-1: Maximum allowable SPL and the resulting ensonnified sea area at each Kames farm site.

Farm	Number of porpoises disturbed	Number of Bottlenose Dolphin disturbed	Number of Minke disturbed
North Moine (FS/0356)	0.55	0.2	0.04
Shuna Castle (FS/0465)	0.94	0.34	0.08
Kames Bay East (FS/0462)	0.95	0.34	0.08
Kames Bay West (FS/0271)	0.999	0.36	0.08
Ardifuir (FS/1062)	0.8	0.29	0.06
Pooltiel West (FS/1310)	0.86	0	0.04

Table A-2: The number of each cetacean species that is present in the areas that Kames farms are located in has been indicated by the SCANS III survey. Pooltiel West (FS/1310) is located in Zone I (Minch) where Bottlenose Dolphin are not present.

Potential PTS figures using 3 RT1 devices

Farm	VHF PTS Threshold Radius (m)	VHF PTS Sea area (km^2)	Number of Porpoise potentially at risk of PTS injury
North Moine (FS/0356)	6	0.0001	0.000034
Shuna Castle (FS/0465)	3	0.00003	0.000010
Kames Bay East (FS/0462)	6	0.0001	0.000034
Kames Bay West (FS/0271)	4	0.00005	0.000016
Ardifuir (FS/1062)	3	0.00004	0.000012
Pooltiel West (FS/1310)	3	0.00002	0.000009

Table A-3: The Very High Frequency (VHF) PTS injury radius, the sea area in which PTS is possible and the number of Harbour Porpoise that might be injured by the use of 3RT1 devices.

Farm	HF PTS Threshold Radius (m)	HF PTS Sea area (km^2)	Number of Bottlenose Dolphin potentially at risk of PTS injury
North Moine (FS/0356)	1	0.000001	0.0000002
Shuna Castle (FS/0465)	0.4	0.0000004	0.00000005
Kames Bay East (FS/0462)	1	0.000001	0.0000002
Kames Bay West (FS/0271)	0.5	0.0000007	0.00000008
Ardifuir (FS/1062)	0.4	0.0000005	0.00000006

Table A-4: The High Frequency (HF) PTS injury radius, the sea area in which PTS is possible and the number of Bottlenose Dolphin that might be injured by the use of 3RT1 devices.

Farm	LF PTS Threshold Radius (m)	LF PTS Sea area (km^2)	Number of Minke Whale potentially at risk of PTS injury
North Moine (FS/0356)	18	0.00105	0.000028
Shuna Castle (FS/0465)	10	0.0003	0.000008
Kames Bay East (FS/0462)	18	0.00105	0.000028
Kames Bay West (FS/0271)	13	0.00049	0.000013
Ardifuir (FS/1062)	11	0.00038	0.000010
Pooltiel West (FS/1310)	9	0.00023	0.000005

Table A-6: The Low Frequency (LF) PTS injury radius, the sea area in which PTS is possible and the number of Minke Whale that might be injured by the use of 3RT1 devices.

Potential PTS figures using 1 US3 device

Farm	VHF PTS Threshold Radius (m)	VHF PTS Sea area (km^2)	Number of Porpoise potentially at risk of PTS injury
North Moine (FS/0356)	122	0.046	0.015
Shuna Castle (FS/0465)	65	0.013	0.004
Kames Bay East (FS/0462)	122	0.046	0.015
Kames Bay West (FS/0271)	83	0.021	0.007
Ardifuir (FS/1062)	74	0.016	0.005
Pooltiel West (FS/1310)	57	0.01	0.004

Table A-7: The Very High Frequency (VHF) PTS injury radius, the sea area in which PTS is possible and the number of Harbour Porpoise that might be injured by the use of 1 US3 devices.

Farm	HF PTS Threshold Radius (m)	HF PTS Sea area (km^2)	Number of Bottlenose Dolphin potentially at risk of PTS injury
North Moine (FS/0356)	8	0.00018	0.00002
Shuna Castle (FS/0465)	4	0.00005	0.00001
Kames Bay East (FS/0462)	8	0.00018	0.00002
Kames Bay West (FS/0271)	5	0.00008	0.00001
Ardifuir (FS/1062)	5	0.00006	0.00001

Table A-8: The High Frequency (HF) PTS injury radius, the sea area in which PTS is possible and the number of Bottlenose Dolphin that might be injured by the use of 1 US3 device.

Farm	LF PTS Threshold Radius (m)	LF PTS Sea area (km^2)	Number of Minke Whale potentially at risk of PTS injury
North Moine (FS/0356)	8	0.0002	0.000005
Shuna Castle (FS/0465)	4	0.00006	0.000002
Kames Bay East (FS/0462)	8	0.0002	0.000005
Kames Bay West (FS/0271)	6	0.0001	0.000003
Ardifuir (FS/1062)	5	0.00007	0.000002
Pooltiel West (FS/1310)	4	0.00004	0.000001

Table A-9: The Low Frequency (LF) PTS injury radius, the sea area in which PTS is possible and the number of Minke Whale that might be injured by the use of 1 US3 device.

Potential PTS figures using 3 RT1 devices & 1 US3 device

Farm	VHF PTS Threshold Radius (m)	VHF PTS Sea area (km^2)	Number of Porpoise potentially at risk of PTS injury
North Moine (FS/0356)	122	0.046	0.015
Shuna Castle (FS/0465)	65	0.013	0.004
Kames Bay East (FS/0462)	122	0.046	0.015
Kames Bay West (FS/0271)	84	0.022	0.007
Ardifuir (FS/1062)	74	0.017	0.005
Pooltiel West (FS/1310)	57	0.01	0.004

Table A-10: The Very High Frequency (VHF) PTS injury radius, the sea area in which PTS is possible and the number of Harbour Porpoise that might be injured by the use of 3 RT1 & 1 US3 devices.

Farm	HF PTS Threshold Radius (m)	HF PTS Sea area (km^2)	Number of Bottlenose Dolphin potentially at risk of PTS injury
North Moine (FS/0356)	8	0.00018	0.00002
Shuna Castle (FS/0465)	4	0.013	0.00001
Kames Bay East (FS/0462)	8	0.00018	0.00002
Kames Bay West (FS/0271)	5	0.00008	0.00001
Ardifuir (FS/1062)	5	0.00006	0.00001

Table A-11: The High Frequency (HF) PTS injury radius, the sea area in which PTS is possible and the number of Bottlenose Dolphin that might be injured by the use of 3RT1 & 1 US3 devices.

Farm	LF PTS Threshold Radius (m)	LF PTS Sea area (km^2)	Number of Minke Whale potentially at risk of PTS injury
North Moine (FS/0356)	20	0.00131	0.00004
Shuna Castle (FS/0465)	11	0.0003	0.00001
Kames Bay East (FS/0462)	20	0.046	0.00004
Kames Bay West (FS/0271)	14	0.0006	0.00002
Ardifuir (FS/1062)	12	0.00048	0.00001
Pooltiel West (FS/1310)	10	0.00029	0.00001

Table A-12: The Low Frequency (LF) PTS injury radius, the sea area in which PTS is possible and the number of Minke Whale that might be injured by the use of 3RT1 & 1 US3 devices.

Appendix 2:

Ace ASR transmission average source pressure levels.

Ace Aquatec has three devices available (Flex, Ring and US3).

Source sound pressure levels (dB)

Flex:

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	182	179	177	177	179	177.5	175	177	177
level 8	181	178	176	176	178	176.5	174	176	176
level 7	180	177	175	175	177	175.5	173	175	175
level 6	178.5	175.5	173.5	173.5	175.5	174	171.5	173.5	173.5
level 5	177	174	172	172	174	172.5	170	172	172
level 4	175	172	170	170	172	170.5	168	170	170
level 3	172	169	167	167	169	167.5	165	167	167
level 2	169	166	164	164	166	164.5	162	164	164
level 1	163	160	158	158	160	158.5	156	158	158

US3:

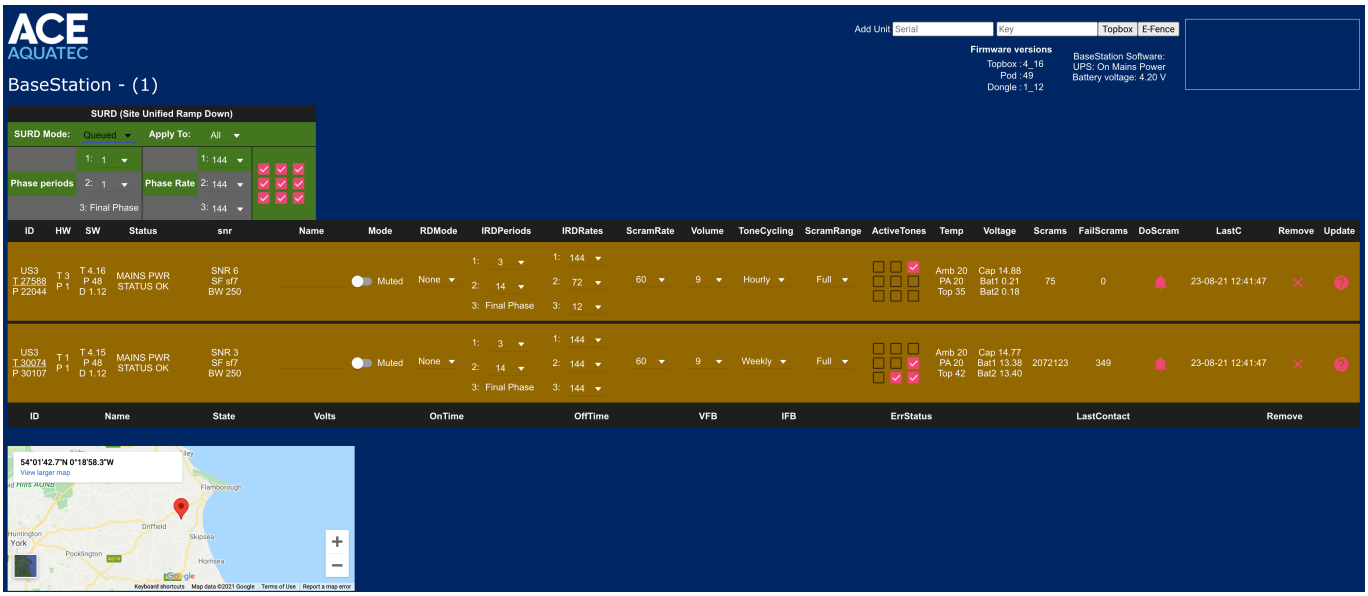
	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	181	178	176	176	178	176.5	174	176	176
level 8	180	177	175	175	177	175.5	173	175	175
level 7	179	176	174	174	176	174.5	172	174	174
level 6	177.5	174.5	172.5	172.5	174.5	173	170.5	172.5	172.5
level 5	176	173	171	171	173	171.5	169	171	171
level 4	174	171	169	169	171	169.5	167	169	169
level 3	171	168	166	166	168	166.5	164	166	166
level 2	168	165	163	163	165	163.5	161	163	163
level 1	162	159	157	157	159	157.5	155	157	157

Ring:

	tone 1	tone 2	tone 3	tone 4	tone 5	tone 6	tone 7	tone 8	tone 9
level 9	180	177	175	175	177	175.5	173	175	175
level 8	179	176	174	174	176	174.5	172	174	174
level 7	178	175	173	173	175	173.5	171	173	173
level 6	176.5	173.5	171.5	171.5	173.5	172	169.5	171.5	171.5
level 5	175	172	170	170	172	170.5	168	170	170
level 4	173	170	168	168	170	168.5	166	168	168
level 3	170	167	165	165	167	165.5	163	165	165
level 2	167	164	162	162	164	162.5	160	162	162
level 1	161	158	156	156	158	156.5	154	156	156

Control:

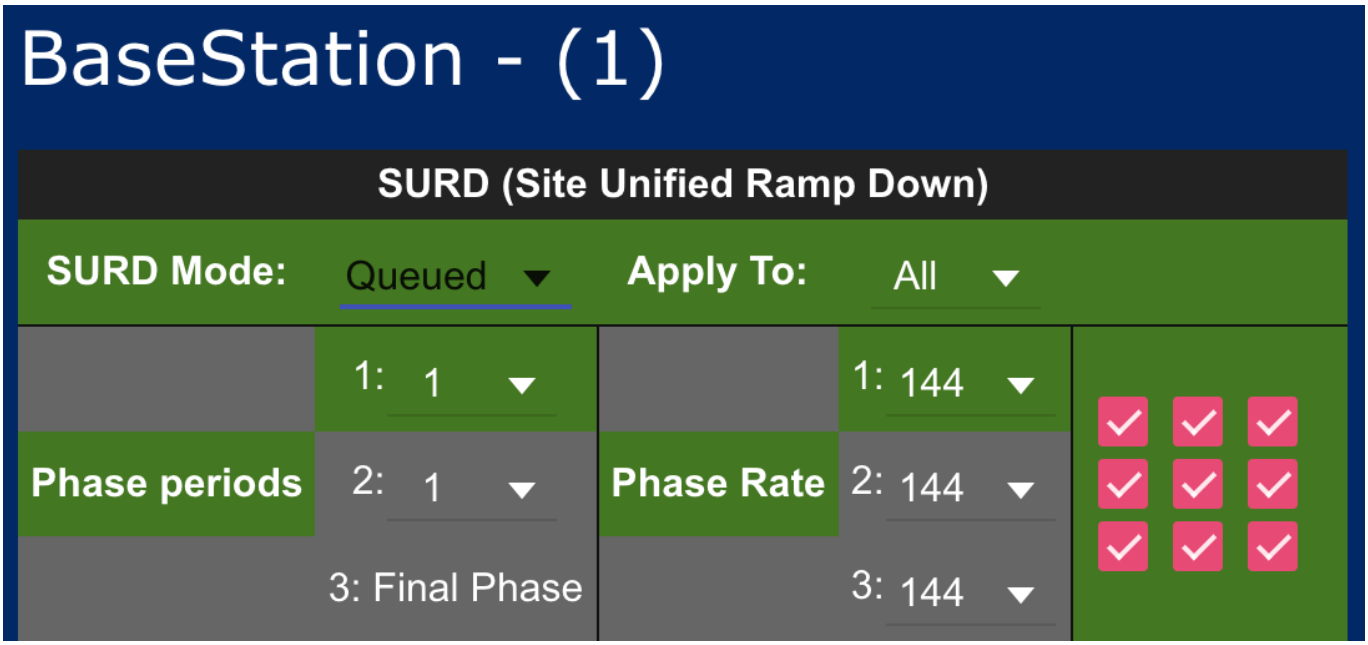
Each device is operated and logged through the Ace portal.



The following check boxes indicate tones 1-9 being selected or inactive.

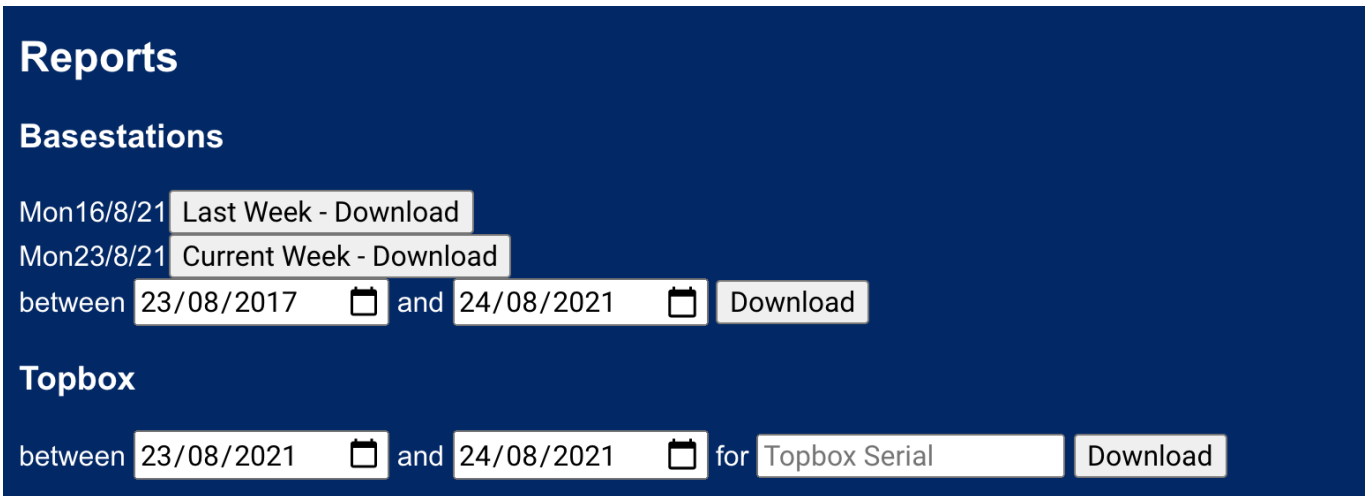
Sequential Scramming (SURD mode):

‘SURD mode Queued’ allows all systems connected to the same control to operate intelligently and responsively to each other. No device connected in this mode will ever play sound at the same time as another device, but rather they will be queued.



Logging and downloading:

The Ace ASR systems are fully audited and traceble in their activities. The following details show hoe downloads are administered:



All portal data can be shared with compliance organisations (as submitted for the recent MPs reveiew in March 2021 for Alex Coram).