



## **Non-Technical Summary - DP3442QV**

### *Hayes Data Centre Emergency Back-up Generation Facility*

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## 1.0 INTRODUCTION

This Non-Technical Summary (NTS) assessment has been prepared by HDR Consulting Limited (HDR) on behalf of the operator Amazon Data Services UK Ltd (ADS), in support of the application to vary the existing Environmental Permit, DP3442QV, for the following installation:

**Hayes Data Centre Emergency Back-up Generation Facility  
Bulls Bridge Industrial Estate  
North Hyde Gardens  
Hayes  
UB3 4DG  
Grid reference: TQ 10514 79252**

ADS, as the legal operator, is required to apply to the Environment Agency (EA) for a permit because the total net thermal input capacity of the site's combustion plant exceeds the 50MW thermal threshold stipulated in the legislation<sup>1</sup>.

The existing permit covers the activities associated with Energy Centre 1 (EC1). This NTS is to support the permit variation to add the activities associated with Energy Centre 2 (EC2), which is currently being constructed, with completion and handover expected around summer 2025. The data centre will house various IT equipment that will require a constant stable electrical supply to operate effectively. The Data Centre will use Emergency Standby Generators or 'ESGs' to provide emergency power.

This document provides a non-technical introduction to the site and the application for a permit. For a detailed description of the data centre design, surrounding area and risk assessments please refer to the Best Available Techniques (BAT) Assessment, Environmental Risk Assessment (ERA) and Site Condition Report submitted with the application.

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<sup>1</sup> The Environmental Permitting (England and Wales) Regulations 2016

## 2.0 SITE SUMMARY

The Hayes Data Centre and associated Energy Centres (EC1 and EC2), shown in Figure 2.1 comprises two of three data centres on the 'Union Park Data Centre Campus'. The other data centre (EC3) is under the control of a separate operator and thus is covered by a separate environmental permit (ref ZP3527SS).

This NTS relates solely to the Hayes Data Centre operated by ADS (ref DP3442QV), however, this application and the noise and air quality modelling associated with it have been prepared in full cognisance of the operating regime of the two adjacent data centres.

The Data Centre will use Emergency Standby Generators or 'ESGs' to provide emergency power in the event of grid electrical failure.

The current permit was issued on 28<sup>th</sup> Sept 2023 and covers the 14 no. ESGs associated with Energy Centre 1 (EC1), which is fully operational. This permit variation is to add another 14 no. ESGs associated with Energy Centre 2 (EC2), to give a total of 28 no. ESGs across EC1 and EC2, as shown in Table 2.1 below.

The generator model selected for EC2 is the same as the existing EC1 generators: Rolls Royce MTU DS4000 with an electrical output rating of 3.2 MWe. Each ESG has a net thermal input rating of 8.01 MWth, resulting in a combined site total of 224.25 MWth across both EC1 and EC2 (see Table 2.1).

The ESGs are capable of operating on diesel or biodiesel such as Hydrogenated Vegetable Oil (HVO). The ESGs will be located in EC2, as seen in Figure 2.1 and Figure 2.2. The permit boundary outlined in green in Figure 2.1 includes the ESGs and the Directly Associated Activities (DAA) which includes the fuel storage tanks, urea tanks, pipework and surface water drainage network.

All ESGs comply with 2g TA LUFT standard and have been fitted with Selective Catalytic Reduction (SCR) to provide NO<sub>x</sub> abatement to 95mg/Nm<sup>3</sup> at 5% O<sub>2</sub>.

At the time of writing, construction of EC2 is ongoing with commissioning of the ESGs due in summer of 2025.

All the ESGs are due to be commissioned are over 1MWth and are therefore classed as new 'Medium Combustion Plant' (MCP) and Specified Generators. These ESGs are 'limited hour MCPs' as they are purely standby plant that will operate less than 50 hours per year and there is no capacity agreement in place. The operation of the ESGs is likely to be limited to monthly/annual maintenance and testing.

**Table 2.1 - Summary of combustion plant**

MCP type	No. of ESGs	Thermal capacity	Install date
Existing EC1 ESGs	14	112 MWth	2023
New EC2 ESGs	14	112 MWth	2025
<b>Total after expansion</b>	<b>28</b>	<b>224.25 MWth</b>	

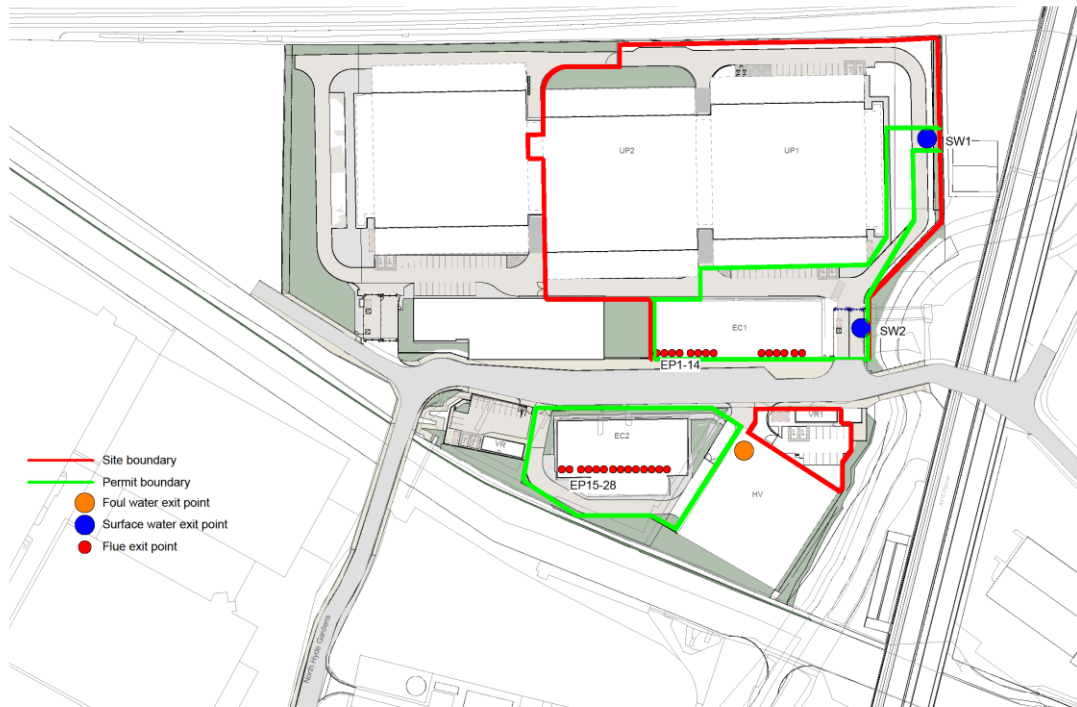


Figure 2.1 - Site plan and emission points

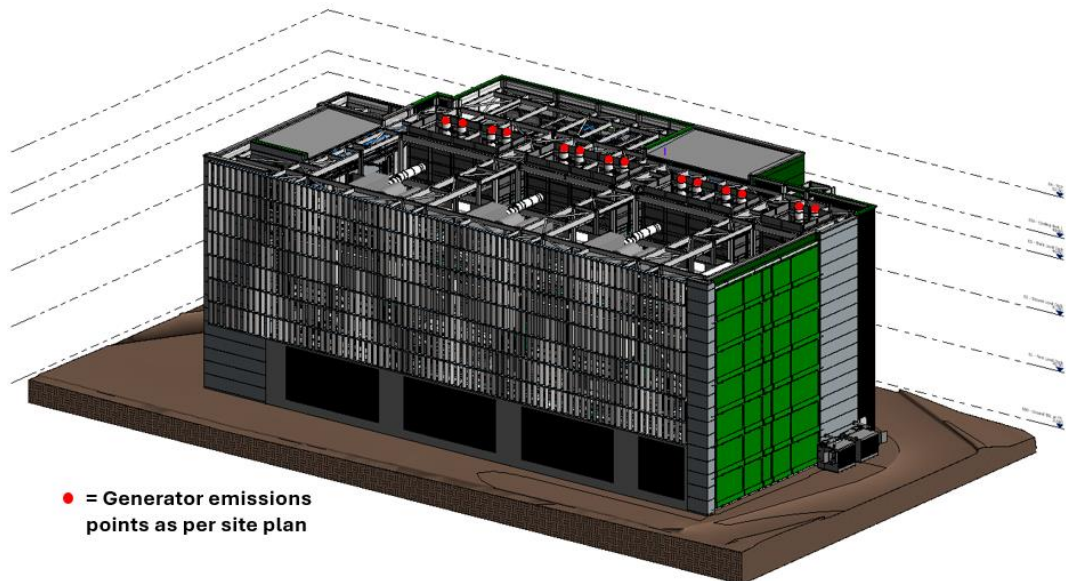


Figure 2.2 - Indicative EC2 Building layout

Data centres have recently been classed as Critical National Infrastructure (CNI), as they underpin a large portion of the UK’s economy. 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 rely on an uninterruptible supply of electricity to power various 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 employ ESGs to provide power, should the grid supply be unavailable.

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 rare events and thus operation is normally limited to testing and maintenance, which is likely to be less than 50 hours per ESG or 0.006% of a year.

### 2.1 Site Context

The surrounding land use can be seen in Figure 2.3 below. Further details can be found in the Environmental Risk Assessment (ERA) and Site Condition Report submitted with the application for a permit.

The site is located in Hayes, in an urban location, which is relatively industrial in the immediate vicinity with residential properties to the north and south.

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.

The closest ecological receptors are Local Wildlife sites (LWS) approximately 2,000m from the site, with the closest Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar sites approximately 10,000m from the site boundary.

The installation is located within an Air Quality Management Area (AQMA) for NO<sub>2</sub> and near an Air Quality Focus Area (AQFA). As a result, during the planning process, the London Borough of Hillingdon (LBH) required that NO<sub>x</sub> abatement be fitted to the generators in the form of Selective Catalytic Reduction (SCR). Further details on the SCR system are presented in sections 3.5.1 and 3.6.3.

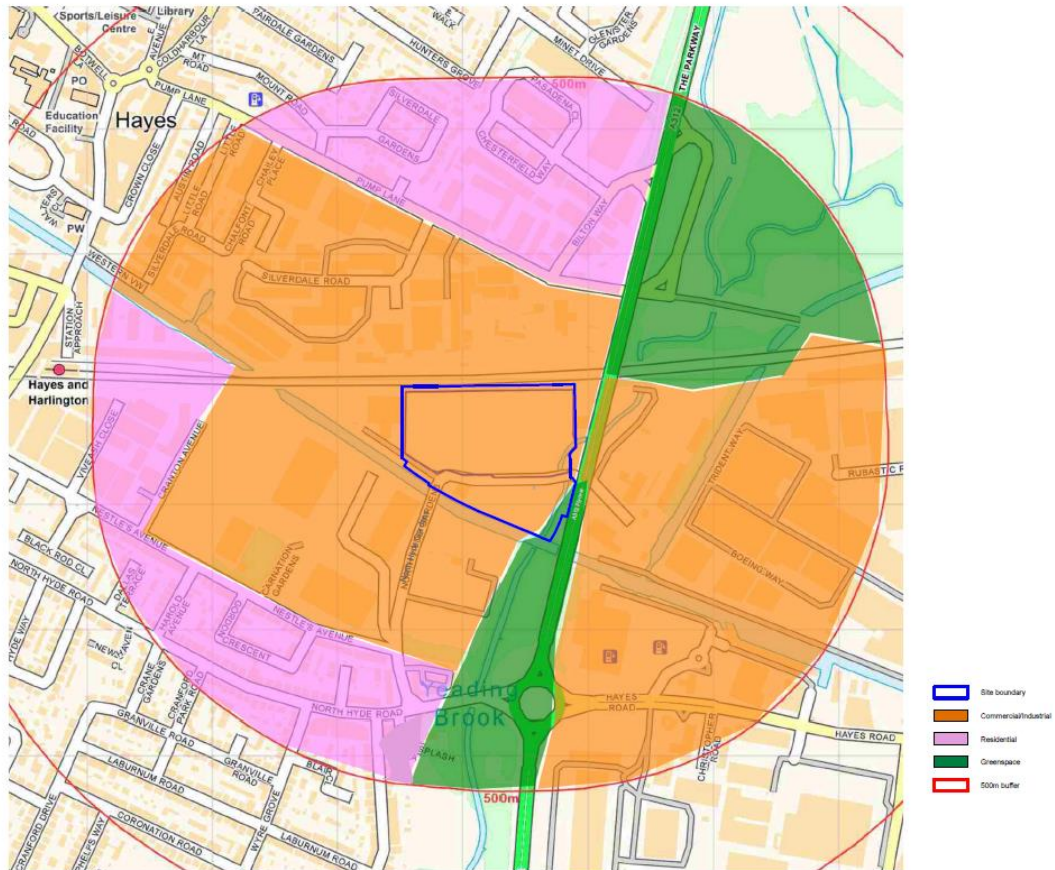


Figure 2.3 - Site setting plan

## 2.2 Site History

The historical land use has been detailed in the Site Condition Report submitted with the application for a permit. One of the Site Condition Report appendices is a Phase 1 Environmental risk assessment which notes the following:

*“The earliest available map from 1865 shows the site as mostly vacant with a river running north to south along the eastern part of the site. This map also shows a railway and creosoting works in the northeast corner. By 1932, the creosoting works had extended into the site and a building was shown in the centre. Excavations and ground workings were noted onsite by 1963 to 1964. The creosoting works were no longer shown by 1973 and a power station with chimney was shown in the western part of the site by 1983. By 2002, the power station was no longer shown and the British Airways building was shown. The building on the Vodafone plot was constructed by 2010.”*

The same Phase 1 report also notes the following:

*“The surrounding area has supported various industrial (potentially contaminative) land uses, including factories (50m all directions), brick fields (200m northwest), mills (200m northwest), railway (10m north), electricity substation (100m south), creosoting works (1m east and northeast), and rubber works (200m east).”*



## 3.0 ENVIRONMENTAL PERMIT APPLICATION

### 3.1 Permit Type and regulated activities

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 data centre will use Emergency Standby Generators or ‘ESGs’ to provide emergency power in the event of a grid electrical failure. These ESGs will be located in the associated ‘EC2’ Energy Centre which provides emergency power to the UP2 data halls. At final fit-out, EC1 and EC2 will house a total of 28 no. ESGs. The model selected are Rolls Royce MTU DS4000. which have an electrical output rating of 3.2 MWe each. This equates to a net thermal input rating of 8.01MW per ESG and an aggregated total of approximately 224.28 MWth.

All of the ESGs due to be commissioned are over 1MWth and are therefore classed as ‘Medium Combustion Plant’ (MCP) and Specified Generators. These ESGs are ‘limited hour MCPs’ as they are purely standby plant that will operate less than 500 hours per year and there is no capacity agreement in place. The operation of the ESGs is likely to be limited to monthly/annual maintenance and testing.

The Directly Associated Activities (DAA) include the fuel storage tanks, urea tanks that service the SCR system, associated pipework and the surface water drainage network.

### 3.2 EA Pre-application meeting

An enhanced pre-application meeting was held on 28<sup>th</sup> June 2024. This included attendance from the EA, HDR, ADS and the operator for the adjacent developing data centre (ref ZP3527SS). A pre-application advice letter was issued by Miriam Townshend of the EA on 20<sup>th</sup> August 2024.

### 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 variation. 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.

- Application forms – Part A, C2, C3, F1 and Directors’ Details
- Best Available Techniques Assessment (BAT)
- Non-technical Summary (this document)
- Site Condition Report (SCR)
- Environmental Risk Assessment (ERA)
  - Air Quality Assessment (AQA)
  - Noise Impact Assessment (NIA)
- Thermal Schedule
- Supporting information including site plans, drawings, generator datasheets, etc.

### 3.4 Site Condition Report

An updated Site Condition Report (or ‘Site Baseline Report’) has been submitted along with the application for a permit as the permit boundary has been extended to include additional activities. Extensive baseline soil and groundwater sampling and site investigations were undertaken as part of planning requirements of the development of the site. These identified the presence of some degree of contamination from historical land use. A risk assessment and remediation strategy were undertaken, and subsequent sampling has since shown this to be effective with all planning conditions discharged. The existing EC1 site condition report has been updated to include site investigations for EC2.

The Site Condition Report is intended to provide the EA with a description of the baseline conditions at permit issue and it 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.

### 3.5 Environmental Risk Assessment

An updated ERA has been provided in support of this application using the EA's "Risk assessment for your environmental permit" guidance<sup>3</sup>. This provides an update on the potential risks the site poses as a result of the aforementioned expansion works.

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

Detailed standalone risk assessments have been completed to assess the risk of air quality and noise impacts from the operation of the ESGs. These are summarised below.

#### 3.5.1 Air Quality Assessment

Emissions to air will occur from the operation of the generators. Due to the Data Centre's high levels of resiliency, it is expected that operation will be limited to maintenance and testing only, with no capacity agreement / 'elective operation'.

An updated Air Quality Assessment (AQA) was completed in support of the permit application to model the predicted impacts of operating the generators, with their associated SCR, on short-term and long-term air quality. A summary of the findings is as follows:

##### Scenario 1: Testing scenario

- Fortnightly Routine Testing - All generators are expected to run independently for 30 minutes per fortnight at 25% load, totalling 10 hours per year.
- Quarterly Routine Testing - All generators are expected to run independently for 1 hour per quarter at 25% load, totalling 4 hours per year.

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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)

- Bi-Annual Routine Testing - All generators are expected to run independently for 90 minutes twice per year, at full load.

### Scenario 2: Emergency running scenario

All 28 of the generators would be used during emergency running. It has been assumed that the generators would be used for 72 hours of continuous, concurrent running at 100% load out of a year for power failure purposes. This is a conservative estimate as during an outage it is likely that the generators would run at less than 80% load at any one time.

The conclusion of the assessment is as follows:

*A dispersion modelling assessment of the 28 No. standby generators was undertaken. Concentrations of NO<sub>2</sub>, PM, CO, C<sub>6</sub>H<sub>6</sub>, NO and SO<sub>2</sub> were predicted at selected human receptors using a detailed dispersion model and compared with relevant long and short-term AQSs, EALs and AEGLs. Concentrations of NO<sub>x</sub>, NH<sub>3</sub> and SO<sub>2</sub> were predicted at selected ecological receptors.*

*Long-term and short-term impacts from the operation of the generators were predicted to be insignificant during testing and maintenance and a prolonged grid failure at all relevant modelled receptor locations when assessed against all relevant long-term and short-term exceedance thresholds.*

An Air Quality Management Plan or 'AQMP' to mitigate air quality impacts during ESG operation in response to prolonged grid failure has been implemented under the EC1 permit and will be updated to consider impacts associated with of the addition of EC2.

### Conclusions

The EC1 and EC2 maintenance and testing regime is sufficiently different to that of the neighbouring data centre, meaning it is highly unlikely that the ESGs will be tested simultaneously. This means air quality impacts from maintenance and testing are unlikely to be significant as testing of EC1 and EC2 are unlikely to overlap. Even if the testing regimes coincided with one another, the combined impact would still be well below the critical limits and critical loads identified in the two reports.

The only event that is likely to cause coincident running of all the generators in the two facilities is a significant grid outage affecting both facilities (extremely unlikely). Even in this extremely unlikely event the air quality impact of all generators running simultaneously would be below critical limits and critical loads. This is because of the significant effect of the SCR systems on the generators which reduces NO<sub>x</sub> emissions to 95mg/Nm<sup>3</sup>.

The individual AQAs for both permits do not predict significant impacts, and this is the same conclusion that was drawn from the AQA that was produced for the Planning Permission. This assessed the impacts of 42 ESGs across the campus operating in an outage and represents a worst-case scenario as it assessed the impacts of 42 ESGs. In reality, there will only be 40 ESGs across the 2 permit applications.

Given the above, the site's ESGs are unlikely to have a significant impact on surrounding receptors and therefore represent the BAT.

### 3.5.2 Noise Assessment

An updated Noise Impact Assessment (NIA) has been completed as part of the planning application and this has been submitted as part of the application to vary the existing environmental permit ('Noise Impact Assessment'). This report assesses the likely impact from the operation of the 14no. new ESGs and the associated equipment that serves the data halls, including the chillers, etc. The impact assessment concluded the following:

*"The 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 found in the 'Noise Impact Assessment' submitted as part of this variation application.

### 3.6 BAT Assessment

An updated BAT assessment has been submitted with the application which focuses on an assessment of the 14 no. new ESGs being installed in EC2.

This has been structured using the EAs informal BAT guidance document; 'data centre FAQ Headline Approach v21' (November 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.

### 3.6.1 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.

### 3.6.2 Generator Operation

The ESGs are solely used as standby plant for emergency power provision in the event of the grid supply being unavailable. 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. Therefore, the generators are classed as 'limited hour MCPs' and are therefore exempt from meeting the BAT emissions limit values (ELVs) for new MCPs / specified generators.

The intended operation of the ESGs is as follows (see Table 3.1). This reflects the air quality modelling assessment which accompanies the application for a permit.

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 redundancy arrangement for EC2 is 'n+2' meaning that 12 generators can satisfy the maximum electrical demand for the site, with 2 generators as back up in the event a generator fails to start.

**Table 3.1 - Summary of generator test regime**

Generator Test Frequency	Description	Load Profile	Individual Test Duration	Total hours / gen
Fortnightly test	Testing each generator separately at 25% load for 0.5 hour every two weeks per year. <i>The quarterly and bi-annual tests would supersede the requirement for 6 fortnightly tests.</i>	25%	30 mins	10
Quarterly Test	Testing each generator separately at 25% load for 1 hour each quarter.	25%	1 hour	4
Bi-annual test	Testing each generator separately at 100% load for 1.5 hours, twice a year.	100%	1.5 hours	3
<b>Total hours of operation per generator</b>				<b>17</b>

### 3.6.3 Generator emissions performance

The generators that have been selected for EC1 are identical to those for EC2 and 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<sub>x</sub> emissions.

The installation is located within an Air Quality Management Area (AQMA) for NO<sub>2</sub> 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<sub>x</sub> emissions rate of 95mg/Nm<sup>3</sup> (at 5% O<sub>2</sub>). In response to this planning requirement, the operator has made significant investment in NO<sub>x</sub> 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<sub>x</sub> emissions before they enter the atmosphere. The SCR system has been designed and sized so that it can outperform even gas generators on NO<sub>x</sub> 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 banded 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.

### 3.6.4 Generator flue and exhaust design

Each of the 14 no. ESGs has its own dedicated flue that rises to 21.1m above ground. Stacks are orientated vertically and are unimpeded by cowls or caps.

### 3.6.5 Grid electrical supply

Under normal circumstances electricity to the site will be provided direct from the National Grid 275/66kV North Hyde Substation. The electrical infrastructure is such that there are multiple supply routes or 'feeds'. 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%).

### 3.6.6 Emissions monitoring plan

An Emissions monitoring plan is to be developed once the site is operational in conjunction with the EA guidance. To facilitate flue gas testing, Monitoring ports are to be pre-installed on the generator flues to facilitate NO<sub>x</sub> and CO monitoring in accordance with web guide 'Monitoring stack emissions: low risk MCPs and specified generators' Published 16 February 2021 (formerly known as TGN M5)<sup>4</sup>.

### 3.6.7 Fuel storage

The ESGs will combust a liquid fuel in order to generate electricity in an emergency. The current plans are for the ESGs to operate on diesel or biodiesel such as HVO. Each of the 14 ESGs will have its own 26,000 litre (usable) banded belly tank which sits below the generator itself.

The tanks have been sized to provide 24 hours of continuous operation at 100% rated load and offer a total storage capacity for the site of 364,000 litres. The tanks are banded to 110% and will be fitted with an Overfill Protection Valve (OPV) to the tank fill line and a leak detect float switch within the tank bund. More details can be found in the BAT Assessment.

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<sup>4</sup> <https://www.gov.uk/government/publications/monitoring-stack-emissions-low-risk-mcps-and-specified-generators/monitoring-stack-emissions-low-risk-mcps-and-specified-generators>

### 3.6.8 Drainage

The site's drainage system is split into separate foul and surface water networks as shown in the site's drainage plan supplied with the application. This network serves the entire campus irrespective of the operator/permit boundaries, as it was originally designed for a single operator of all three data centres.

Runoff from concrete loading bays (including fuel refuelling areas) is treated by full retention petrol interceptors prior to connecting to the downstream surface water network. The fuel filling points at each energy centre are bounded by channel drains so that, in the event of a spill, all of fuel/oils are intercepted for collection by a forecourt separator prior to connecting to the downstream foul water network.

The point source emissions points to surface water from the entire Campus are shown as 'SW1' and 'SW2' in Figure 2.1. Both of these emissions points are existing emissions points that reside within the boundary of the current EC1 environmental permit (ref: DP3442QV).

Emissions points that reside within the boundary of the EC3 environmental permit (ref: ZP3527SS) will not be included in this application, as there cannot be dual regulation of emissions points that are already covered under a separate permit application. Therefore, as agreed during the enhanced pre-app meeting with the EA, several manholes have been identified that are close to the site boundary that could be considered to be the point at which the surface water drainage is discharged from ZP3527SS into the drainage system covered under DP3442QV.

### 3.6.9 Waste

Small quantities of wastes may be generated from routine generator maintenance activities or in the event of a spillage/leakage. This is likely to be low given the standby nature of the generators and procedures utilised on site by ADS will be in place to reduce the risk of spills and leaks spillage/leaks.

Procedures for licenced and responsible collection of waste oils and other hazardous wastes are already in place and may require an update as the new ESGs are installed. In accordance with the sites' ISO14001:2015 certification, waste generated is to be managed in line with the waste hierarchy, using licenced waste management providers and relevant Duty of Care information retained.

### 3.6.10 Operating procedures

Various procedures are already in place at the site to help ensure compliance with the Environmental Permit as well as other requirements of legislation for the protection of the environment and human health. Once EC2 is operational, procedures will be reviewed, amended and implemented to this installation.

Relevant and responsible staff are to receive appropriate training and awareness on these procedures, and this will be documented through the operator's management systems (e.g. ISO 14001 & ISO 50001). 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. Procedures are as follows:

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

### 3.6.11 Management systems

ASD is certified in accordance with:

- ISO 9001:2015 – Quality Management System
- ISO 14001:2015 – Environmental Management System
- ISO/IEC 27001:2013 – Information Security Management System
- ISO 45001:2018 – Occupational health and safety management.

## 4.0 CONCLUSION

We consider this to be comprehensive submission that meets the requirements of all relevant EA guidance documentation.

The overall conclusion is that there is unlikely to be a significant impact on human health or the environment from the additional 14no. new generators that are being added as part of this permit variation.

ASD is fully committed to operating in accordance with the relevant permit conditions and demonstrating best practice within the data centre sector.