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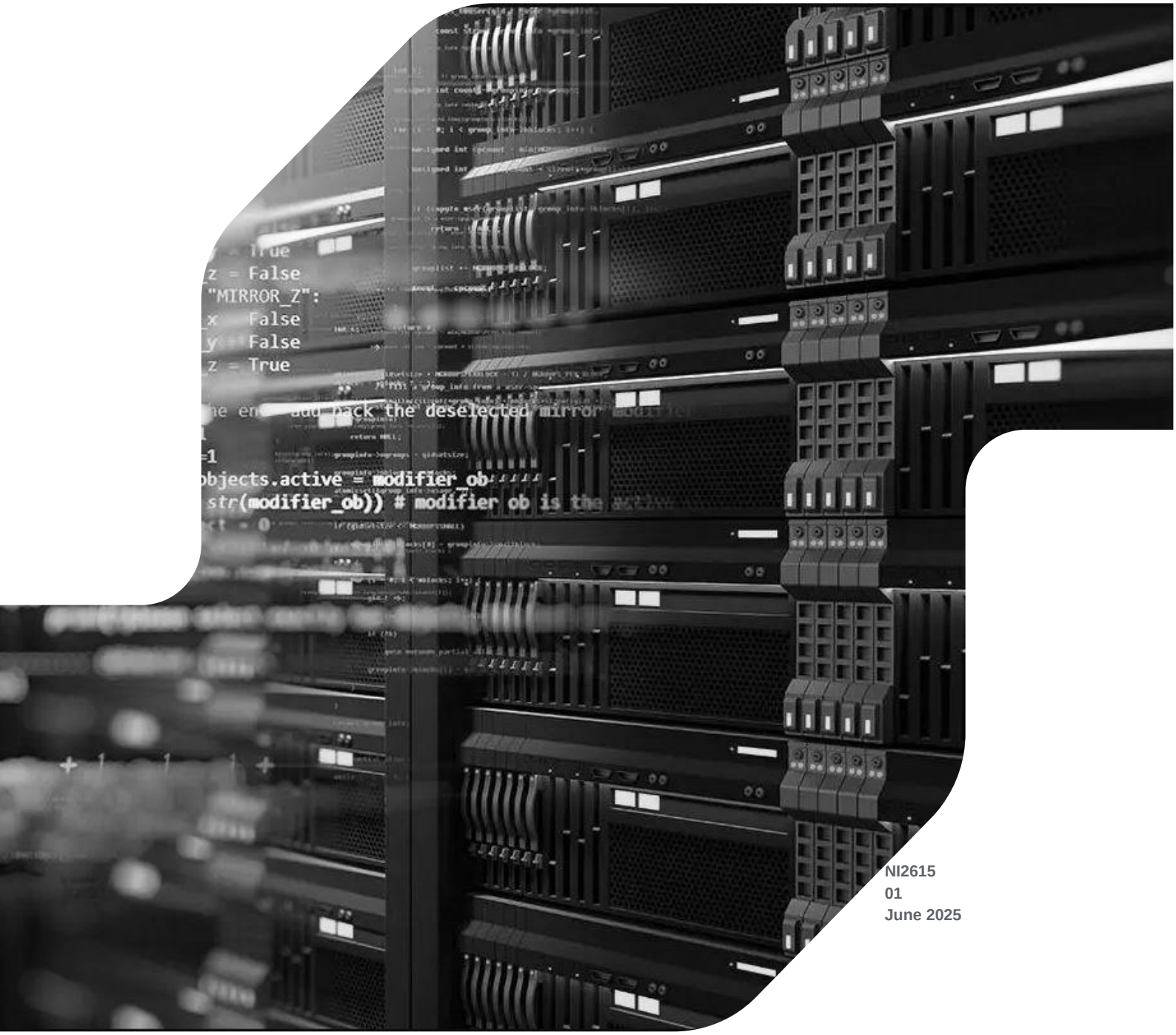
HERBATA DATA CENTRE, NAAS -RESPONSE TO REQUEST FOR FURTHER INFORMATION (“RESPONSE TO RFI”) FROM KILDARE COUNTY COUNCIL

ADDENDUM TO CHAPTER 9 NOISE AND VIBRATION



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ADDENDUM TO CHAPTER 9 NOISE AND VIBRATION

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9.1 Introduction

This Addendum to Chapter 9 Noise and Vibration of the EIAR (dated June 2024), submitted to Kildare County Council as part of the planning application for the Project on 13th August 2024, updates the noise and vibration assessment of the Project, in response to the Kildare County Council RFI.

This Addendum to Chapter 9 should be read in conjunction with the previously submitted EIAR, Chapter 9 Noise and Vibration of that EIAR and its associated figures and appendices, and in conjunction with the other information and documentation submitted as part of the Response to the RFI.

This Addendum to Chapter 9 together with Chapter 9 Noise and Vibration of the EIAR outlines the noise and vibration impact assessment for the Project and assesses the potential impacts and likely significant effects of noise and vibration associated with the construction and operational phases of the Project.

This Addendum is provided in response to the Kildare County Council RFI, in respect of the proposed design amendments as set out in the Addendum to Chapter 4 of the EIAR Description of the Project and Need for the Project. Specifically in consideration of the proposed amendments to Data Centre 4 and proposed amendments to the Project energy strategy as set out in Volume III, Appendix 4.3 Updated Energy Policy Compliance Report and Appendix 4.4 Updated Energy Strategy Report, and in Sections 4.1 of the RFI Response Report submitted as part of the response to the RFI.

Of specific relevance to the noise and vibration assessment, the key changes are as follows:

- Data Centre 4 – amended design resulting in a reduced number of (i) turbines and (ii) associated Air Handling Units;
- Use of Combined Cycle Gas Turbines (CCGTs) alongside Open Cycle Gas Turbines (OCGTs) in all Data Centre External Plant Areas;
- Additional equipment included in the design:
    - 6 no. Steam Turbines
    - 6 no. Air-cooled condensers

Details of these amendments are provided in Section 9.2 of this Addendum. This Addendum provides a review of amendments to operational plant and equipment noise model and verification of the noise impact assessment, in respect of the proposed design amendments to Data Centre 4 and the proposed use of combined cycle gas turbines and associated equipment within **all** data centre external plant areas.

The noise and vibration impact assessment has followed the methodology set out in the submitted EIAR Chapter 9 Noise and Vibration. A summary of the operational noise model inputs are shown in the sections that follow for new or amended noise sources. For full details of noise modelling methodology, please refer to the submitted EIAR Appendix 9.4: Noise Propagation Modelling.

9.2 Proposed Design Amendments

The proposed design amendments as set out in Addendum to Chapter 2 of the EIAR (and as summarised above) have prompted a review of the amended site plans and designs to identify any changes to existing noise sources and any potential additional noise sources.

9.2.1 Amendments to Data Centre 4: Data Hall

The amendments to the data hall within Data Centre 4 results in the reduction of noise sources associated with the cooling system. The result is a halving of the quantum of Air Handling Units (AHU) equipment from 56 to 28 duplex AHUs, as summarised in Table 0.1. The number of fans is therefore also halved from 672 to 336 intake fans and from 448 to 224 exhaust fans.

Table 0.1: Data Centre (DC) 4 Data Hall Cooling System

	DC4 (As per noise model in submitted EIAR Appendix 9.4)	Amended DC4
No. Duplex AHUs	56	28
AHU Air Intake Fans	672	336
AHU Exhaust Fans	448	224

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9.2.2 Gas Turbine Types

The on-site generation of electricity will primarily use CCGTs (Combined Cycle Gas Turbines) to provide for 50% of the energy required, supplemented by OCGTs (Open Cycle Gas Turbines) and smaller reciprocating engines. The noise modelling within the submitted EIAR Chapter 9 Noise and Vibration and Appendix 9.4 Noise Propagation Modelling assumed OCGT types for all gas turbines.

Combined cycle turbines include a heat recovery system within each data centre external plant area and additional equipment located adjacent to the external plant area.

The project-specific sound power level for each aspect of the gas turbine packages have been supplied by the manufacturer/supplier *Solar Turbines* a wholly owned subsidiary of Caterpillar Inc. which manufactures the world's most widely used family of mid-sized industrial gas turbines. The CCGTs systems (including heat recovery) will have the same sound power output as the OCGTs assessed in the submitted EIAR; (data confirmed by turbine supplier Solar Turbines) a total sound power level for each unit of 94.3 dB L_W. Therefore, the change of some of the turbine types from OCGTs to CCGTs will not influence the noise impact assessment.

9.2.3 Number of Turbines Installed

A break-down of turbine types (OCGTs/CCGTs) and associated inverters within the external plant areas are shown in Table 0.2.

The number of turbines installed within each data centre external plant area has decreased in comparison to the design assessed within the submitted EIAR. The number of each turbine type to be installed within the Data Centre external plant areas are shown in Table 0.2; for Data Centre 4 and for all other Data Centres.

Table 0.2: Installed Gas Turbine Types within Data Centre (DC) External Plant Areas

	DC4		All Other DCs	
	Daytime	Night-Time	Daytime	Night-Time
Open Cycle Turbines	2	2	4	3
Combined cycle turbines	2	2	3	3
Inverters	28	28	49	42

9.2.3.1 Turbine Operational Scenarios

The number of turbines which will actually be in operation at any time will fluctuate with power demand, with at least one turbine typically in standby for the majority of operational conditions.

The worst-case power scenarios were assessed in the submitted EIAR noise and vibration chapter, therefore to allow for direct comparison, a worst-case power scenario has been assessed below taking into account the proposed design amendments. 'Worst case' in terms of noise would see the maximum number of turbines in each data centre external plant area which will operate simultaneously. This scenario is expected to occur very infrequently, with fewer turbines operating for the majority of operations. The worst-case scenario has been assessed to ensure that the highest possible operational noise levels have been considered, with 'typical' noise level output from power generation expected to be lower than those levels predicted.

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The number of turbines operational in each external plant area in a worst-case scenario are shown in Table 0.3 updated assessment which incorporates the proposed design amendments. Also shown are the worst-case operational scenarios for the submitted EIAR assessment for comparison (see submitted EIAR, Volume II, Appendix 9.4 'Noise Propagation Modelling Inputs and Results').

Table 0.3: Worst-Case Operational Scenarios for Submitted and Updated Noise Model

		Submitted EIAR Model (As per noise model in submitted EIAR, Volume II Appendix 9.4)		Updated Model with Design Amendments	
		Daytime	Night-Time	Daytime	Night-Time
DC4	No. Turbines	8	7	4	4
	No. Inverters	40	35	28	28
All other DCs	No. Turbines	8	7	7	6
	No. Inverters	40	35	49	42

9.2.4 Additional Noise Sources

The use of combined cycle gas turbines (CCGTs) enables recovery of energy via a steam turbine. The items of plant and equipment associated with this capability which have potential to affect the noise impact assessment and were not included in the submitted EIAR noise model have been identified. These additional noise sources are:

- Steam Turbines
- Air-Cooled Condensers

These items are discussed in more detail below, with the location of equipment shown in drawing number 10360452-HDR-XX-XX-DR-C-082111 COMBINED CYCLE GAS SYSTEM COMPOUND provided in Volume III Figures and Drawings (also provided as part of the design drawing package submitted in response to the RFI from Kildare County Council).

9.2.4.1 Steam Turbines

There will one steam turbine for each Data Centre, located adjacent to the external plant area and fully enclosed within bespoke buildings, with the exception of Data Centre 4. The Data Centre 4 steam turbine will be located within the external plant area, as shown in the Data Centre 4 general arrangement drawing 22217-RKD-ZZ-00-DR-A-1115-DATA CENTRE - OVERALL GROUND FLOOR PLAN TYPE D provided in Volume III Figures and Drawings (also provided as part of the design drawing package submitted in response to the RFI from Kildare County Council). Each building will achieve an average external sound pressure level of 56.4 dBA at 1m from the enclosure (data confirmed by turbine supplier Solar Turbines).

9.2.4.2 Air-Cooled Condensers (ACCs)

Each steam turbine will have an associated bank of air-cooled condensers, located adjacent to the steam turbine building and to the external plant area of the relevant Data Centre.

Noise from the air-cooled condensers is primarily generated from the fin fan coolers, which have a variable operation speed and therefore variable noise output. It is anticipated that these will operate as required 24/7, with a reduced fan speed during the night-time period.

Low-noise air-cooled condensers will be installed, with a total sound power level of 84 dBA per data centre (data confirmed by turbine supplier Solar Turbines). This sound power level has been assumed for both daytime and night-time scenarios.

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9.3 Noise Propagation Model Update

The noise propagation model for the Project has been updated to include all proposed design amendments as detailed within Section 9.2.

The noise propagation modelling methodology follows that previous employed as detailed in the submitted EIAR Chapter 9 'Noise and Vibration' and Volume II, Appendix 9.4 'Noise Propagation Modelling Inputs and Results'. Note that elements of the design which have not changed have been included in the noise model as per the submitted EIAR.

The model inputs for the elements of the design that have changed are detailed in Volume II, Appendix 9.1 of this Addendum to the EIAR. The results of the updated noise modelling can also be found in Volume II, Appendix 9.1 of this Addendum to the EIAR, for both daytime and night-time worst-case power generation scenarios.

9.4 Effect of Proposed Design Amendments on Noise Assessment

9.4.1 Amendments to Data Centre 4: Data Hall

The noise model has been updated to reflect the reduction in the number of AHUs, intake fans and exhaust fans within Date Centre 4.

The halving of any number of noise sources leads to a 3 dB reduction in sound energy output. Therefore, the halving in the number of AHUs, intake fans and exhaust fans within Date Centre 4 results in a reduction in the sound contribution from the Data Centre 4 data hall sources of 3 dB, compared with the submitted EIAR noise modelling[1].

9.4.2 Gas Turbine Amendments

The total sound power level for each gas turbine unit (including the CCGT heat recovery system within the external plant area) will remain as per the noise model and assessment within the submitted EIAR. There is therefore no increase in noise from the gas turbines at noise-sensitive receptors associated with the change in some turbine types from Open Cycle Gas Turbines (OCGTs) to Combined Cycle Gas Turbines (CCGTs). This is set out in detail in Volume II, Appendix 9.1, which details the noise propagation model inputs and results.

The halving of any number of noise sources leads to a 3 dB reduction in sound energy output. Therefore, the halving in the number of gas turbines and inverters within the Data Centre 4 external plant area results in a reduction in the sound contribution from the Data Centre 4 external plant area sources of 3 dB, compared with the submitted EIAR noise modelling[1]. A smaller reduction (< 1dB) in sound output is associated with the reduction in the number of turbines within the other Data Centre external plant areas from 8 to 7; from a simplified calculation of ($10*\log_{10}(7/8)$).

The noise model results reflect the proposed amendments in quanta and turbine types, as detailed in Section 9.2.

[1] It should be noted that this does not necessarily result in a 3 dB reduction of noise at receptor locations, as there are other sources contributing to the total received noise level.

9.4.3 Noise from Additional Noise Sources

Additional noise sources associated with the proposed design amendments have been identified as steam turbines and air-cooled condensers. The additional noise sources have been included in the noise propagation model, with details of the noise source data for these items within Volume II, Appendix 9.1 of this Addendum.

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9.5 Noise Modelling Results

The worst-case daytime and night-time predicted sound pressure levels are presented in Volume II, Appendix 9.1, with a direct comparison to the worst-case predicted levels presented in the submitted EIAR (from Volume II, Appendix 9.4 of that document).

Comparison of the modelling results shows that the sound pressure levels at receptors from the project (including the proposed design amendments) did not vary significantly to those presented in the submitted EIAR.

In the daytime worst-case operational scenario, the predicted levels at all noise-sensitive receptors were within 0.5 dB of previously predicted levels (in submitted EIAR), with the vast majority of receptor sound pressure levels staying the same or reducing by 0.1 dB or more. The maximum increase compared to the submitted EIAR modelling results was 0.2 dB, which is not a significant difference in acoustic terms.

In the night-time worst-case operational scenario, the predicted levels at all noise-sensitive receptors were within 0.2 dB of previously predicted levels (in the submitted EIAR), with the vast majority of receptor sound pressure levels staying the same or reducing by up to 0.2 dB. The maximum increase compared to the submitted EIAR modelling results was 0.2 dB, which is not a significant difference in acoustic terms.

9.5.1 Overall Effect on Noise Impact Assessment

The effect of the updated noise predictions on the noise impact assessment has been reviewed.

As shown in the results tables within Appendix 9.1 and discussed in 9.5, there was no significant variance in the predicted operational daytime or night-time sound pressure levels when comparing the predicted levels in the submitted EIAR and the updated model incorporating the proposed design amendments (as described in this EIAR Addendum).

These negligible amendments in predicted levels have no impact on the noise impacts as assessed within the submitted EIAR. As such, the noise effect due to the project remains low to negligible for all noise-sensitive receptors.

Therefore, there is no change in the operational noise effects resulting from the proposed design amendments (described at section 9.2 above), which all arise from the design amendments required to Data Centre No. 4, when compared with those within the submitted EIAR Chapter 9 Noise and Vibration.