Non-Technical Summary – FP3630EU

LON1-East Data Centre

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CONTENTS

Page No.

1.0 INTRODUCTION

This Non-Technical Summary (NTS) assessment has been prepared by HDR Consulting Limited (HDR) on behalf of the operator Green Mountain DC UK Ltd (Green Mountain), in support of the application for a variation to existing Environmental Permit (EP), FP3630EU

The permit is related to the operation of the combustion plant and the associated fuel storage facilities at the 'LON1-East' data centre, (formerly 'Romford North'), located at:

3 King George Close
Eastern Avenue
Romford
RM7 7PN
Grid reference: TQ 50290 89820.

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.

2.0 SITE SUMMARY

The site has been operating as a data centre (DC) since 2010. Under normal circumstances, electricity to the site is provided by the National Grid. Grid reliability is critical to a DC and as such the site currently has 7no. emergency standby generators (ESGs) and 2no. emergency DRUPs (Diesel rotary uninterruptible power supply) engines to provide standby power in the event of an outage / failure in the grid supply. The ESGs and DRUPS are solely to support the campus in times of grid failure.

As per the table and site plan below, expansion works in 2023/24 (referred to as 'build 4') will see 8no. additional ESGs installed in phases. The first phase of 5 no. ESGs are likely to be commissioned in November 2024 with the remaining 3 sometime in the future.

Green Mountain have selected the 3,306 kVA / 2,645 kW Rolls Royce MTU DS3600 generator set with a MTU 20V4000G94F Emissions Optimised Diesel Engine. Each ESG has a thermal capacity of 7.4MWth and all will be located inside the existing building (shown as blue in the site plan).

The 8no. new ESGs will operate on diesel or Hydrogenated Vegetable Oil (HVO) and will be fitted with Selective Catalytic Reduction (SCR) to reduce NOx emissions.

Table1 Summary of MCP details

MCP type	No. of ESGs	Thermal capacity	Install date
Existing – Diesel generators	7	45.13 MWth	2011/12
Existing – DRUPS	2	9.03 MWth	2010
New – Diesel generators	8	59.21 MWth	Phase 1 – 2024 Phase 2 – TBC
Total after expansion	**17**	**113.37 MWth**	

All the ESGs are over 1MWth and are therefore classed as 'Medium Combustion Plant '(MCP). 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 location of the generators, fuel tanks and emissions points (flues / stacks) and surface water connections are shown below. The installation boundary encompasses the listed activities only.

The site has one main building which houses all the ESGs. There is a substation on site, as well a small security portacabin and two outbuildings, currently used for storage. The locations of the ESGs are shown below in Figure 1.

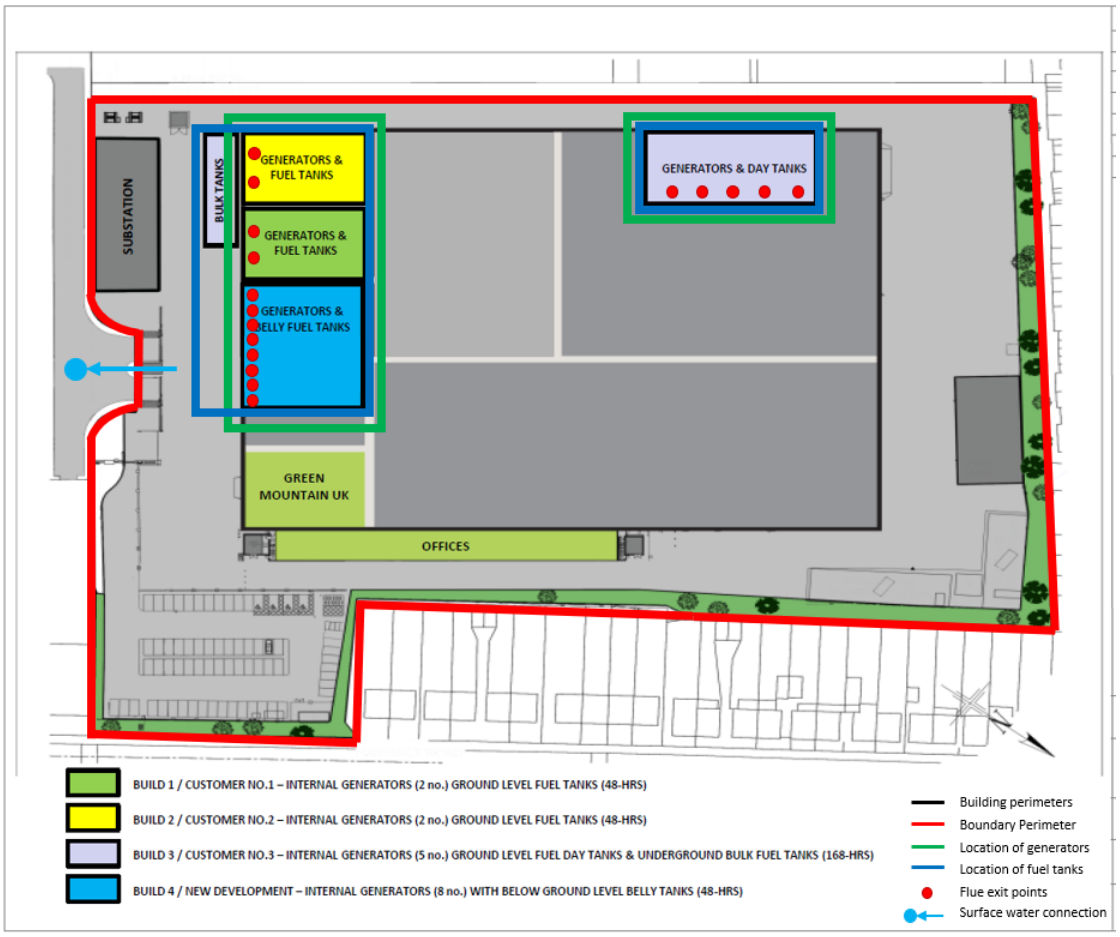

Figure 1 – Installation boundary and emission points.

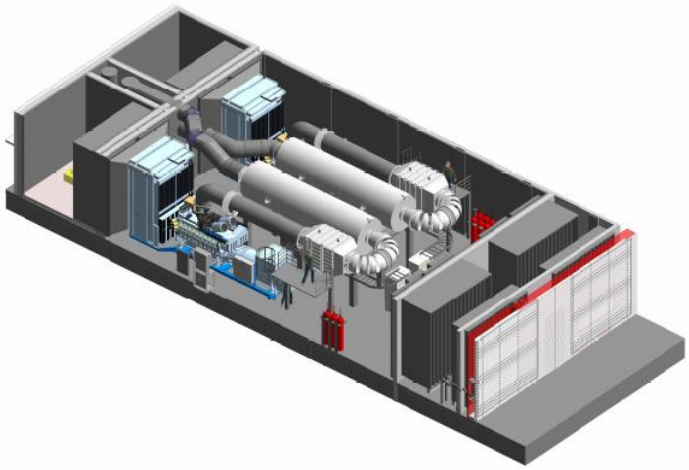

Figure 2 - Plant layout for new ESGs.

2.1 Data Centre function

Data Centres are an essential part of national infrastructure, underpinning 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 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.

Under normal circumstances, electricity to the site will be provided by the National Grid. Grid reliability is critical to a DC and as such, these often will have back-up power options onsite in case of a grid outage. The DRUPs and ESGs are on site solely to support the campus in times of grid failure.

2.2 Site setting and context

The site is located in Romford, surrounded by residential properties to the East and North and by commercial/industrial properties to the South and West. The River Rom runs to the West of the site. The A12 road is to the South of the site. The specific location is Green Mountain, 3 King George Close, Eastern Avenue, Romford, RM7 7PN, with National Grid Reference TQ 50290 89820.

The surrounding area has supported various industrial and potentially contaminative land uses, including works and warehouses. No sensitive land uses have been identified. Beyond the direct site boundaries, the closest ecological receptor is the Hainault Forest which (LNR and SSSI) which is approximately 4kmto the N/SE/W of the site.

Further details can be found in the Environmental Risk Assessment (ERA) submitted with the application for a permit, document reference "Environmental Risk Assessment v1.0".

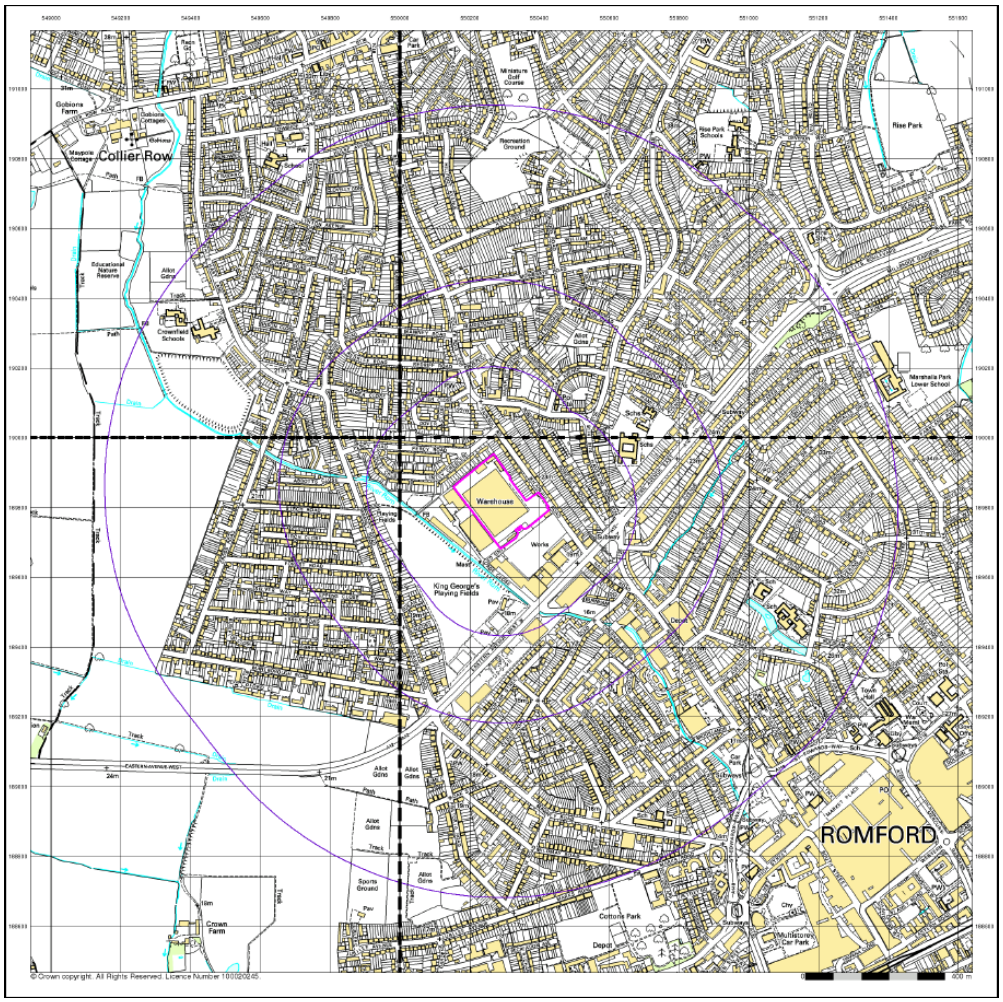

Figure 3 - Site Location (10000m)

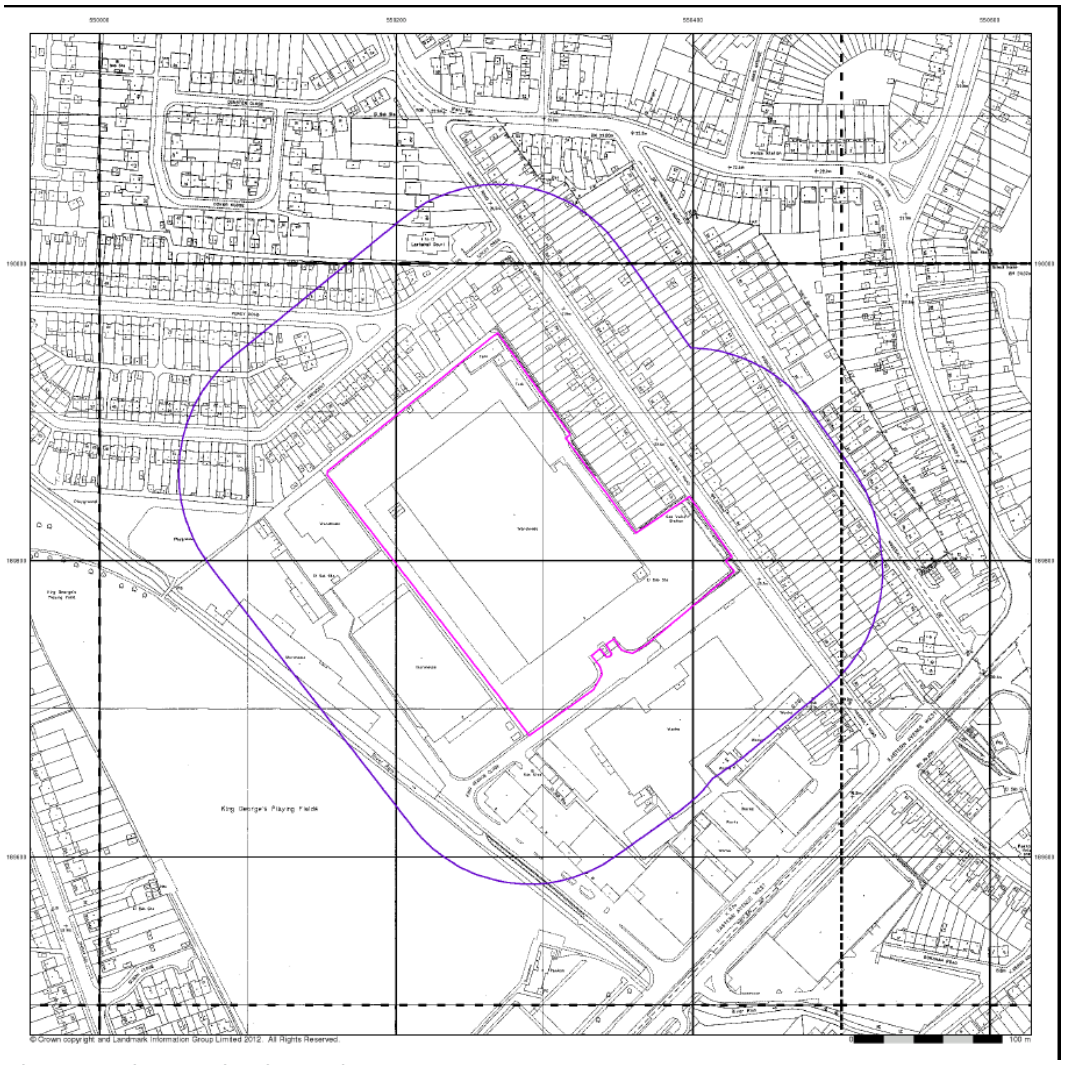

Figure 4 - Site Location (2500m)

2.3 Site history

The development site is located on King George Close in the town of Romford in Essex. Historically this site was open land prior to the land being used as a Brick Works by 1920. This was demolished during the 1960s and by 1971 a warehouse was located on site. It has been used for industrial purposes since then.

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 regulated activity relates to the operation of 17no. ESGs: 7no. existing ESGs, 8no. new ESGs and 2no existing DRUPs, with a total thermal capacity of approx. 113 MWth.

The Directly Associated Activities (DAA) include the fuel storage tanks, urea tanks that service the SCR system (8no. new ESGs only), associated pipework and the surface water drainage network.

3.2 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 the latest version of these documents for further information.

- Non-technical Summary (this document)
- Application forms – A, B2, B3 & F1
- Site Condition Report
- Environmental Risk Assessment (ERA)
    - Air Quality Assessment (AQA)
    - Noise Impact Assessment
- Best Available Techniques Assessment (BAT)
- Thermal Schedule
- Supporting information including site plans, drawings, generator datasheets etc.

3.3 Site Condition Report

An updated Site Condition Report (or 'Site Baseline Report') has been submitted along with the application for a permit. Extensive baseline soil and groundwater sampling and site investigations were completed in 2007 and then monitoring has been undertaken since permit issue in 2016 and in 2022.

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

The Site Condition Report which has been prepared in accordance with the EA's H5 Guidance Note[1] 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.

[1] Environmental permitting: H5 Site condition report - GOV.UK (www.gov.uk)

3.4 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[2]. 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.

3.4.1 Air Quality Assessment

The ERA identified that Air Quality may be impacted from the operation of the generators. To investigate this potential risk, an AQA has been undertaken. This is an updated assessment to the AQA that was submitted during the application for a permit in 2014/15.

The focus of this assessment was on NO_x emissions as this is the primary pollutant of concern for combustion engines. Additional pollutants considered in the AQA included PM, SOx and CO.

The site is located within London Borough of Havering which has declared the whole of the borough as Air Quality Management Area (AQMA) for $NO_2$and PM_{10}.

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**: Testing and maintenance (no SCR)

  At site load (assumed to be 75%) for standby generator tests for each phase of the generators these will occur either monthly or bi-weekly, from approximately 10 minutes to 1 hour every month and 2 hours annually (this will typically replace one monthly test) with all but one generator from each phase operating concurrently.

- **Scenario 2**: Emergency power outage (no SCR)

  At site load (assumed to be 75%) for 72 hours with all but one generator from each phase operating cumulatively.

- **Scenario 3**: Scenario 1 + Scenario 2 (with SCR)

  Both Scenario 1 and Scenario 2 outlined above will be assessed as stated above, with abatement applied to the 8no.proposed generators only.

At the time the AQA was completed, it was uncertain whether abatement would be fitted to the 8no. new ESGs. Green Mountain have since decided to go ahead with abatement in the form of SCR on the 8no. new ESGs. As a result, Scenario 3 is regarded to be most realistic representation of impacts.

An Air Quality Management Plan or 'AQMP' to mitigate air quality impacts during ESG operation in response to prolonged grid failure is already in place and will be updated to include the new ESGs.

[2] Risk assessments for your environmental permit - GOV.UK (www.gov.uk)

3.4.2 Noise Assessment

A 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 8no.new ESGs and the associated equipment that serves the data halls including the chillers etc. The impact assessment concluded the following:

> "*The proposed plant and building design are predicted to produce noise levels of 10 dB below the existing background noise levels at the nearby receptors, during normal operation, with the proposed mitigation. During emergency operation, when the generators operate, the noise levels are predicted to be no more than the existing background levels*".

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.

3.5 BAT Assessment

An updated BAT assessment has been submitted with the application which focuses on an assessment of the 8no. new ESGs being installed.

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.

3.5.1 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

3.5.2 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. 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 testing and maintenance regime varies across the different builds on site – refer to Figure 1 for clarification on the builds. The regimes are outlined in the BAT document.

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.

3.5.3 Generator emissions performance

The existing Generators and DRUPS engines, already covered under the existing permit, conform to the MCP limits for existing plant, i.e. TA -Luft 4000 mg/m^3.

The EA guidance for new generators is that they, as a minimum achieve the following:

"TA-Luft 2g' or Tier II USEPA with guaranteed emissions: this has requirements for 2000mg/m³ NOx; 650 mg/m³ for CO; particulates and dust 130 mg/m³ and 150 mg/m³ for hydrocarbons (all at reference conditions and 5% O_2)."

The 8no. new ESGs are emissions optimised and achieve the Tier II US EPA standard. The maximum design load for these is 75% per generator and at this load unabated NOx emissions are 1,865mg/Nm³(at 5% Oxygen and standard temperature and pressure). The engine and emissions datasheets have been supplied with the application.

Furthermore, each of the 8no. new ESGs will be fitted with SCR systems that have been sized to reduce NO_x emissions concentrations by approximately 81% (at 100% load) to 500mg/Nm³ (at 5% Oxygen and standard temperature and pressure).

Further information on generator emission performance can be found in the AQA, emissions datasheets and BAT Assessment documentation.

3.5.4 Generator flue design

Dispersion of pollutants has been considered when designing the flues for the new generators. The 8no. new ESGs are set up in units of two, with an adjoining flue stack to dissipate the emissions from each unit. These stacks are not impeded by flaps or cowls, and the exhaust will exit vertically, approximately 13.3m above the ground and in line with the apex of the roof. The design of the flues is therefore considered to be BAT for this application.

3.5.5 Grid electrical supply

Under normal circumstances, electricity to the site will be provided by UK Power Distribution. The electrical infrastructure is such that there are two supply routes or 'feeds', A and 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 99.999612% for period 2021/22).

3.5.6 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 NOx 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)[3].

3.5.7 Fuel storage

The existing ESGs run on diesel and, whilst the 8no. new ESGs can do so, the intention is for them to run on HVO. The fuel storage arrangements are as follows:

Table 2 – ESG groups and fuel storage arrangements

Building	ESGs in place	Fuel tanks	Capacity per tank (litres)
Build 1	2no. DRUPs	2no. above ground bulk tanks	25,500
Build 2	2no. generators	2no. above ground bulk tanks	28,000

[3] https://www.gov.uk/government/publications/monitoring-stack-emissions-low-risk-mcps-and-specified-generators/monitoring-stack-emissions-low-risk-mcps-and-specified-generators

Building	ESGs in place	Fuel tanks	Capacity per tank (litres)
Build 3	5no. generators	4no. underground bulk tanks with 5no. above ground day tanks.	100,000 (underground) 4,700 (day tanks)
Build 4	8no. generators	8no. belly tanks	44,546 (38,915 useable)

Existing tanks are bunded and fitted with bund and overfill alarms. Generator rooms and/or corridors are bunded with spill alarms. Each new generator will have its own belly tank. Tanks are to be bunded to BS799 Part 5 Type J 2010 specifications. More details can be found in the BAT Assessment.

3.5.8 Drainage

The site is 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. Discharges are likely to be limited to surface run-off which is unlikely to contain significant levels of contaminated liquid e.g. fuel / oils.

As per the drainage plan, a petrol interceptor is in place to act as tertiary containment for only the area surrounding the substation and the existing sub surface fuel bulk tanks. This is fitted with an automatic sensor / shut off valve that will close upon detecting the presence of spilt fuel.

Drainage works on the site are ongoing as part of the development work, and an updated plan will be available once these are completed later in 2024.

3.5.9 Waste

Small quantities of wastes are 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 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.

3.5.10 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. These include the following: waste management, fuel strategy process, spills procedure, and fuel delivery and storage procedure.

3.5.11 Management systems

Green Mountain 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

The LON1-East campus is also certified according to the following standard:

- ISO 20000-1:2018 – Information Technology Service 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 8no. new generators that are being added as part of this permit variation.