Non-technical Summary - DP3442QV

Hayes Data Centre Emergency Back-up Generation Facility

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1.0 INTRODUCTION

1.1 Purpose of this document

This non-technical summary (NTS) has been prepared by HDR Consulting Limited (HDR) on behalf of the operator *Amazon Data Services UK Limited (ADS)* in support of the application for a new bespoke Environmental Permit (ref DP3442QV) for the "*Hayes Data Centre Emergency Back-up Generation Facility"* to be located at Bulls Bridge Industrial Estate, North Hyde Gardens, Hayes, UB3 4DG (Grid reference TQ 10514 79252).

ADSas the legal operator are required to apply to the Environment Agency (EA) for an Environmental Permit because the total thermal input capacity of the site's combustion plant exceeds the 50MWth threshold stipulated in the legislation[1]

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.

[1] The Environmental Permitting (England and Wales) Regulations 2016 (as amended)

2.0 SITE SUMMARY

The Hayes Data Centre Emergency Back-up Generation Facility, labelled 'EC1' and outlined in green (see Site Plan in Figure 1.1), is required to provide emergency back-up power to the Data Centre and its associated infrastructure, located within the red site boundary. This is 1 of 3 Data Centres being developed on the campus. At the time of writing, the other 2 Data Centres are due to be under the control of a separate operator and are likely to be covered under a separate Environmental Permit.

The construction of the Hayes Data Centre will see x14 no 3.2MWe (8.01MWth) Rolls Royce MTU DS4000 emergency back-up diesel generators installed over several floors in Energy Centre 1 ("EC1" in Figure 2.1 below). The total capacity is approx. 112MWth.

At the time of writing, the installation is not yet operational with commissioning due to commence in early 2023.

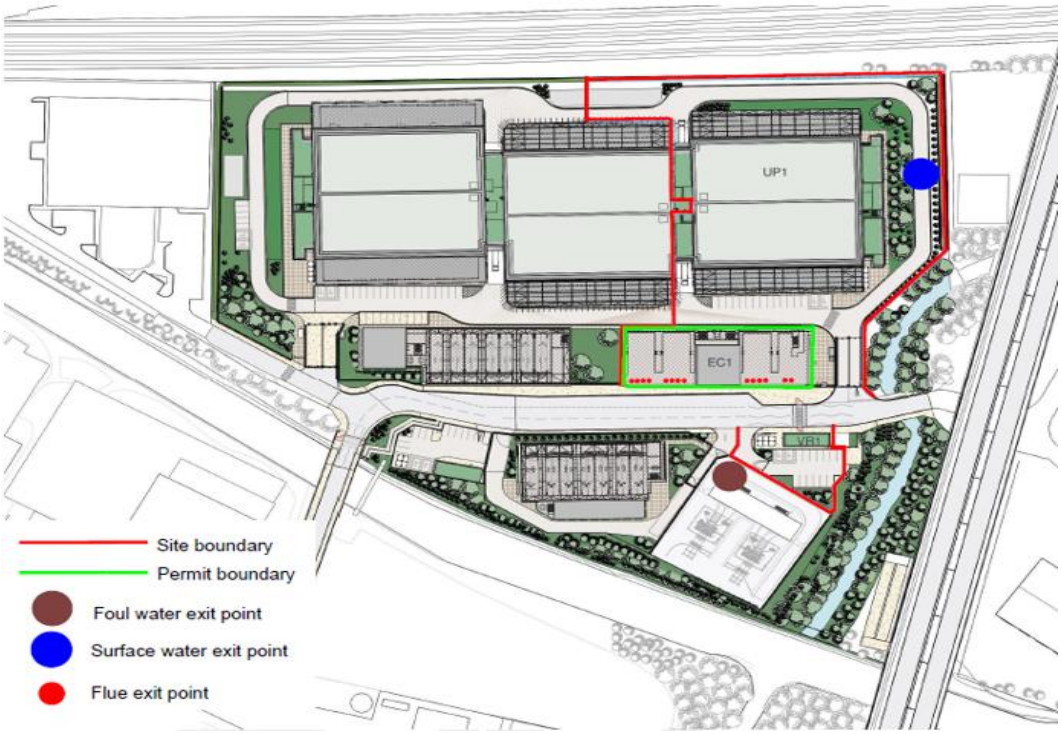

Figure 2.1 : Site Plan showing permit boundary and emissions points

2.1 Site operations

Data Centres are an essential part of national infrastructure, underpinning a large 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 the Hayes Data Centre, 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, Data Centres, such as the Hayes Data Centre Emergency Back-up Generation Facility, employ standby backup generators 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, which is likely to be less than 50 hours or 0.006% of a year.

2.2 Site context

The site is in an urban location, which is relatively industrial in the immediate vicinity, with residential properties 400m to the North and South of this. The Parkway dual carriageway is located directly to the East which joins the M4 Motorway further South. To the North, the site backs onto a railway line. The Grand Union Canal borders the campus to the South, while the River Crane borders the East boundary of the site. There are several small businesses, restaurants, offices, leisure facilities, religious buildings, parks and schools in the wider vicinity of the installation.

2.3 Site history

Historical land use maps show the campus was vacant during the mid-1800's. At this point only the railway was present to the North. Major urbanisation occurred in the surrounding area between 1920-1935, along with the construction of a Creosote Works on the Northwest section of the campus. These works were demolished in 1979 to make way for a power station which was situated to the West of the campus. Other land uses in the surrounding area included various factory buildings, joinery works, railway works, and an asphalt works.

3.0 ENVIRONMENTAL PERMIT APPLICATION

3.1 Application type

The application is for a Data Centre to conduct a Schedule 1, Part A(1) (a) activity: 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 14 no emergency back-up generators, 8.1MWth each with a total site capacity of approx. 112MWth (see Thermal Schedule v1 submitted alongside this application).

All of the 14 no emergency back-up generators are over 1MWth and are classed as new Medium Combustion Plant (MCP).

3.2 Application contents

This application has been prepared in accordance with the EA's informal BAT guidance document for Data Centres: '*Data Centre FAQ Headline Approach v11'* (May 2020).

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 the latest version of these documents for further information.

- Non-technical Summary (this document)
- Application forms – A, B2, B3 & F1
- BAT Assessment
- Site Condition Report
- Environmental Risk Assessment
- Climate Change Risk Assessment
- Air Quality Assessment
- Noise Assessment

3.3 Directly Associated Activities.

The Directly Associated Activities (DAA) include the fuel storage tanks, urea tanks for Selective Catalytic Reduction (SCR), pipework and the drainage network which are further discussed in the following sections. For description of SCR, please see Section 3.4.3.

3.4 BAT Assessment

The BAT assessment was completed using the EAs informal BAT guidance document created specifically for data centres, '*Data Centre FAQ Headline Approach v11*' (May 2020). The assessment report is structured using this guidance document and 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 BAT requirements for a Data Centre.

3.4.1 Technology selected to provide emergency power

Emergency back-up generators 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 generators are solely used as standby plant for emergency power provision in the event of grid failure. At the theoretical design load, only 12 of the14 generators would need to operate to carry the sites electrical load with 2 acting as redundancy.

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 50 hours / year / generator.

The planned operation of the generators is as follows and will be confirmed once the site is operational:

1. **Testing and maintenance**

   Each generator unit is tested separately at 25% load for half an hour every two weeks per annum. There is also a 1 hour test each quarter. This totals 14 hours per generator.

   In addition to fortnightly and quarterly tests, each generator unit will be tested separately at 100% load for 1.5 hours, twice per annum. This equates to 3 hours per generator.

2. **Grid outage**

   In the unlikely event of a loss of grid power to the building, all 14 generators will start and then drop off according to requirement. The arrangement at this installation ensures that 12 generators can provide the full electrical requirement to the site, with 2 generators as back up in the event a generator fails to start.

3.4.3 Generator emissions performance

The generators that have been selected are emissions optimised and achieve the Tier II US EPA standard. For the size and output, the engines selected are best in class for NO_x emissions.

The installation is located within an Air Quality Management Area (AQMA) for NO_2 and near an Air Quality Focus Area (AQFA). As a result, during the planning process, the London Borough of Hillingdon (LBH) required that abatement be implemented on the generators to achieve a NO_x emissions rate of 95mg/m^3 (at 5% O_2). In response to this planning requirement, the operator has made significant investment in NO_x abatement technology in the form of SCR. This technology has been employed for this specific scenario and does not represent BAT for general Data Centre developments.

The SCR system will be fitted to the generator exhaust system to help reduce NO_x emissions before they enter the atmosphere. The SCR system has been designed and sized so that it can outperform even gas generators on NO_x emissions.

The SCR system will rely on a source of Ammonia fed from 7 no 2,500 litre Urea tanks. These are to be integrally bunded to 110% and located within the generator rooms, with 1 tank serving 2 generators. In addition, these tanks will also have overflow alarms and leak detection devices.

3.4.4 Generator flue design

Each generator set will have a dedicated flue / ‘stack’ that will be unimpeded by flaps / cowls and exit vertically out the top of EC1 at a height of approx. 23m, approx. 2m above roof height.

3.4.5 Grid electrical supply

The site is powered via two independent supplies that connect directly to the national grid without the need for an intermediary such as a Distribution Network Operator (DNO). Each substation has two feeds (A & B). Each feed can support the full site load, meaning that if one feed was to fail, electrical provision to the installation would not be compromised.

A site wide failure is considered extremely rare as it would require a catastrophic regional failure on the grid, or at the supplying power station, and would likely impact not only the site but the surrounding London area. As a result, the grid connection is considered to be highly reliable as demonstrated in the grid reliability letter provided with the application (calculated as 99.999605%).

3.4.6 Fuel tanks

The emergency back-up generators will be supplied with fuel from 14 no 26,000 litre belly tanks, located beneath each generator.

The belly tanks will store enough fuel to provide 24 hours' worth of electricity when running at 100% continuous load. Each tank is double skinned and integrally bunded to 110% of the capacity of the tank. Leak detection and overfill alarms are present on each tank.

Typical fuel use is expected be low as the emergency back-up generators will only operate in emergencies or as part of the maintenance and testing regime.

3.4.7 Drainage

The site is to be covered in good quality hard standing and the drainage system is split into separate foul and surface water networks. The permitted activities will not generate large volumes of trade effluent that would require EA consent to discharge which has been confirmed with Thames Water There is potential that wastewater from cooling plant will be discharged. While this is not within the permitted installation, it has been considered. Thames Water were consulted and confirmed that a Trade Effluent License is not required. The installation has no discharge to any surface water and will go through interceptor before entering the local network. Discharges are likely to be limited to surface run-off which is unlikely to contain significant levels of contaminated liquid e.g. fuel / oils .

The surface water drainage system is connected to a forecourt separator / interceptor prior to discharging to the local network. This will be fitted with an automatic sensor for detecting the presence of fuel and will close when actuated.

3.4.8 Operating procedures and management systems

Once the site is operational suitable procedures are to be developed and implemented. Relevant and responsible staff are to receive appropriate training and awareness on these procedures, and this will be documented through the operator's management system. This will help ensure compliance with the Environmental Permit as well as other requirements of legislation for the protection of the environment and human health.

Once the site is operational, management systems will be developed. Management systems will be the responsibility of the operator. It is our understanding that management systems will be broadly in line with the principles of the following management standards:

- ISO 14001:2015
- ISO 50001:2018
- ISO/IEC 27001:2013
- ISO 9001:2015

An Environmental Management System (EMS) will be implemented for the site. This will be developed in line with the ISO 14001:2015 standard or a suitable equivalent. The EMS would focus on the following:

- Reducing risks to the environment
- Integrating EMS responsibilities within line management
- A commitment to personnel environmental awareness and competence
- The ongoing monitoring and review of environmental performance

3.5 Site Condition Report

The site has had several uses since the early 1900's such as creosoting works, potential landfill use, and housing a power station. There is potentially contaminative land from historical uses throughout the site which has been/will be addressed through remediation strategies during various construction phases. An investigation into the risk of site contamination to water courses and sensitive receptors determined that there is a low risk to the surrounding environment from current pollution on site.

Extensive soil and groundwater sampling and laboratory analysis has been completed as part of the development of the site. This provides a record of baseline conditions prior to permit issue.

The Site Condition Report has been prepared to cover the entire campus as covered by Planning Application *[75111/APP/2022/1007].* This approach has been taken as the contaminated land investigations and subsequent remediation works have been carried out across the whole site. This occurred prior to the decision being made that part of the site would be subject to this Permit Application.

It should be noted that this Site Condition Report will likely also underpin future separate environmental permit applications for the remainder of the original site.

The Site Condition Report has been prepared in accordance with the EA's H5 Guidance Note [2] 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

3.6 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.

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

[2] https://www.gov.uk/government/publications/environmental-permitting-h5-site-condition-report.

- Water discharges

3.7 Climate Change Risk Assessment

A Climate Change Risk Assessment (CCRA) has been completed in line with the requirements set out in Application Form B2, Section 6b. These have been further assessed in the ERA. The predominant risks from climate change relate to site flooding.

The likelihood of site flooding from increased rainfall or due to sea level rise is thought to be unlikely. Drainage systems will be maintained and routinely checked for blockages, while the nearby watercourses are not tidal and therefore won't be directly affected by an increase in sea level.

3.8 Air Quality Assessment

The ERA identified that Air Quality may be impacted from the operation of the generators. To investigate this potential risk, an Air Quality Assessment (AQA) has been undertaken. The focus of this assessment was on NO_x emissions, given the installation is located within a designated Air Quality Management Area (AQMA) for NO_2.

Additional pollutants considered in the AQA included PM, SOx and CO.

The AQA reviewed the long and short-term impacts on local air quality from the operation of the generators under the following scenarios:

- **Scenario 1**: 'Fortnightly and Quarterly Test' – this will account for 14 hours of operation per year, per generator at 25% load and tested individually.
- **Scenario 2**: 'Bi-Annual test' –Accounting for 3 hours of operation per year, per generator and tested individually at 100% load.
- **Scenario 3**: '72-hour grid failure event' – this will be all generators running concurrently at 100% load.

The modelled emissions rates allowed for a 20 minute 'SCR warm up time' where emissions are unabated whilst the catalyst gets to temperature. Once up to temperature, emissions are to achieve a NO_X concentration of 95mg/Nm^3 or 0.244 g/s (@5% O_2) as per the warranty letter provided by the SCR manufacturers and submitted as evidence with the application for a permit.

The AQA concluded that impacts from the generators were predicted to be insignificant at all relevant modelled receptor locations, when assessed against all relevant long-term and short-term UK Air Quality Standards, in normal grid failure or testing scenarios. As such, the proposed development's impacts are not anticipated to have an overall significant effect on local air quality.

Once the site is operational, an Air Quality Management Plan (AQMP) is to be developed. This will provide details on appropriate site management in the event of prolonged generator usage, such as during an outage. The aim of this will be to minimise impacts on local air quality during emergency operation of the combustion plant. This will be produced with input from the EA and LBH, with a finalised plan incorporated into the site's EMS.

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 (NIA) was conducted.

Generators, whilst operational, are a potential source of noise. As such, mitigation measures will be implemented to reduce the engine exhaust noise. The generators are located internal to EC1, providing a basic level of noise attenuation. The SCR system to be fitted to the engines will also provide effective levels of noise attenuation. In addition, generator flues exit the building at approx. 23m above ground, much higher than the location of modelled sensitive receptors.

The report identified that no significant impacts to nearby sensitive noise receptors are predicted due to generator operation. Daytime levels are predicted to be 13dB below the allowable limit and night-time levels are thought to be 9dB below. The installation is predicted to achieve the noise limits at the nearest noise sensitive properties and no additional mitigation plans have been developed at this stage.

It is expected that the AQMP, once developed, will also seek to address the potential noise impacts from generator operation especially during prolonged operation in the event of an outage. While the likelihood of this is low, it is important that plans are in place so that local residents are notified of potential impacts. Outages, as previously stated, are likely to be very rare, and prolonged operation of the emergency back-up generators is thought to be unlikely.