Appendix 8.6

Noise Source Schedule and Outline Required BAT Noise Control

APPENDIX 8.6
NOISE SOURCE SCHEDULE AND OUTLINE REQUIRED BAT NOISE CONTROL

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
Reception Building																					
Hitachi ZW220 loading shovel	Typical operation	Historic Sol measurement (P1730 - 10/05/2017)	102	104	106	97	95	96	97	96	92	88	1	I	15	90		Intermittent	100%	0%	Standard noise reduction kit is required to be fitted. Attenuated and smart reversing alarms must also be fitted. No night-time operation permitted (night time being defined as any period between 23:00 hours and 07:00 hours, refer to BS4142 *et al*)
Discharge chain conveyor & associated levelling screws	As installed	On-site measurement during 6 February 2019, see ADN039	98	96	101	101	101	95	91	88	80	68	1	I	87	78		Continuous	100%	100%	
Collection chain conveyor (internal)	As installed	On-site noise measurements on 17 January 2019, see ADN036	97	94	91	93	94	91	92	91	81	63	1	I	51	79	No material	Continuous	100%	100%	
Reception Building extract fan inlet	Exposed unit	Vendor	76		82	85	79	81	79	75	72	64	8	I	6	68	Sound power level as advised on datasheet: C3454 Barry ATS Commissioning.01, page 8, received via email on 05/11/2018	Does not operate			PCML have advised Sol Acoustics that these fans will never be required to run under any circumstances. (If this changes at any time in the future, the fans will require acoustic evaluation and significant further attenuation will be required both to atmospheric and roomside, per fan)
	Attenuator insertion loss				2	3	6	11	10	6	5	4									
Main Process Building																					
MPB extract fan inlet (Internal)	Attenuator fitted	On-site noise measurements on 11 November 2019, See ADN100	83	79	91	91	85	81	74	74	71	65	8	I	6.3	75	Noise measurements conducted with acoustic enclosure fitted	Continuous	100%	100%	Outlet (i.e. atmospheric side) attenuator fitted, per fan
Drag chain conveyor top drive	As installed	On-site noise measurements on 17 January 2019, see ADN036	102	88	87	93	100	99	97	97	88	74	1	I	58	85	No material	Continuous	100%	100%	
Fuel metering bin drives	As installed	On-site measurement at Barry on 24 April 2019, see ADN049	76	73	71	70	70	75	72	68	57	53	1	I	15	64	Noise levels for all three drives operating	Continuous	100%	100%	
Fuel metering plug screw conveyor	As installed	On-site measurements at Barry on 30 May 2019, see ADN057	88	81	86	87	80	77	79	75	85	71	2	I	30	73		Continuous	100%	100%	
Gasifier casing	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	I	-	-	Not significant with all other plant running	Continuous	100%	100%	
Bed recycle vibrating screen and magnetic belt separator	Acoustic enclosure fitted	On-site noise measurements on 11 November 2019, See ADN100	91	98	97	96	91	89	84	82	78	73	1	I	247	67	Noise measurements conducted with acoustic enclosure fitted. No material being processed	Continuous	100%	100%	Full bespoke, proprietary acoustic enclosure required, to include acoustic tunnels and attenuation of all product chutes *et al*, must achieve at least 30-35dB overall attenuation as constructed
Bed reinjection bucket elevator and drive	As installed	On-site noise measurements on 9 January 2018, see ADN034	93	89	97	101	94	89	87	83	77	67	1	I	200	70	No material	Continuous	100%	100%	
SNCR urea tank mixing	As installed	On-site measurements at Barry on 30 May 2019, see ADN057	77	67	67	67	75	70	74	67	61	55	2	I	13	65		Continuous	100%	100%	
SNCR urea pumps	As installed	On-site measurements at Barry on 30 May 2019, see ADN057	81	71	78	69	71	75	71	71	64	81	2	I	13	70		Continuous	100%	100%	
SNCR injectors in gasifier	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	I	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
SNCR water pumps	As installed	On-site measurements at Barry on 30 May 2019, see ADN057	71	69	69	68	67	68	64	64	61	62	2 (1 in standby)	I	13	60		Continuous	100%	100%	
SNCR top motor	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	I	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Lap valve hoppers	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	I	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Soot blower	As installed	Sol Acoustics measurement (Enna plant 30/06/2017)	99	94	90	87	90	86	86	89	93	97	1	I	6	91		Intermittent, does not operate at night.	5%	0%	No night time operation of any soot blowers is permitted (night time being defined as any period as occurring between 23:00 hours and 07:00 hours inclusive, refer to BS4142 *et al*)
UFA inlet aperture	Attenuator fitted	Vendor	77	-	94	84	77	71	68	67	67	69	1	I	5	70		Continuous	100%	100%	Inlet (suction side) attenuator fitted
UFA fan case and motor	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	100	109	107	100	97	98	94	93	87	78	1	I	167	78	Noise measurements conducted with acoustic enclosure fitted.	Continuous	100%	100%	Full proprietary acoustic enclosure to encompass fan and motor etc., complete with attenuated ventilation for motor cooling to achieve 70dB $L_{Aeq,T}$ at 1 metre distance from any enclosure external surface
UFA fan discharge duct wall	As installed	Vendor	87	-	104	94	87	81	78	77	77	79	1	I	50	70	Noise breakout from fan casing taken from Rotamil data sheet.	Continuous	100%	100%	100mm thick high density acoustic cladding with outer metal skin fitted to ductwork outside of acoustic enclosure; duct radiated noise to not exceed 70dB $L_{Aeq,T}$ at 1 metre distance from any external surface
OFA inlet aperture	Attenuator fitted	Vendor	77	-	94	84	77	71	68	67	67	69	1	I	5	70		Continuous	100%	100%	Inlet attenuator fitted
OFA fan case and motor	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	96	108	105	100	96	93	89	88	84	74	1	I	145	74	Noise breakout from fan casing taken from Rotamil data sheet.	Continuous	100%	100%	Full proprietary acoustic enclosure to encompass fan and motor etc complete with attenuated ventilation for motor cooling to achieve 70dB $L_{Aeq,T}$ at 1 metre distance from any enclosure external surface
OFA discharge duct wall	As installed	Vendor	88	-	105	95	88	82	79	78	78	80	1	I	60	70	Noise breakout from fan casing taken from Rotamil data sheet.	Continuous	100%	100%	100mm thick high density acoustic cladding with outer metal skin fitted to ductwork outside of acoustic enclosure; duct radiated noise to not exceed 70dB $L_{Aeq,T}$ at 1 metre distance from any external surface
Boiler	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	1	I	-	-	Not significant with all other plant running	Continuous	100%	100%	
Boiler water jacketed ash chain conveyor	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	1	I	-	-	Not significant with all other plant running	Continuous	100%	100%	
Ash hoppers from boiler	As installed	Sol Acoustics observation on site at Barry on 26 April 2019	-	-	-	-	-	-	-	-	-	-	5	P	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Multiclone	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	1	I	-	-	Not significant with all other plant running	Continuous	100%	100%	
Multi-clone screw conveyors	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	1	I	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Economizer	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	1	I	-	-	Not significant with all other plant running	Continuous	100%	100%	
Economizer rotary feeder	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	1	I	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
Economizer ash screw conveyor	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	1	I	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Boiler feed water pumps	As installed	On-site noise measurements on 6 February 2019, see ADN039	95	79	84	85	88	89	88	90	84	81	2 (1 in standby)	I	9	85		Continuous	100%	100%	
Two waves crusher	As installed	On-site noise measurements on 9 January 2019, ADN034	84	71	77	82	87	79	78	74	71	66	1	I	13	72	No material	Continuous	100%	100%	
Pneumatic ash conveying system blower	As installed	On-site measurement at Barry on 24 April 2019, see ADN049	85	68	70	69	60	62	69	78	82	73	1	I	20	72		Continuous	100%	100%	
Recycled lime conditioning drum cooling water pump	As installed	On-site noise measurements on 6 February 2019, see ADN039	88	73	71	74	76	78	81	84	80	76	1	I	7	80		Continuous	100%	100%	.
Bed cooling fan	As installed	Supplier confirmed sound pressure level of 75dB at 1m	96				105						1	I	138	75		Continuous	100%	100%	Supplier to ensure fan acoustic enclosure and all cooling attenuators etc., as built, is wholly comply with specified acoustic performance requirement of 75dB $L_{Aeq,T}$ at 1 metre distance from any enclosure surface. Max 10°C mean temperature rise within acoustic enclosure, NB run/standby fans required
All louvres to be high performance, 600mm deep DOUBLE BANKED acoustic louvres, Allaway Acoustics type AL3015D or equal and approved	As installed	*Minimum acoustic louvres insertion loss, dB*	-	-	*7*	*8*	*13*	*19*	*33*	*39*	*37*	*30*	-	-	-	-					All louvres to be high performance, 600mm deep DOUBLE BANKED acoustic louvres, e.g. Allaway Acoustics type "AL3015D" or equal and approved. (Others to check free area, ventilation, and heat dissipation requirements. NB: louvre free area is c.25% only, which must be factored into heat dissipation and ventilation assessment etc.)
Main Process Building - Lean-To																					
Air compressor	As installed	On-site noise measurements on 18 January 2019, see ADN036	-	-	-	-	-	-	-	-	-	-	2	I	35	73	On-site reverberant sound pressure level measured on site has been used in the model. No equivalent sound power level	Continuous	100%	100%	
Instrument air compressor	As installed	On-site noise measurements on 18 January 2019, see ADN036	-	-	-	-	-	-	-	-	-	-	2	I	35	73	On-site reverberant sound pressure level measured on site has been used in the model. No equivalent sound power level	Continuous	100%	100%	
Steam Turbine Room																					
All louvres to be high performance, 300mm deep DOUBLE BANKED acoustic louvres, Allaway Acoustics type AL1515D or equal and approved	As installed	*Minimum acoustic louvres insertion loss, dB*	-	-	*5*	*5*	*8*	*13*	*22*	*30*	*28*	*23*	-	-	-	-					All louvres to be high performance, 600mm deep DOUBLE BANKED acoustic louvres, e.g. Allaway Acoustics type "AL3015D" or equal and approved. (Others to check free area, ventilation, and heat dissipation requirements. NB: louvre free area is c.25% only, which must be factored into heat dissipation and ventilation assessment etc.)
Gland steam condenser fan	As installed	On-site measurements on 24 April 2019, see ADN049	99	72	75	84	90	95	92	92	91	82	1	I	20	85		Continuous	100%	100%	
Steam turbine and generator	As installed	Vendor data from TGM Kanis for the turboset.	109	95	97	99	100	101	102	102	103	101	1	I	250	85		Continuous	100%	100%	

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
Auxiliary oil pump	As installed	Not significant	-	-	-	-	-	-	-	-	-	-	-	I	-	-		Continuous	100%	100%	
Oil mist separator fan	As installed	Not significant	-	-	-	-	-	-	-	-	-	-	-	I	-	-		Continuous	100%	100%	
Main oil pump	As installed	Not significant	-	-	-	-	-	-	-	-	-	-	-	I	-	-		Continuous	100%	100%	
Heat exchangers	As installed	Not significant												I				Continuous	100%	100%	
Water Treatment Room (within Welfare Building)																					
Water treatment pumps	As installed	On-site noise measurements on 18 January 2019, see ADN036	-	-	-	-	-	-	-	-	-	-	-	I	-	-	Not measured, deemed not significant	Continuous	100%	100%	
Process service water booster pump	As installed	On-site noise measurements on 18 January 2019, see ADN036	-	-	-	-	-	-	-	-	-	-	-	I	-	-	Not measured, deemed not significant	Continuous	100%	100%	
External																					
Collection chain conveyor	Existing unit with acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	85	95	98	97	95	90	86	83	72	59	1	L	325	60.1	Noise measurements conducted with acoustic enclosure fitted. No material was being transported	Continuous	100%	100%	Acoustic enclosure fitted. Acoustic compliance testing has been undertaken with the conveyor operating at typical duty but without transporting any biomass material. The inclusion of material within the conveyor could significantly affect the noise levels generated – likely reducing the noise output, as due to a dampening effect. It is thus essential that further noise measurements of the collection chain conveyor are undertaken at the earliest opportunity to determine whether compliance with the acoustic specification of 60dB $L_{Aeq,T}$ at 1 metre distance has actually been achieved, or if a further c.7dB overall attenuation is confirmed to be necessary
	Further noise reduction is required			7																	
Collection chain conveyor top drive	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	80	85	87	87	82	77	75	71	60	51	1	P	67	62.0	Noise measurements conducted with acoustic enclosure fitted. No material	Continuous	100%	100%	Bespoke templated acoustic enclosure, complete with acoustic absorption to achieve 60dB $L_{Aeq,T}$ at 1 metre distance
Overband magnet conveyor	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	84	88	89	88	86	82	77	73	65	56	1	P	139	62.1	Noise measurements conducted with acoustic enclosure fitted. No material	Continuous	100%	100%	Bespoke templated acoustic enclosure, complete with acoustic absorption to achieve 60dB $L_{Aeq,T}$ at 1 metre distance
Disc screen	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	81	89	88	86	82	79	75	71	63	57	1	P	81.6	61.9	Noise measurements conducted with acoustic enclosure fitted. No material	Continuous	100%	100%	Bespoke templated acoustic enclosure, complete with acoustic absorption to achieve 60dB $L_{Aeq,T}$ at 1 metre distance
Weigh belt	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	88	89	92	90	89	84	82	80	74	67	1	P	88	68.1	Noise measurements conducted with acoustic enclosure fitted. No material	Continuous	100%	100%	Bespoke templated acoustic enclosure, complete with acoustic absorption to achieve 60dB $L_{Aeq,T}$ at 1 metre distance
Drag chain conveyor	Exposed unit	On-site noise measurements on 17 January 2019, see ADN036	82	89	89	95	99	94	91	88	80	69	1	L	130	60	Measurements undertaken prior to fitting the acoustic enclosure	Continuous	100%	100%	Bespoke templated acoustic enclosure, complete with acoustic absorption to achieve 60dB $L_{Aeq,T}$ at 1 metre distance. NB: The current, as fitted and wholly complete, finished acoustic enclosure has not yet tested by Sol Acoustics (as of July 2022)
	Acoustic enclosure enhancement required			15																	
4-Ladder push floor hydraulic power pack drive and cooler	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	82	94	86	76	76	81	75	75	72	62	1	P	51	65	Noise measurements conducted with acoustic enclosure fitted.	Continuous	100%	100%	Bespoke templated acoustic enclosure, complete with acoustic absorption to achieve 60dB $L_{Aeq,T}$ at 1 metre distance

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
8-Ladder push floor hydraulic power pack drive and cooler	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	82	94	86	76	76	81	75	75	72	62	1	P	51	65	Noise measurements conducted with acoustic enclosure fitted.	Continuous	100%	100%	Bespoke templated acoustic enclosure, complete with acoustic absorption to achieve 60dB $L_{Aeq,T}$ at 1 metre distance
Reception Building extract fan outlet	Exposed unit	Vendor	71		80	91	81	83	80	78	73	65	8	P	6	63	Sound power level as stated on datasheet: C3454 Barry ATS Commissioning.01, page 8, received on email on 05/11/2018	n/a	n/a	n/a	PCML have advised Sol Acoustics that these fans will never be required to run under any circumstances. If this changes at any time in the future, the fans will require acoustic evaluation and significant further attenuation will be required both to atmospheric and roomside, per fan)
	Attenuator insertion loss				2	5	11	21	27	24	14	10									
Reactor / Spray scrubber	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not measured, deemed not significant	Continuous	100%	100%	
Reactor (scrubber) feed screw conveyor and drive	As installed	On-site noise measurements on 18 January 2019, see ADN036	79	73	75	70	78	72	77	69	60	55	1	L	13	68	Noise from conveyor not audible therefore assumed noise from drive	Continuous	100%	100%	
Powdered activated carbon (PAC) enclosure	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	91	98	115	94	91	86	77	77	73	62	1	A	259	67	Noise measurements conducted with acoustic enclosure fitted.	Continuous	10%	10%	
Fresh lime conveying blower	As installed	On-site noise measurement at Barry by Sol on 1st November 2018, see ADN026	70		78	79	81	80	86	85	82	73	1	P	10	60	No material	Continuous	100%	100%	Acoustic enclosure is required to envelop this plant; the unit is required to achieve a maximum permissible sound pressure level of 60dB $L_{Aeq,T}$ at 1 metre distance from any external surface formed by the new enclosure
	Acoustic enclosure required			20																	
Recycled lime conditioning drum drive	As installed	On-site measurements on 8 January 2019, see ADN034	74	70	69	68	67	71	70	67	61	58	1	P	13	63	No material	Continuous	100%	100%	
Recycled lime conditioning drum blower	As installed	On-site measurements on 8 January 2019, see ADN034	71	70	72	76	82	75	80	76	70	65	1	P	13	60	No material	Continuous	100%	100%	Acoustic enclosure is required to envelop this plant; the unit is required to achieve a maximum permissible sound pressure level of 60dB $L_{Aeq,T}$ at 1 metre distance from any external surface formed by the new enclosure
	Acoustic enclosure required			12																	
Recycled lime conditioning drum	As installed	On-site measurements on 8 January 2019, see ADN034	-	-	-	-	-	-	-	-	-	-	1	P	80	-	Determined not to be significant during on-site measurements	Continuous	100%	100%	
Baghouse filter	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not measured, deemed not significant	Continuous	100%	100%	ID fan inlet (i.e. suction side) attenuator required to provide c.10dB overall insertion loss
Baghouse penthouse ventilation fans	As installed	On-site measurements on 8 January 2019, see ADN034	88	106	103	96	86	87	81	78	73	67	2	P	13	77	10dB reduction included in model as these will be fully screened from the receptors by the Baghouse enclosure	Continuous	100%	100%	
Baghouse gathering screw conveyors	As installed	On-site measurements on 8 January 2019, see ADN034	82	73	75	75	74	75	80	73	70	67	2	L	70	64	No material	Continuous	100%	100%	
Baghouse transfer screw conveyor	As installed	On-site measurements on 8 January 2019, see ADN034	82	73	75	75	74	75	80	73	70	67	1	L	70	64	No material	Continuous	100%	100%	

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
Reagent recycle (APCR) conveying blower	As installed	On-site noise measurements on 11 November 2019, See ADN100	88	93	91	95	93	89	87	82	75	65	1	P	64	70	Noise measurements conducted with acoustic enclosure fitted	Continuous	100%	100%	Further enhancement, corrective measures are required to the existing, as-fitted acoustic enclosure, in order to meet the original acoustic specification of 70dB $L_{Aeq,T}$ when measured at a distance of 1 metre from any external surface of the enclosure (the current enclosure achieves c. 75dB $L_{Aeq,T}$ at 1 metre distance)
	Further attenuation required			4																	
Reagent recycle (APCR) conveying blower piping	As installed	Sol estimate	76	69	69	74	74	71	71	69	66	64	1	L	120	55		Continuous	100%	100%	Double skinned with high mass cladding with external metal skin to provide 55dB $L_{Aeq,T}$ at 1 metre distance from any external pipe (duct) surface
Recycle to silo rotary feeder	As installed	On-site measurements on 8 January 2019, see ADN034	82	72	69	72	74	81	78	73	70	68	1	P	6.3	74	No material	Continuous	100%	100%	
Hydrated lime metering rotary feeder	As installed	On-site measurements on 8 January 2019, see ADN034	75	72	74	74	67	66	71	62	71	64	1	P	12	65	No material	Continuous	100%	100%	
Urea blower	As installed	On-site measurements on 30 May 2019, see ADN057	91	83	82	86	93	88	86	81	74	65	1	P	24	77		Intermittent	10%	10%	
Urea screw conveyor	As installed	On-site measurements at Barry on 30 May 2019, see ADN057	-	-	-	-	-	-	-	-	-	-	-	I	-	-	Not measured, deemed not significant	Continuous	100%	100%	
Ash conditioner	As installed	On-site measurements at Barry on 24 April 2019, see ADN049	85	91	97	80	78	75	74	81	73	39	1	P	186	62	With the ash conditioner and ash rotary feeder and motor running, a reverberant sound pressure level of 96dB $L_{Aeq,T}$ was measured within the ash silo. It was not possible to measure the noise level external to the silo due to extraneous noise. Sound power levels presented are calculated for the external walls of the silo, as based upon the reverberant noise level and assuming the sound insulation performance of a typical metal doorset	No night time operation	100%	0%	
Ash rotary feeder and motor	As installed																	No night time operation	100%	0%	
APCR conditioner	As installed	On-site measurements on 06 February 2019, see ADN039	79	92	100	85	76	71	71	72	61	51	1	P	186	56	With the APCR conditioner and APCR rotary feeder and motor running, a reverberant sound pressure level of 88dB $L_{Aeq,T}$ was measured within the APCR silo. Not possible to measure the noise level external to the silo due to extraneous	No night time operation	100%	0%	

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
APCR rotary feeder and motor	As installed																Sound power levels presented are calculated for the external walls of the silo based upon the reverberant noise level and assuming the sound insulation performance of a typical metal doorset	No night time operation	100%	0%	
LPPH drain pumps	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	83	77	74	70	70	74	77	78	76	72	2, 1 in standby	P	27	69	Noise measurements conducted with acoustic enclosure fitted	Continuous	100%	100%	
ID fan system ductwork	As installed	Vendor	81		101	93	84	69	50	38	24	10	1	P	60	63	Breakout calculation based on Rotamil vendor data for in-duct sound power level post attenuator. Outotec advise 6mm steel duct and 90mm insulation	Continuous	100%	100%	Insulation to be at least 100mm thick and to have a final external metal cladding layer having a mass per unit area of at least 10kg/m^2 (e.g. 1.3mm gauge steel) or to have a 5kg/m^2 polymeric barrier layer between the insulation and the final, outer metal sheet forming the complete cladding system
ID fan system case and motor	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	88	109	98	95	93	82	78	80	77	71	1	P	290	64	Noise measurements conducted with acoustic enclosure fitted during "cold measurements"	Continuous	100%	100%	
ID fan system flue gas recirculation duct (external section only)	As installed	Vendor	79		101	92	79	67	60	50	30	11	1	L	80	60	Breakout calculation based on vendor data for ID fan post attenuator. Recirculation duct is 70m long (of which 25m is outside) and 0.7m dia. Noise from the main flow entering the recirculation duct is attenuated by acoustic lagging of the duct	Continuous	100%	100%	6mm steel duct constructional specification and 90mm thick insulation advised by Outotec. Additional upgrade of polymeric layer at 5kg/m^3 Must limit noise to 60dB $L_{Aeq,T}$ at 1 metre distance from any external surface
ID fan stack outlet aperture	Attenuator fitted	On-site noise measurements on 16 February 2018 via crane. Fan operating at 85% speed, inlet vane damper set to 50% open	94	112	113	106	92	85	82	81	83	78	1	P	6.3	86		Continuous	100%	100%	High performance, replacement splitter attenuator required to achieve a sound pressure level of 76dB $L_{Aeq,T}$ when measured at a distance of 1 metre from the ID fan stack outlet (distance taken from outer stack wall surface), as at 90° off the vertical axis of the stack. (Note that the existing ID fan attenuator will need to be removed and replaced)
	Replacement of current attenuator required (with larger, enhanced unit)	Post attenuator noise spectrum taken from Sol Acoustics on-site measurement at Hull on 28 February 2019, see ADN118	84		96	93	83	81	78	74	66	54	1	P	6	76		Continuous	100%	100%	
ACC fans (all 8)	As installed	Sol Acoustics onsite measurement at Barry on 6 February 2019. 8 fans running at 100%, see ADN039	101	109	106	100	96	96	97	93	94	80	1	A	492	74	"Ultra-low noise" fans installed and measured. Noise measurements as based on 8 fans running at 100%	Continuous	100%	100%	
ACC vacuum unit	As installed	Sol Acoustics measurement at Hull on 29 May 2019. See ADN056	91		86	83	83	82	82	82	86	83	1	P	50	74		Continuous	100%	100%	

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
ACC steam header	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Condensate pumps	As installed	On-site noise measurements on 18 January 2019, see ADN036	84	77	74	70	77	81	80	76	72	67	1	P	6.3	76		Continuous 1 on and 1 on standby	100%	100%	
External steam lines	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Auxiliary dry/ air blast cooler	Acoustic enclosure	Vendor	94	93	99	97	96	94	86	80	76	71	1	P	255	70	Noise measurements conducted with acoustic enclosure fitted	Continuous 1 on and 1 on standby	100%	100%	Acoustic enclosure fitted
Glycol/water circulation pumps (3 pumps)	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	81	83	89	87	81	78	75	71	68	68	1	P	84	62	Noise measurements conducted with acoustic enclosure fitted	Continuous	100%	100%	Acoustic enclosure fitted
Air compressor outlet	As installed	On-site measurement on 17 January 2019, see ADN036	87	85	88	85	85	85	81	79	75	73	3	P	6	79		Continuous	100%	100%	
DNO transformer	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Reactor (transformer)	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
MPB extract fan outlet	Exposed unit	Vendor	70		80	91	81	83	80	78	73	65	8	P	6	62	Sound power level as advised on datasheet ref. C3454 Barry ATS Commissioning.01, page 8, as received on email on 05/11/2018	Continuous	100%	100%	Outlet attenuators fitted. Not yet tested by Sol Acoustics
	Attenuator				3	7	13	22	29	25	15	11									
Waste rotary feeder	As installed	Sol Acoustics observation on site at Barry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not measured, deemed not acoustically significant	Continuous	100%	100%	
Steam turbine room ventilation fan	As installed	Sol estimate	80	84	84	82	79	74	73	73	71	66	4	P	33	65		Continuous	100%	100%	
Steam turbine room ventilation inlet	As installed	Sol estimate	75	75	75	73	71	68	67	67	69	68	2	P	10	65		Continuous	100%	100%	
Steam turbine room ventilation outlet	As installed	Sol estimate	75	75	75	73	71	68	67	67	69	68	2	P	10	65		Continuous	100%	100%	
Ash storage exhaust	As installed	PCML	-	-	-	-	-	-	-	-	-	-	2	P	6	-	Advised not significant	Continuous	100%	100%	
APCR storage exhaust	As installed	PCML	-	-	-	-	-	-	-	-	-	-	2	P	6	-	Advised not significant	Continuous	100%	100%	
Boiler feedwater system exhaust	As installed	PCML	-	-	-	-	-	-	-	-	-	-	1	P	6	-	Advised not significant	Continuous	100%	100%	
Gland steam condenser fan exhaust	As installed	On-site measurements on 24 April 2019, see ADN049	72	73	73	77	76	66	64	64	61	46	1	64	6	64		Continuous	100%	100%	

Equipment Name	Component / Scenario	Data Origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1 Metre from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
Deaerator outlet vent pipe	As installed	PCML - Estimated	78				87						1	P	6	70	Identified as significant on 29/03/2019 at Hull Biomass site	Continuous	100%	100%	Requires attenuator to achieve 70dB $L_{Aeq,T}$ at 1 metre distance from outlet
Dust extract fan a case and motor	Exposed unit	On-site noise measurements at Barry on 19 February 2020. See ADN 115	82		97	97	95	92	87	84	85	79	1	P	48	65		Continuous	100%	100%	Acoustic enclosure, complete with attenuated motor cooling ventilation to not exceed 65dB $L_{Aeq,T}$ at 1 metre distance from all enclosure external surfaces (c.20dB overall attenuation minimum required)
	Acoustic enclosure required			12																	
Dust extract fan b case and motor	Exposed unit	On-site noise measurements at Barry on 19 February 2020. See ADN 115	82		100	100	97	95	91	90	88	85	1	P	48	65		Continuous	100%	100%	Acoustic enclosure, complete with attenuated motor cooling ventilation to not exceed 65dB $L_{Aeq,T}$ at 1 metre distance from all enclosure external surfaces (c.20dB overall attenuation minimum required)
	Acoustic enclosure required			16																	
Dust extract louvre	Exposed unit	On-site noise measurements at Barry site on 19 February 2020. See ADN 115	81		107	102	90	78	71	69	66	61	2	P	7	73		Continuous	100%	100%	Internally lined acoustic ductwork bend to be fitted to each of the two existing high level air outlets located at the top of the dust extract filtration cone; to provide an in-duct insertion loss of at least 7dB at 125Hz octave band. (Others must check flow resistance of these is acceptable to OEM, prior to finalisation/manufacture)
	Attenuated duct bends required (attenuators)			7 (125Hz octave band)																	
HGV moving floor/idling	Typical operation	Historic Sol Acoustics measurement (P1730 - 10/05/2017)	103	94	96	95	97	99	99	98	87	80	2	P	39	87	Daytime noise sources only.		2 events per 1 hour period	0	No night time operation is permitted (23:00 hours to 07:00 hours inclusive)
HGV unloading	Typical operation	Historic Sol Acoustics measurement (P1730 - 10/05/2017)	101	111	107	98	97	98	95	94	88	80	2/hour	P	14	89	Daytime noise source only		25%	0%	No night time operation is permitted (23:00 hours to 07:00 hours inclusive)

Table A8.6.1: Noise source schedule and outline required BAT noise control measures – Duty

Key

	Acoustic Enclosure Fitted and Tested
	Noise source not used/modelled
XX	Attenuation to be provided

Equipment name	Component / Scenario	Data origin	Overall Sound Power Level (dB L_{WA})	Sound Power Level (dB) at Octave Band Centre Frequency, Hz									Number of Sources	Source: Area (A), Line (L) Point (P), Internal (I)	Measurement Surface Area at 1m Distance from Equipment (m^2)	Average Sound Pressure Level on Measurement Surface (dB L_{pA})	Comments	Operation	Utilisation		Noise Mitigation
				32	63	125	250	500	1k	2k	4k	8k							Daytime	Night time	
Main Process Building																					
Atomizing air fan (underbed burner)	Acoustic enclosure	On-site noise measurements on 11 November 2019, See ADN100	80	80	89	80	78	77	75	72	69	58	1	I	44	64	Noise measurements conducted with acoustic enclosure fitted	Start-up	100%	100%	Acoustic enclosure fitted
Diesel burner (underfire)	As installed	Contractor's Acoustic Consultant's estimate	90	83	83	88	88	85	85	83	80	78	3	I	30	75	Contractor's Consultant estimates 75dB $L_{Aeq,T}$ at 1 metre distance. These are shown for start-up only	Start-up	100%	100%	
Diesel burner (overfire)	As installed	Contractor's Acoustic Consultant's estimate	90	83	83	88	88	85	85	83	80	78	3	I	30	75	Contractor's Consultant estimates 75dB $L_{Aeq,T}$ at 1 metre distance. These are shown for start-up only	Start-up	100%	100%	
External																					
Diesel transfer pump	As installed	On-site measurement on 6 February 2019	86	84	88	83	82	80	84	76	76	63	1	P	20	73	Contractor's Consultant's estimate of 80dB $L_{Aeq,T}$ at 1 metre distance. Diesel storage steel box with small pumps at the end.	start up	100%	100%	
Vacuum unit start up exhaust	As installed	PCML	86		103	93	86	80	76	75	75	79	1	P	6	78	Specs@ Vacuum SL-05-19011 (1).pdf and Vacuum SL-05-19011 (2).pdf advises 78dB $L_{Aeq,T}$ at 1 metre distance	Start-up	100%	100%	
Desuperheater bypass vent valve outlet (SL-3)	Unattenuated unit	PCML	88		120	126	132	138	143	146	148	145	1	P	6	80	Sound power and attenuator as per MI-17255-PR-SP-009_5 Silencer Data.pdf provided by PCML on 09 May 2019	Start-up. **Does not operate at Barry**	0%	0%	Outlet attenuators fitted. Not yet tested by Sol
	Attenuator insertion loss				15	31	44	56	64	69	71	66									
Superheated steam start-up exhaust	Unattenuated unit	PCML	85		117	123	129	135	141	146	149	151	1	P	6	77	Sound power and attenuator as per HPM-18606-PR-SP-001_A2 Superheated Silencer.xls as provided by Harris Pye	intermittent	100%	100%	
	Attenuator insertion loss				18	34	47	59	59	75	78	78									

Table A8.6.2: Noise source schedule and outline required BAT noise control measures – Start-Up

Key

	Acoustic Enclosure Fitted and Tested
	Noise source not used/modelled
XX	Attenuation to be provided