



## Non-technical summary - JP3647JU

*Kao Data Centre – KLON 06*

**Date:** April 2023

**Issue:** 1.0

**Reference:** 10311670

**Status:** Issue

**Issuing Office:** Glasgow

**DOCUMENT CONTROL**

Issue	Date	Status	HDR Author	HDR Approval	Notes
1	27/04/23	Issue	27/04/23_JL	27/04/23_NS	First Issue

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## 1.0 INTRODUCTION

This Non-Technical Summary (NTS) has been prepared by HDR Consulting Limited (HDR) on behalf of 'the operator' KD 2 Limited (Kao) in support of the application for a new bespoke Environmental Permit (ref JP3647JU) for the KLON-06 Data Centre installation located at:

**Kao Data**  
**672 Galvin Road**  
**Slough**  
**SL1 4AN**  
**Grid reference: SU 96096 80630**

Kao as the legal operator is required to apply to the Environment Agency (EA) for an Environmental Permit because the total thermal input capacity of the site's combustion plant will exceed the 50MWth threshold stipulated by the legislation<sup>1</sup>.

This document provides a non-technical summary of the installation and the application for a permit, including the supporting information submitted along with the application.

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<sup>1</sup> [The Environmental Permitting \(England and Wales\) Regulations 2016 \(legislation.gov.uk\)](https://www.legislation.gov.uk)

## 2.0 SITE SUMMARY

### 2.1 Site operations

KLON-06, has been operating as a Data Centre since 2009 and as with other Data Centres it uses Emergency Standby Generators (ESGs) to provide emergency power in the event of grid electrical failure.

Data Centres are an essential part of national infrastructure, underpinning a substantial portion of the UK's economy. Essentially, Data Centres enable a wide range of digital activities including hosting various internet-based activities via servers in large "data halls" or warehouses.

Data Centres such as KLON-06, rely on an uninterruptible supply of electricity to power the various servers and associated IT equipment. An interruption or break in this supply even momentarily would have catastrophic consequences on equipment and on the operator's reputation. As such, Kao employ ESGs to provide power should the grid supply to the site fail.

Grid supplies are very reliable, however, in the unlikely event of an outage, the generators are designed to operate until the grid supply is restored. Outages are highly rare events and thus operation is normally limited to testing and maintenance as discussed below in Section 3.4.4.

### 2.2 Site location and context

The installation is located approx. 1.6km to the West of Slough town centre on the South-Eastern corner of Slough Trading Estate, Galvin Road, Slough, SL1 4AN. The National Grid Reference for the centre of the site is SU 96096 80630.

The site is bound to the north by Axel Avenue, beyond which are commercial / light industrial properties, including a car garage. To the north-east of the site is a similar data centre building. To the west and south the site is bound by residential properties. To the West the site is bound by Galvin Road, beyond which are similar data centre properties.

### 2.3 Site history

Historical land use maps show the location has been used in some capacity since 1900s with a gravel and clay pits being present and surrounding location being a trading estate since the 1932. There was a known inert landfill on site Galvin and Thirkelby Road Landfill which was closed at the time of a survey in 1973.

In addition, there were unspecified above ground storage tanks present between 1974 and 1995. The site is currently surrounded by business and residential properties. Sometime between 2001 and 2010, the Factory Works were demolished leaving the land free of development. The site was developed into its current footprint by 2009. For full detail, please refer to the Site condition Report.



Figure 2.1: Recent aerial photo

## 2.4 Combustion plant and expansion plans

The installation has been operating as a Data Centre since 2009. Expansion works in 2023/24 will see 7 no. additional Emergency Standby Generators (ESGs) installed and commissioned. This will see the total thermal capacity exceeding 50MWth for the first time in the site’s history.

The ESGs are all over 1MWth and are therefore classed as new / existing “Medium Combustion Plant” (MCP) with details in the table below:

Table 1 - summary of MCP details and install dates

MCP type	Make and model	No. of ESGs	Thermal capacity	Approx. install date
Existing	MTU 20V4000 G63L	6	40.54MWth	2010
New	Kohler KD4000-E	7	60.09MWth	2023-2025
		<b>13</b>	<b>100.6MWth</b>	

The plans at present are for the expansion works to occur in Phases as follows:

- Phase 1 – Q2 2023, 3 no. ESGs installed within the existing warehouse
- Phase 2 – Q1 2024, 2 no. ESGs installed in the yard, externally
- Phase 3 – Q1 2025, 2 no. ESGs installed in the yard, externally

The ESGs are “excluded MCPs” as they are purely standby plant and there is no capacity agreement in place. The ESGs are capable of operating on diesel or biodiesel such as ‘HVO’ or Hydrogenated Vegetable Oil.

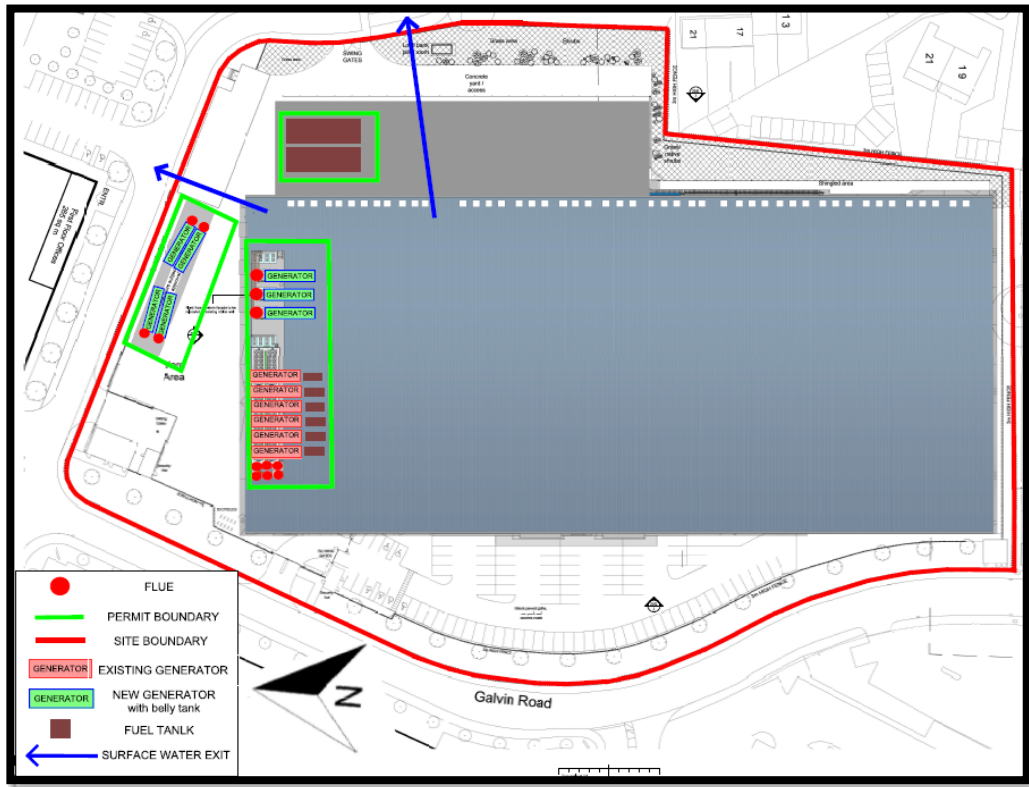


Figure 2.2 Installation boundary and emission points

## 3.0 ENVIRONMENTAL PERMIT APPLICATION

### 3.1 Permit type

The activities onsite require a bespoke installation permit under Schedule 1, Part A (1) (a) of the Environmental Permitting Regulations: “*burning of any fuel in an appliance with a rated thermal input of 50 megawatts or more.*”

The regulated activity relates to the operation of 6 no. existing ESGs and 7 no. new ESGs, with a total site capacity of approx. 100 MWth (see Thermal Schedule & Emissions Points, submitted alongside this application).

All the new ESGs are over 1MWth and are classed as new MCPs. The existing ESGs are classed as existing MCPs. Due to the existing MCPs operating less than 500 hours per year as a 5-year rolling average they are exempt from meeting MCP Emission Limit Values (ELVs).

### 3.2 Directly associated activities

The Directly Associated Activities (DAA) include the fuel storage tanks, pipework and the drainage network which are discussed in the following sections.

### 3.3 Application contents

This application has been prepared in accordance with the EA’s informal BAT guidance document: ‘Data Centre FAQ Headline Approach v21’ (November 2022).

The following documents have been submitted to the EA as part of the application for a permit. We have provided a high level non-technical summary of each of these in the following sections. Please refer to these documents for further information.

- Non-technical Summary (this document)
- Application forms – A, B2, B3 & F1
- BAT Assessment
- Site Condition Report
- Environmental Risk Assessment
- Air Quality Assessment (AQA)
- Noise Impact Assessment
- Draft Air Quality Management Plan
- Supporting information including site plans, drawings, generator datasheets etc

### 3.4 BAT assessment

A BAT assessment has been submitted with the application. This has been structured using the EAs informal BAT guidance document; ‘*Data Centre FAQ Headline Approach v11*’ (May 2022). The assessment report seeks to provide evidence of BAT or justification where the requirements have not been met.

The following sections provide a non-technical summary of the BAT assessment which concluded that the installation is considered to meet the above BAT requirements.

#### 3.4.1 Technology selected to provide emergency power

ESGs operating on Diesel/HVO have been selected to provide emergency power to the installation in the event of grid failure on account of the following:



- Proven as a reliable technology
- Cold start capability
- Space requirements
- Fuel suitability
- Lifetime of stored fuel

### 3.4.2 Generator Operation

The ESGs are solely used as standby plant for emergency power provision in the event of grid failure. There is no capacity agreement in place or plans to operate the generators for generating revenue. As such, operation of the generators is likely to be limited to monthly maintenance and testing of no more than 28 hours / year / generator.

Planned operation of both existing and new ESGs for testing and maintenance is expected to be the same, however, operation during a grid outage may vary due to differing electrical arrangement.

#### Monthly Testing and maintenance:

The maintenance schedule for the generators is based on manufacturer guidelines. These guidelines help to prolong the life of the equipment, reduce the use of raw materials (e.g., replacement parts, oil changes) and help ensure the engines perform efficiently to prevent increases in pollutant levels or black smoke.

- **Existing ESGs:** operated at 100% load using a load bank for 2 hours with one generator operated at a time.
- **New ESGs:** operated against site load with all generators coming online and then dropping off as required (i.e., not all will operate).

#### Emergency operation:

In the unlikely event of a loss of grid power to the building, the ESGs will operate to support the site load. The arrangement for a single side outage and a micro power outage at this installation vary depending on what data hall the ESGs support.

Major power outages are rare. In the last 8 years the KLON-06 site has had high levels of grid reliability, only experiencing brown outs (micro-outages or 'blips') that last less than 0.1 second.

For more information on ESG operation during an outage please refer to the 'BAT Assessment' submitted with the application.

### 3.4.3 Generator emissions performance

The engine and emissions datasheets for the existing and new ESGs have been supplied with the application.

#### Existing ESGs:

The 6no. existing generators are legacy sets which were commissioned in 2009 and are aligned with the German TA-Luft 4g standard for NO<sub>x</sub>.

#### New ESGs

The 7no. new ESGs that have been selected to support the site expansion are emissions optimised and achieve the TA-Luft 2g' (2,000mg/Nm<sup>3</sup> @ 5%O<sub>2</sub> @100% load) as well as the Tier II US EPA standard.

The operator has made significant investment in NO<sub>x</sub> abatement technology in the form of Selective Catalytic Reduction (SCR) for the x7no. new ESGs. The SCR

system has been sized to reduce NO<sub>x</sub> emissions concentrations to 507 mg. Nm<sup>-3</sup> at 5% O<sub>2</sub> (190 mg. Nm<sup>-3</sup> at 15% O<sub>2</sub>). Factory Acceptance Tests (FAT) available on request.

Further information on generator emission performance can be found in the AQA in Section 3.8 and the BAT Assessment in Section 3.4.

#### 3.4.4 Grid Reliability

There are two substations powering the installation: Foxtrot and Golf. Each feed can support the full site load, meaning that if one feed were to fail, electrical provision to the installation would not be compromised. Grid electrical supplies are highly reliable and have potential to meet 99.99995% reliability (BAT Assessment – Appendix C). To date, the site has only experienced ‘brown outs’ (micro-outages or ‘blips’) that last less than 0.1 second.

#### 3.4.5 Generator flue design

The flue arrangement for the existing and new ESGs has been summarised in the table below.

- Each generator set has dedicated flue / ‘stack’
- Flue gas from the x3 no. new internal ESGs goes through a flue dilution system prior to dispersing vertically above roof height.
- Dispersion of pollutants has been considered when designing the flues for the new generators. As a result, all new build generator flues are unimpeded by flaps/cowls and have been orientated vertically, exiting above the height of the building.

Table 2 Information relating to new and existing flues

MCP type	No. of ESGs	Flue height (m)	Flue orientation	Cowls / caps?
Existing (internal)	6	17	Horizontal	None
New (internal)	3	17	Vertical	None
New (external)	4	7	Vertical	None

#### 3.4.6 Fuel tanks

The fuel for the 6no. existing ESGs is held in 2no. bulk tanks which are located outside of the main building under the gantry. Fuel is pumped from these 2 no. bulk tanks to 6no. day tanks inside the plant room adjacent to each ESG.

The new 7no. ESGs each have their own dedicated belly tank below the ESG they feed.

For further details of the sites fuel storage arrangements please refer to the BAT assessment submitted with the application for a permit.

#### 3.4.7 Drainage

The area immediately surrounding the 2no. external bulk tanks and the 4no. new external ESGs is covered in good quality hard standing. The drainage system is split into separate foul and surface water networks (see drainage plans submitted with the application). Site drainage exits into the drainage network for the entire industrial estate which is managed by Thames Water and ISS.

Discharges to surface water drains are expected to be limited to surface run-off which is unlikely to contain significant levels of contaminated liquid e.g., fuel / oils. Drain covers are to be used during refuelling exercises and multiple stocked spill kits are located close to fuel tanks and fill points.

The surface water drainage system is connected to a Hydrodynamic Vortex Separator located near the new generators. This operates under gravity flow, to maximise the removal of pollutants, which are typically found attached to silts and debris within surface water runoff, before its dispersal to a suitable outlet. Surface drainage from this area is directed through this prior to discharging to the local network.

### 3.4.8 Management Standards

The following management standards (or equivalent, including non-certified standards) are to be developed:

- ISO 14001:2015 – specifies the requirements for an environmental management system that an organisation can use to enhance its environmental performance.
- ISO 50001: 2018 is for organisations committed to addressing their impact, conserving resources, and improving the bottom line through efficient energy management. Designed to support organisations in all sectors, this ISO standard provides a practical way to improve energy use, through the development of an energy management system (EnMS).
- ISO/IEC 27001:2013 – specifies the requirements for establishing, implementing, maintaining, and continually improving an information security management system within the context of the organisation. It also includes requirements for the assessment and treatment of information security risks tailored to the needs of the organisation. The requirements set out in ISO/IEC 27001:2013 are generic and are intended to be applicable to all organisations, regardless of type, size, or nature.
- ISO9001:2015 – specifies the requirements for establishing, implementing, monitoring, managing, and improving quality throughout the organisation.

### 3.4.9 Environmental management system

Kao has implemented an effective Environmental Management System (EMS) that is accredited to the internationally recognised ISO 14001:2015 standard. The EMS places specific focus on the following:

- Reducing risks to the environment to a level that is as low as reasonably practicable using best available techniques
- Integrating EMS responsibilities within line management
- A commitment to personnel environmental awareness and competence
- The ongoing monitoring and review of environmental performance
- A commitment to working to achieve continuous improvement in environmental performance.

Integral to the EMS will be an overarching environmental policy. This seeks to help uptake by staff, with sufficient training provided as required.

### 3.4.10 Air Quality Management Plan

A draft Air Quality Management Plan or 'AQMP' has been provided with the application which describes the risk to local air quality in the event of prolonged generator operation in response to a grid outage. The aim of this is to minimise impacts on local air quality and describes the actions to be taken to help reduce impacts and notify sensitive receptors and the EA (as required). This will be finalised and incorporated into the site's operating procedures once the new plant is commissioned.

### 3.5 Operational procedures

Kao has several Standard Operating Procedures (SOPs) that are pertinent to the application for an environmental permit. These include:

- Spill response procedure
- Refuelling procedure
- Grid failure procedure (Air Quality Management Plan or 'AQMP')

### 3.6 Site condition report

The Site Condition Report which has been prepared in accordance with the EA's H5 Guidance Note<sup>2</sup> with details on the following:

- Site background
- Condition of the land at permit issue
- Geology
- Hydrogeology
- Hydrology
- Previous land use
- Pollution history
- Evidence of historical contamination
- Permitted activities

Baseline soil and groundwater reference data was not available at the time of the application for an environmental permit. Kao are aware of the requirement to provide this data and therefore request that an Improvement Condition is included in the Environmental Permit.

Current plans are for site investigations to be undertaken alongside future ground works, as this would help to minimise potential impacts to the environment and underground services.

### 3.7 Environmental risk assessment

An Environmental Risk Assessment (ERA) has been provided in support of this application using the EA's "Risk assessment for your environmental permit" guidance<sup>3</sup>.

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<sup>2</sup> [Environmental permitting: H5 Site condition report - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/environmental-permitting-h5-site-condition-report)

<sup>3</sup> [Risk assessments for your environmental permit - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit)

The purpose of the ERA is to identify the potentially significant risks to human health and the environment from permitted activities, as well as the controls in place to help mitigate these risks to an acceptable level.

The potential risks identified as part of the ERA are outlined below:

- Controlled releases to air
- Accidents
- Odour
- Noise and Vibration
- Fugitive emissions (from uncontrolled sources)
- Visible emissions
- Global warming potential
- Waste
- Water discharges

### 3.8 Air Quality Assessment

An Air Quality Assessment (AQA) was completed in support of the permit application to predict the impacts of operating the generators on short- and long-term air quality. A summary of the findings is below, with further information in the 'Air Quality Permit Assessment'

#### Scenario 1: 'Testing and Maintenance'

In this scenario, all generators are expected to run concurrently for 2 hours per month at 100% load. Throughout scenario 1, the existing generators will operate under load bank, with one generator operating at a time. The generator shall be operated at 100%. The new generators shall be operated against site load with all generators coming online and then dropping off.

#### Scenario 2: Emergency operation

72-hour 'Grid Failure'/ power outage emergency inclusive of the testing and maintenance run times above.

#### Conclusion

The conclusion of the assessment is as follows, with further details, in the AQA:

*“Long term impacts from the proposed SDGs were predicted to be insignificant during testing and maintenance (Scenario 1) and a prolonged grid failure (Scenario 2) at all relevant modelled receptor locations.*

*Short term impacts were also found to be insignificant during testing and maintenance operations. Exceedances of the short-term UK Air Quality Objective for NO<sub>2</sub> was only predicted during a prolonged 72-hour grid failure event for the following receptors: Gym Group gymnasium and Astoria Heights residences.*

*Prolonged 72-hour grid failure events are considered to be extremely rare events and therefore do not reflect the likely impacts from the installation.”*

The conclusion of the AQA indicates that there is a low likelihood of that short- and long-term impacts from operation of the sites ESGs is likely to be insignificant.

### 3.9 Noise assessment

The ERA identified that noise from the site's generators might impact nearby receptors. To investigate this potential risk, a Noise Impact Assessment was conducted.

The assessment concluded that:

*“noise levels are predicted to achieve the noise limits at the nearest noise sensitive properties and therefore noise impacts are not considered to be significant.”*

Further information can be seen in the 'Noise Impact Assessment' submitted with this application.