The Keadby 3 Low Carbon Gas Power Station Project

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The Keadby 3 Low-Carbon Gas Power Station Order

Land at and in the vicinity of the Keadby Power Station site, Trentside, Keadby, North Lincolnshire

Preliminary Environmental Information (PEI) Report Volume II - Appendix 9B: Operational Noise Information

The Planning Act 2008

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Applicant: SSE Generation Limited

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GLOSSARY

Abbreviation	Description
CCGT	Combined Cycle Gas Turbine - a highly efficient form of energy generation technology. An assembly of heat engines work in tandem using the same source of heat to convert it into mechanical energy which drives electrical generators and consequently generates electricity.
CCP	Carbon Capture Plant – plant used to capture carbon dioxide (CO_2) emissions produced from the use of fossil fuels in electricity generation and industrial processes.
ES	Environmental Statement - a report in which the process and results of an Environment Impact Assessment are documented.
HRSG	Heat Recovery Steam Generator - an energy recovery heat exchanger that recovers heat from a hot gas stream. It produces steam that can be used in a process (cogeneration) or used to drive a steam turbine (combined cycle).
ISO	International Organization for Standardization – produce international standards for a range of markets.
LIDAR	Light Detection and Ranging - a remote sensing method that uses light in the form of a pulsed laser to measure ranges.
OS	Ordnance Survey - the national mapping agency for Great Britain.

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TABLES

1.0   OPERATIONAL NOISE INFORMATION

1.1   Noise model Settings

1.1.1   This development was constructed in CadnaA (version 2019 MR 2) acoustic modelling software. This software implements the sound propagation calculation methodology set out in ISO 9613-2.

Data Sources - Proposed Power Plant Site

Table 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-SE81sw.zip National-LIDAR-Programme-DTM-2018-SE82sw.zip	Downloaded from Open Survey Data (www.environment.data.gov.uk/DefraDataDownload)	05 June 2020
Topography; Building Height Attribute; Ground Absorption	OS MasterMap Topography Layer	.shp	OSMM_2020.zip	Project Team	22 May 2020
Site building dimensions	Scheme designs	.pdf	Various files	Project Team	Updated throughout project
Sound source data	Keadby 2 ES, Karsto FEED study	.pdf	Various files	Project Team	Updated throughout project

Modelling Assumptions

1.1.2   The model was configured with the following specifications:

- maximum number of reflections: 2.

- maximum source to receiver distance: 3km.

- areas of ground absorption were determined from the OS Topography Layer. Natural areas that are not water were assumed to be acoustically soft while everything else was assumed to be acoustically hard.

- all buildings exhibited an absorption coefficient of 0.21.

- existing residential buildings have been assumed to be 4m for 1 storey, 6m for 2 storeys and plus 2.5m for every storey thereafter. The number of storeys for existing buildings was determined using a combination of OS MasterMap Topography Layer data and a survey of images from Google Earth 'Streetview'.

- receivers were positioned at 1.5m from ground for 1 storey buildings, at 4m from ground for 2 storey buildings and then plus 2.5m for every storey thereafter.

- proposed Development building dimensions were 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 Keadby 2 Power Station Environmental Statement (ES) (ERM 2016 – 2018) data. Where sources are internal, an external level has been calculated assuming walls are made of steel insulated panels. These levels have been adjusted such that when placed at the Keadby 2 Power Station plant location they give similar levels to those in the Keadby 2 Power Station ES.

- sound level data for the Carbon Capture Plant (CCP) has been sourced using available data from the Project Team. This includes the FEED study for a similar CCP at Karsto, Norway and data from Net Zero Teeside PEI Report (AECOM 2020) or used the assumption that CCP plant will produce 85 dB $L_{Aeq,T}$ at 1m for the absorber, compressor and each of the inlet gas blowers.

- Proposed Development stacks have been modelled as individual point sources, located 0.1m above the top of each stack.

Table 2: Sound Power Levels

Details	Linear sound power levels each frequency band (dB)									Number in model	L_{WA} (dB)
	31	63	125	250	500	1k	2k	4k	8k		
CCGT Plant											
Hybrid cooling tower	116	111	114	109	96	88	93	93	89	1	104
Steam turbine hall	125	114	93	65	52	48	36	29	26	1	90
Steam turbine hall aux	108	99	78	50	37	33	21	15	12	1	78
Transformer	85	96	96	83	61	55	42	22	21	1	82
PCC	87	83	70	48	26	3	1	-5	-6	1	59
Gas turbine hall	117	108	87	59	46	42	30	24	21	1	84
Gas gen turbine hall	95	98	84	62	33	29	22	11	8	1	73
Boilerhouse	134	124	99	78	66	58	50	40	47	1	100
Water Treatment	104	108	94	71	52	38	31	21	18	1	83
Feedwater	116	119	105	82	63	49	42	32	29	1	95
Turbine intake	131	123	115	99	94	97	90	92	89	1	104
Stack	107	98	97	90	96	88	84	72	74	1	95
Water treatment container	93	97	99	89	81	75	75	67	60	1	87

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Details	Linear sound power levels each frequency band (dB)									Number in model	L_{WA} (dB)
	31	63	125	250	500	1k	2k	4k	8k		
CCP											
Inlet gas blower casing*	94	93	93	98	91	83	83	72	65	3	-
Absorber stack exhaust*	105	96	95	88	94	86	82	70	72	1	-
Absorber*	111	102	101	94	100	92	88	76	78	1	-
Compressor*	120	109	88	60	47	43	31	24	21	1	-

* frequency spectrum provided to illustrate the relative frequency band levels. Actual frequency band levels modelled are adjusted per plant item façade to achieve a noise level of 85dB $L_{Aeq,T}$ at 1m from each item of plant.

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<u>Uncertainty</u>

1.1.3   It should be noted than any predictions of sound levels 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 source levels have been based on data provided by the manufacturers for the Keadby 2 Power Station ES (CCGT) and data from the CCP at Karsto, Norway or assumed 85dB $L_{Aeq,T}$ at 1m. These data are 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.

- 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.

2.0   REFERENCES

AECOM (2020) Appendix 11B: Operational Noise Information, available online https://www.netzeroteesside.co.uk/wp-content/uploads/2020/06/PEIR-Appendix-11B-Operational-Noise-Information.pdf

Bechtel Overseas Corporation (2019) CO2 Capture Facility at Karsto, Norway FEEDStudy report

Environmental Resources Management (ERM) (2016) Keadby 2 Power Station Environmental Statement

Environmental Resources Management (ERM) (2018) Keadby 2 Power Station Environmental Statement Update Report

Planning Inspectorate (2017) *Planning Inspectorate Advice Note Seven (Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping). Version 7 May 2020.*