Net Zero Teesside – Environmental Statement

Planning Inspectorate Reference: EN010103

Volume III – Appendices

Appendix 11B: Operational Noise Information

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended)

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11B. Operational Noise Information

11.1 Noise Model Settings

11.1.1 This development was characterised in CadnaA (version 2021) acoustic modelling software. This software implements the sound propagation calculation methodology set out in ISO 9613-2.

Data Sources – Proposed Power Plant Site:

Table 11B-1: Modelling Input Data

Model element	Data package	Format	Source file	Received from	Received Data
Digital Terrain Map	LIDAR	.tiff	National-LIDAR-Programme-DTM-2018-NZ52ne.zip National-LIDAR-Programme-DTM-2018- NZ52se.zip National-LIDAR-Programme-DTM-2018- NZ62nw.zip National-LIDAR-Programme-DTM-2018- NZ62sw.zip	Downloaded from Open Survey Data (www.environment.data.gov.uk/DefraDataDownload)	22 July 2019
Topography; Building Height Attribute; Ground Absorption	OS MasterMap Topography Layer	.shp	OSMM_2020.zip	Project Team	25 July 2019
Site building dimensions	Scheme designs	.pdf	Various files	Project Team	Updated throughout project
Sound Source data	Kings Lynn Power station data ,Eggborough power station data, Keadby 3 power station data, Karsto FEED study	Various	Various files	Acoustics Team	Updated throughout project

Modelling Assumptions:

11.1.2 The model has been prepared with the following configurations and assumptions:

- maximum number of reflections: two;
- maximum source to receiver distance: 3 km;
- areas of ground absorption have been determined from the OS Topography Layer. Natural areas that are not water were assumed to be acoustically soft whilst all other ground was assumed to be acoustically hard;

- all buildings have been modelled with an absorption coefficient of 0.21 apart from those on the PCC Site, which are modelled with an absorption coefficient of 0;
- residence building heights of existing residences have been assumed to be 4 m for one storey, 6.5 m for two storeys and plus 2.5 m for every storey thereafter;
- the number of storeys for existing buildings has been determined using a combination of OS MasterMap Topography Layer data and a survey of images from Google Earth 'Streetview';
- receivers have been positioned at 1.5m above ground for one storey buildings, at 4m above ground for two storey buildings and plus 2.5 m for every storey thereafter;
- building dimensions have been modelled based upon data provided by the Project Team;
- sound emission data for key sound emitting plant/ buildings within the CCGT component of Proposed Development (turbine halls, heat recovery steam generator (HRSG), peaking plant) have been taken from the Kings Lynn and Eggborough Power Station Environmental Statements (ES) data. The Kings Lynn site included significant embedded mitigation, therefore it has been necessary to adjust the data to represent an unmitigated scenario for this assessment. Through comparison and correlation with data from other current CCGT projects, the CCGT plant sound power levels have been increased for this project by 7 dB $L_{A,}$ to allow modelling of the specific conditions and layout of an unmitigated scenario of the Site;
- sound level data for the CCP have been sourced using available data from the Project Team. This includes data from the FEED study for a similar CCP at Karsto, Norway, or has included the assumption that the CO_2 absorber stack exhaust and high-pressure compressors will each produce a sound pressure level of 85 dB $L_{Aeq,T}$ at 1m;
- the sound power level for the main tower of the CO_2 absorber has been modelled based upon the absorber being an open structure producing a sound pressure level (A-weighted) of 77 dB $L_{Aeq,T}$ at 1 m. The absorber stack exterior (adjacent to the stack casing rather than at the point of emission to atmosphere) has also been modelled as radiating a sound pressure level (A-weighted) of 77 dB $L_{Aeq,T}$ at 1 m;
- assumptions have been made in relation to areas in which pumps may be required (assumed to be absorber unit auxiliaries; amine pumps; chemical storage pumps; compressor pumps; direct contact cooler auxiliaries; fire water tank pumps; steam condensate pumps). Each area has been assumed to contain two pumps that each produce a sound pressure level of 85 dB $L_{Aeq,T}$ at 1 m; and
- stack outlets have been modelled as area sources, located 0.1 m above the top of each stack.

Table 11B-2: Source Data Inputs

Details	Linear sound power levels each frequency band dB									Number in power plant	L_{WA} dB
	31	63	125	250	500	1k	2k	4k	8k		
CCGT Plant											
400kV substation	99	105	97	84	68	49	55	64	66	2	85
Heat recovery steam generator (HRSG)	131	122	110	101	97	96	93	91	98	1	104
Gas turbinehall	118	110	103	87	81	84	77	78	91	1	91
Steam turbinehall	127	119	112	95	90	93	87	87	85	1	100
Gas compressor	98	102	101	90	79	72	70	68	65	1	88
Cooling pump	98	102	101	90	79	72	70	68	65	1	88
Hybrid cooling tower	118	113	116	111	98	90	95	95	91	1	106
Workshop	109	104	102	86	62	48	46	58	63	1	88
Generator step-up transformer (GSUT)	80	92	105	103	89	90	82	70	69	1	97

Details	Linear sound power levels each frequency band dB									Number in power plant	L_{WA} dB
	31	63	125	250	500	1k	2k	4k	8k		
Wastewater treatment area	102	96	98	88	80	74	74	66	59	1	86
Wastewater treatment plant	97	101	100	89	78	71	69	67	64	1	86
CCP Plant											
High pressure compressor*	141	130	109	81	68	64	52	45	42	2	106
Absorber	122	113	112	105	111	103	99	87	89	1	110
Absorber stack	111	102	101	94	100	92	88	76	78	1	99
Absorber stack exhaust*	110	101	100	103	100	91	86	74	77	1	100
Direct Contact Cooler	91	82	79	75	78	61	48	30	32	1	76
Pumps**	107	111	110	99	88	81	79	77	74	14	96
Inlet gas blower casing	94	93	93	98	91	83	83	72	65	3	93

*These source sound power levels have been calculated by assuming a sound pressure level of 85 dB $L_{Aeq,T}$ at 1 m in free field conditions

**two pumps for each of: absorber auxiliaries; amine pumps; chemical storage pumps; compressor pumps; direct contact cooler auxiliaries; fire water tank pumps; steam condensate pumps

Uncertainty:

11.1.3 It should be noted than any sound level predictions have an associated degree of uncertainty. Modelling and measurement processes have been carried out in such a way to reduce such uncertainty. In particular, the following sources of uncertainty have been noted:

- sound emission data for key sound emitting plant/ buildings within the Proposed Development has been taken from Kings Lynn ES. This site included significant embedded mitigation; therefore, it has been necessary to adjust the data to represent an unmitigated scenario for this assessment. Through comparison and correlation with data from other current CCGT projects, the CCGT plant sound power levels have been increased by 7 dB $L_{A,}$ to allow modelling of the specific conditions and layout of an unmitigated scenario of the Proposed Development Site.
- it has been assumed that the CO_2 Absorber stack exhaust and high-pressure compressors will each produce a sound pressure level of 85 dB $L_{Aeq,T}$ at 1m. This is assumed to be representative of the Proposed Development, although the precise methodology by which these data were gathered by third parties, and hence the uncertainty associated with these is not known.
- the sound power level for the main tower of the CO_2 Absorber has been modelled based upon the absorber being an open structure producing a sound pressure level (A-weighted) of 77 dB $L_{Aeq,T}$ at 1 m. The absorber stack exterior (adjacent to the stack casing rather than at the point of emission to atmosphere) has also been modelled as radiating a sound pressure level (A-weighted) of 77 dB $L_{Aeq,T}$ at 1 m. This has been determined as a reasonable worst case from available design information and other projects; and
- predictions of sound pressure levels according to ISO 9613 are based on an assumption of moderate downwind propagation, and hence could be considered as a worst-case calculation. However, the standard also indicates an estimated accuracy of ±3 dB(A) in predicted levels.