Intended for
VDC LHR11 LIMITED

Date
February 2024

Project Number
1620009615-002

Environmental Permit Application: Operations Report

LHR-11/12, Chandos Road, Park Royal, London

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LHR-11/12, Chandos Road, Park Royal, London

Project name	**LHR-1, Chandos Road, Park Royal, London VDC Environmental Permitting Support**
Project no.	**1620009615-002**
Recipient	**VDC LHR11 Limited**
Document type	**Operations Report**
Version	**2**
Date	**February 2024**
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Description	**Environmental Permit Application**

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Non-Technical Summary

This Part A(1) Environmental Permit application is submitted by VDC LHR11 Limited (referred to hereinafter as "VDC" or "the Client") for the operation of a combustion plant comprising electricity generators present at the LHR-11/12 Datacentre (LHR 1 Datacentre) located at Chandos Road, Park Royal, London, NW10 6NF ("the Installation").

The LHR 1 Datacentre comprises two datacentre buildings referred to as LHR11 and LHR12, with dedicated infrastructure housing for the generators, one for each datacentre building, containing a total of 37 diesel fired generators for the production of electricity located within associated with the datacentre buildings. The generators associated with the operation of LHR11 are housed within a generator building, whilst the generators associated with the operation of LHR12 are housed inside individual acoustic enclosures on a gantry structure. The generators are intended as emergency generation provision to the datacentres in the event of an interruption to the electricity supply to the site from the National Grid. Each generator is expected to operate for approximately 24-hours per year as part of periodic testing and maintenance, in addition to any emergency operation. As such, the typical operation of the generators will be limited to 50 hours per year for testing and maintenance. The generators will be capable of operating with both diesel and hydrogenated vegetable oil (HVO).

In total 37 generators will be present at the site, with an aggregated net rated thermal input capacity of approximately 225.7 MW_{th}. Under Schedule 1, Part 2, Chapter 1, Section 1.1 Part A(1)(a) of the Environmental Permitting (England and Wales) Regulations 2016 (as amended) ("the EP Regulations") the burning of any fuel in an appliance with a rated thermal input of 50 or more megawatts is a regulated activity, and an environmental permit is required to operate the Installation.

Raw materials

The primary raw materials used in the permitted activity consists of fuel (diesel or HVO), which will be used to power the generators; urea for use within the Selective catalytic Reduction (SCR) abatement, lubricants, and coolants. Fuel will be stored in four underground bulk tanks which will fill the individual belly tanks associated with each generator. All material storage container is provided with suitable and adequate containment measures, in line with the requirements of CIRIA 736.

Waste

The permitted activity is expected to generate minor quantities of waste, primarily from maintenance and repair activities. All waste generated at the Installation will be managed in line with the waste hierarchy and will be removed from the site by a licenced waste management company.

Energy

Diesel (or HVO) is used as the predominant primary energy source for the facility; however, a limited amount of electricity will also be used by the generator plant control equipment. All plant

being installed is new and highly efficient, with the typical electrical efficiency of the generators being in the region of 45%.

Emissions to air

Each generator will have an individual flue stack which have the potential to generate emissions of oxides of nitrogen (NOx)`. The flue stacks for the generators for LHR11 grouped together as three groups of four and one in a group of five, therefore resulting in four emission points for LHR11, whilst the flue stacks for the flue stacks for the LHR12 generators are arranged in two rows of ten.

The impact of the emissions from these points have been assessed using air dispersion modelling and the Environment Agency's risk assessment methodology, which demonstrates that the long-term and short-term impacts are not significant at any of the identified receptors (both human health and ecological). The impact of ammonia deposition associated with the NOx emissions from the generators on the identified ecological receptors was also found to not be significant.

The emission limit values set out under the Schedule 25B of the Environmental Permitting (England and Wales) Regulations 2016 (as amended) are applicable to the Installation. However, as the generators are planned to operate for less than 500 hours per year the emission limit values applicable under this Schedule are not applicable to the installation.

As there are no emissions limit values relevant to the Installation, periodic monitoring of NO_x emissions is not proposed.

Emissions to Water and Sewer

There are no process emissions to controlled waters (comprising groundwater, surface water and sewer), with discharges to controlled waters limited to uncontaminated rainwater run-off through interceptors before entering the local municipal surface water drainage network. Where drainage serves storage and delivery areas, shut-off valves are installed prior to leaving site.

Emissions to Land

The Installation will be located on a concrete floor with no pathways to the underlying ground. There will therefore be no process emissions to land from the Installation.

Noise

A noise impact assessment has been undertaken for the operation of the generators in an emergency scenario (all generators being operational) and for the regular testing of the generators (one generator tested at one time). The assessment concluded that:

- the predicted rating level at the nearest residential receptors will be less than the typical daytime background noise levels under the testing scenario; and
- The predicted rating level at the nearest residential receptors will be less than the typical background noise level under the emergency operation scenario.

Therefore, noise is not considered to be a significant issue at the Installation.

Environmental Management Systems

The Installation will be operated in line with an environmental management system (EMS), which will be developed prior to commencement of operations, to manage the environmental aspects of the operation of the Installation. The EMS will be developed in line with the requirements of ISO14001: 2015 and relevant Environment Agency guidance.

Site Condition

A Site Condition Report has been prepared which considers the risks presented by the materials stored at the installation, the sensitivity of the receiving environment and the measures in place to mitigate the potential for ground contamination. The primary risk is derived from the storage and use of diesel (or HVO). It is considered that appropriate containment will be provided to all fuel storage and transfer systems to prevent loss of materials to environment. All raw materials and wastes will be stored in appropriate containers.

1. Introduction

This document supports the application submitted by VDC LHR11 Limited (referred to hereinafter as "VDC" or "the Client") to the Environment Agency ("EA") under the Environmental Permitting (England and Wales) Regulations 2016 (as amended) (the "EP Regulations") for an Environmental Permit (application reference EPR/NP3949QS/A001) for the operation of combustion plant at the LHR 1 Datacentre located at Chandos Park Industrial Estate, Chandos Road, Park Royal, London, NW10 6NF (the "site" or the "Installation"). An overview of the location of the site is provided in Figure 1 in Appendix 1.

The Installation site comprises two six-storey buildings to be used as datacentres (LHR 11 and LHR 12, together referred to as the LHR 1 Datacentre) and emergency back-up generators associated with each datacentre building. LHR 11 will have 17 emergency generators associated with its' operation whilst LHR 12 will have 20 emergency generators. Each datacentre building will be powered using electricity from the national grid under normal operating conditions. The datacentre buildings, however, have provision for emergency backup electricity generators to provide electricity in the event of an interruption to the national grid supply.

The generators associated with LHR 11 will be located in a dedicated generator building whilst the generators for LHR 12 will be located on a dedicated gantry. The generators for LHR 12 will be contained in acoustic enclosures. Each generator will have a net rated thermal input of 6.1 MW_{th}. When aggregated, the net rated thermal input capacity of all 37 generators at the Installation will be approximately 225.7 MW_{th}, and will therefore require an environmental permit under EP Regulations Schedule 1, Part 2, Chapter 1, Section 1.1 Part A (1) (a) - Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts. The operation of the data centres themselves does not represent a listed activity under the EP Regulations and does not require an Environmental Permit; this application is therefore limited to the operation of the emergency back-up generators.

This Operations Report is intended to support VDC's application to the Environment Agency (EA) for a permit to operate the combustion plant at the site and provides an overview of the proposed regulated activity and the operator's management arrangements.

2. Process Description

2.1 Proposed Activity

The proposed Installation will comprise a total of 37 generators to provide emergency power to the two datacentre buildings LHR 11 and LHR 12. The total thermal input to the generators is 225.7 MW_{th} whilst the electrical output is just over 103 MW_e. The maximum power generation will be dependent on the reliability of the local electric grid. It is anticipated that the typical annual operation of the generators will be limited to regular testing and maintenance, not exceeding 50 hours per generator.

A summary of the scheduled activity to be included in the environmental permit and directly associated activities is shown below in Table 2.1.

Table 2.1: List of Proposed Activities to be undertaken at the Installation

Activity Ref	Schedule 1 – Part 2 Reference	Description of Activity	Limits of Specified Activity
AR1	Section 1.1 Part A(1) (a) Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts.	Operation of 37 emergency standby generators with a total thermal input of approximately 225.7 MW_{th}. The generators will burn diesel solely for the purpose of providing electricity to the datacentre in the event of a failure of supply from the National Grid and during maintenance testing. 37 x 6.1 MW_{th} engines	From receipt of raw materials and generation of electricity to despatch of waste. Electricity produced at the Installation will not be exported to the National Grid.
Directly Associated Activities			
AR2	Storage of raw materials	Storage of raw materials	From receipt of raw materials to use within the facility.
AR3	Surface water drainage	Surface water drainage	Input to site drainage system until discharge to surface water sewer via interceptors (emission point SW1).

2.2 Process Summary and Technical Standards

2.2.1 Process Summary

The primary activities proposed to be undertaken at the site are associated with the operation and maintenance of two datacentres, which are currently under construction. The generators will be installed in two phases in 2024, with each phase consisting of the respective generators associated with each datacentre. It is anticipated that all 37 generators will be operational by the end of 2024.

Each datacentre will comprise a six-storey datacentre building, with dedicated infrastructure (generator building for LHR 11 and a gantry for LHR 12) housing diesel powered electricity

generators (17 for LHR 11 and 20 for LHR 12) and associated ancillary infrastructure. Under normal operating conditions the electrical demand for the data centre will be met through the provision of electricity from the National Grid; however, in the event of an interruption to the supply of electricity from the National Grid an uninterruptable power supply (UPS) and the proposed installation will provide electricity to the site until the electricity supply from the National Grid can be restored.

The Installation will have four below ground bulk storage tanks located externally providing 24-hours fuel storage capacity for all 37 generator units at the Installation. The below ground bulk storage tanks will each store 90,000 litres of fuel and will be double skinned and connected to a central filling station, equipped with spill containment features.

Each generator will be provided with a belly/ day tank having a capacity of 1,000-litres located adjacent to each generator set, providing the generators with a minimum of 1-hour fuel storage capacity. The day tanks will be automatically topped-up from the four below ground bulk storage tanks. In total 394,000 litres of fuel will be stored at the Installation allowing for approximately 24 hours operation.

A 20,000 litre below ground fuel dump tank will be located at the installation which will receive fuel released from the generators in the event of a malfunction. Therefore, activities directly associated with the regulated activity at the site are limited to the storage, handling (e.g., receipt, distribution, fuel polishing etc.) and use of fuel across the site.

The site location is shown on Figure 1 and a site layout plan and installation boundary is provided in Figure 2 provided within Appendix 1.

2.2.2 Technical Standards

The following technical standards are considered to apply to the proposed installation:

- EA's Data Centre FAQ Headline Approach guidance[1];
- Best Available Techniques (BAT) Reference (BRef) document for Emissions from Storage[2];
- Emergency backup diesel engines on installations: best available techniques (BAT)[3]; and
- Medium combustion plant and specified generator regulations[4].

The Data Centre FAQ document is not an official release from the EA, however, this document forms the basis for a common methodology for applications for combustion activities associated with data centres.

Since the individual generator units have a thermal input of <15 MW_{th}, they are not classed as Large Combustion Plant (LCP), therefore the LCP BRef is not applicable to the Installation.

The general permitting guidance provided by the EA for Part A (1) environmental permits[5] has also been considered. In addition, the Installation will operate in line with a management system developed in accordance with available EA guidance[6].

[1] Data Centre FAQ Headline Approach, Draft version 10.0, Environment Agency, published 01st June 2018
[2] Integrated Pollution Prevention and Control Reference Document on Best Available Techniques on Emissions from Storage, EC, July 2006
[3] Emergency backup diesel engines on installations: best available techniques (BAT), Environment Agency, Published: 21 August 2023
[4] Medium combustion plant and specified generator regulations, Environment Agency, published 15th July 2019
[5] A1 Installations: Environmental Permits, Environment Agency, published 01st February 2016, Last updated 20th July 2023, available at: https://www.gov.uk/guidance/a1-installations-environmental-permits, accessed on 13th February 2024
[6] Develop a Management System: Environmental Permits, Environment Agency, Published 01st February 2016, Last updated 3rd April 2023, available at: https://www.gov.uk/guidance/develop-a-management-system-environmental-permits accessed on 13th February 2024

2.2.3 "Same Site" Permitting

The Operator intends to construct and operate the two data centres – LHR 11 and LHR 12 at the same location. Both datacentres will be located on a single site wholly owned and operated by VDC, and will share a common site boundary, drainage network, electrical supply infrastructure, fuel supply systems as well as internal road network.

Therefore, it is proposed that the Installation should be permitted as a single site under the EA's data centre guidance stating they would "clearly regard a company's individual campus or obvious standalone boundary as a single site."

2.3 Process Description

2.3.1 General Overview

VDC intends to operate 37 diesel-powered generator sets as an emergency power supply for the two datacentres LHR 11 and LHR 12. Each of the generators will be identical, and will have the following specification (the manufacturers specification sheet has been provided as Appendix 2):

Table 2.2: Generator Specification

Manufacturer	Model	Net Rated Thermal Input (MW_{th})	Thermal Efficiency	Output Rating kVA (kW)	Fuel
Kohler	3500E	6.13	45.6%	3500 (2800)	Diesel

The generators will be capable of providing a N+1 level of resilience with each of the generators running in Standby Mode, which is applicable for supplying power to support the maximum electrical demand, including starting and distorted loads for the duration of power interruption of a reliable utility source.

The mains failure relays on the incoming circuits to the low voltage switch panels will constantly monitor the supply voltage and frequency for under and over tolerance. In the event of a power supply interruption, or variation in supply which is out of tolerance, the immediate power demand of the site will be met via an uninterruptable power supply (battery bank) followed by the generators approximately 15 seconds after the National Grid power supply has been interrupted. The status of the supply interruption is constantly monitored, facilitating single or multiple generators to start depending on the severity of the failure in the supply. Once started the generators will remain operational until the mains restoration detection equipment determines that the supply from the National Grid is stable. The return to the National Grid supply is an automated process, with the National Grid and generator supplies being interlocked to ensure that parallel running cannot be achieved. The generators will not synchronise with the mains supply at any time.

The generators will only be used to meet site demand in the event of an interruption in electricity supply to the site. The generators will not be used for voluntary elective power, such as demand side response (i.e., on-site use), grid short term operating reserve (STOR) (i.e., off-site export of electricity) and frequency control by demand management (FCDM).

2.3.2 Generator Overview

The generators, and the associated alternators and battery banks will be split across the two structures (17 generators located in a dedicated generator building for LHR 11 and 20 generators on a gantry for LHR 12) which will be provided with suitable acoustic containment to minimise noise impacts.

Each generator will be independent in terms of fuel supply, cooling, fire safety, shut down and control, and for resilience reasons there will be no common points of failure between any two sets.

Each generator will be provided with a fuel tank (belly/ day tank) containing sufficient fuel for the units to operate for a minimum of one hour at 100% load, with each tank operating independently. The independent tanks will be fed from the below ground bulk tanks located externally to the generator buildings, via the fuel pump located within a dedicated pump room within each generator building.

Each tank will be located adjacent to the generator it serves, with fuel being transferred from the tanks to the generating sets using pumps located within tank. The day tanks will be equipped with leak detection and a minimum secondary containment bund capacity of 110%. A common overfill and drain line connected to an external dump tank shall be provided for each generator housing structure. The Installation will have an arrangement to allow the fuel to quickly drain to the dump tank in the event of an emergency.

Occasionally fuel polishing may be required for the fuel within the day tanks, and will be undertaken via mobile fuel polishers which will be connected to the required day tank.

Whilst the generators have been chosen as EPA Tier II compliant in accordance with the Environment Agency's draft Data Centre FAQ Headline Approach Guidance, the Tier II compliant operations extend to 75% load operation only. As there is potential for the generators to operate up to 80%-100% load, the Operator has sought to apply Selective Catalytic Reduction (SCR) to ensure emissions remain below the Tier II 2000mg/m^3 NOx limits. The generators are therefore considered to be 'emissions optimised' as defined by the EA.

2.3.3 Stability of Electricity Supply

The power supply to the site is protected by an uninterruptable power supply (UPS), consisting of banks of batteries capable of meeting the full load capacity of the site for approximately 10 minutes. The generators are automatically triggered to start once the power supply has been interrupted, providing power within 20 seconds of the failure of the National Grid supply, at which point the UPS would revert to standby.

The use of the generators to provide electrical power to the site is considered to be unlikely, on the basis that the site is supplied with electricity via two diverse routes and associated infrastructure (e.g., transformers) providing a 2N level of resilience, where N is the power demand of the Installation.

The likelihood of long periods of reliance on the generators to provide power to the site is considered to be highly unlikely given that the National Grid Electricity Transmission System,

which serves the site, reportedly achieved an overall reliability of supply of 99.999981% over the period 2022 - 23[7].

2.3.4 Testing Regime

Regular testing of the generators at the site will ensure that these are operational and capable of providing back-up power. Each of the generators at the site will be subject to a regular testing regime; the testing regime is expected to be in place prior to commencement of operations.

Based on available information, it is anticipated that each generator will be run for up to 24 hours per year for periodic testing.

This testing regime is below the individual generator testing target set out by the EA within the Data Centre FAQ Headline Approach Guidance of 50 hours/annum per generator. The likely impacts associated with operating the generators in accordance with the above testing regime and the operation of the generators to support an interruption to the national grid power supply have been assessed and further information is available in the detailed air quality impact model provided in support of this application.

In accordance with BAT, the operator shall endeavour to schedule generator testing outside of periods of adverse air quality and during working hours. Testing is expected to be undertaken for a single generator at a time.

2.4 Ancillary Activities

The following activities are considered to be associated with the principal regulated activity:

- Fuel handling and storage system;
- Fire protection system; and
- Drainage.

These are discussed further below.

2.4.1 Fuel Handling and Storage

Fuel handling is associated with the delivery of fuel to the site and polishing of fuel prior to use. The generators can operate on both diesel and HVO; the characteristics of both are considered similar and separate procedures for handling are not considered to be required. Each of the belly/ day tanks will permanently be plumbed into the bulk fuel storage system.

The general process of delivery of diesel comprises attaching a flexible hose to the fill points and pumping fuel from the road tanker into the storage tanks using a pump mounted on the delivery vehicle. Each of the fuel storage tanks at the site are fitted with overfill protection devices, which will close the fill point once the storage capacity is reached to prevent a spillage. The level alarms are connected to the building management system, which will alarm if the high-level, low-level or bund alarms are triggered.

The external bulk storage tanks shall be filled centrally from a security cabinet housing the tank fill points, level gauges and overfill alarms. The security cabinet shall have spillage containment and be fitted with a lockable roller shutter, or a similar secure access door. The fill point cabinet will be located on concrete foundation plinth adjacent to a vehicle hard standing which shall be

[7] National Electricity Transmission System Performance Report 2022-23, NationalGridESO, published 28th September 2023, available at https://www.nationalgrideso.com/industry-information/industry-data-and-reports/system-performance-reports accessed on 22nd October 2023

bound by slot drainage leading to a below ground Class 1 full retention separator with alarm in case of spillages or loss of containment from the road tanker. This then connects into the site drainage system. The interceptor vent shall be routed belowground to the rear of the fill point cabinet where it shall rise above ground and discharge within the intercepted area.

The fuel oil system shall comprise of fuel filtration system within the fuel transfer pump which shall supply fuel from the below ground external bulk storage tanks to the generators' belly/day tanks. Fuel is pumped from the day tanks directly to the generator as required via dedicated pumps. A common overfill and drain line connected to an external dump tank shall be provided. The drain line shall feature a fusible link valve arrangement to allow the fuel to quickly drain to the dump tank in the event of an emergency.

Fuel polishing is the process of cleaning fuel to remove water, sediment, and microbial contamination, which may occur when fuel is stored for extended periods. Undertaking fuel polishing contributes to the prevention of blocked filters, fuel system failures, storage tank corrosion and ultimately engine failures.

The process of fuel polishing involves pumping fuel from the bottom of the storage tank though an opening on the top of the storage tank and through flexible aboveground pipework to a processing unit, where the fuel is passed through a series of filters before being pumped through flexible aboveground pipework and returned to the top of the storage tank.

It is proposed that fuel polishing is undertaken for each of the belly/day tanks at a minimum interval of twelve months, with the process being undertaken via a centralised system located within the fuel pump room for LHR11, whilst that for LHR12 generators will be undertaken via mobile fuel polishing units.

It is proposed that fuel is stored in integrally bunded (110%) mild steel belly/ day tanks, which are located adjacent to each generator (37 tanks in total). Each of the tanks will have bund alarms to detect any failure in the primary containment structure, and a contents gauge linked to the building management system showing actual tank contents. The tanks will have a nominal capacity of 1,000 litres each, in addition to the main bulk fuel system comprising four 90,000 litre tanks which equates to 394,000 litres of capacity across the Installation. This is considered by the Operator to represent sufficient capacity to enable the operation of all generators at the site at full load for a maximum period of 24-hours without the need to refuel. The fuel dump tank will comprise of a double skinned horizontal cylindrical below ground storage tank providing sufficient capacity to hold the total volume of fuel stored within the generator belly/day tanks.

2.4.2 Fire Protection System

The datacentre site will consist of a sprinkler system in addition to fire extinguishers located across the site for fire protection. Water for feeding the sprinkler system will be filled using the fire hydrant on site, and the tank will be replenished during operation, for the periodic testing of alarm check valves. The water supply for the building sprinkler systems will be from an existing municipal water system.

Sprinkler systems will be provided throughout the generator housing structures (generator building and generator gantry). The fire pump will be sized to supply sprinkler systems.

A fire alarm system will be provided throughout the Installation. All fire alarm circuits will be electronically supervised. The fire alarm system will be monitored at a local constantly attended location or by a remote supervising station. Flame detection will be utilized in the fuel pump room.

2.4.3 Drainage System

The Installation will not have any process emissions to water due to the nature of operations.

The main drainage system at the Installation will comprise of surface water drainage. All rainwater run-off from the site will be collected and attenuated on site before discharging to the local storm water network managed by Thames Water along Chandos Road.

Discharge pipework from the base of each generator flue stack shall be routed through a condensate neutralizer for final discharge to the foul drainage system. Access doors shall be provided at the base of each common flue enclosure to allow for periodic maintenance/inspection of the condensate pipework and traps and for replacement of the neutralizer cartridge. Condensate collection and emergency drainage will be routed to the exterior for connection to the sanitary main on the east side of the building.

Drain points will be provided for the fire protection system for draining purposes during periodic testing of the system.

2.4.4 Process Control System

The generator system shall be equipped with the engine instrumentation and protection functions. The day to day running of the plant will occur remotely, with the plant being capable of both manual (local) start and operation from a remote station via appropriate communications links to facilitate remote operation, monitoring and control. The equipment will incorporate provision for a remote control of each engine via an appropriate system.

The engine control shall be a control panel located outside each engine enclosure and shall include all required control and monitoring equipment and protection systems.

The plant will have engine control and monitoring systems with interface for local and remote access including remote stop/start and load modification capability. There would also be remote monitoring and control software and interfaces in place to ensure efficient operation.

Functions of the visualisation system at the engine control panel will be available remotely, and will include control and monitoring, trend indications, alarm management, parameter management, and access to long term data recording. The data available via the control panel will also allow reporting on virtually any parameter associated with the plant operation; typically reports covering plant performance and environmental compliance.

2.5 Management System

The Installation will be operated under an Environmental Management System (EMS), which will be developed in line with the requirements of the ISO14001 standard. In summary, the management system will identify systems and procedures that minimise the risk of pollution and harm to human health, which may arise from the operation, maintenance, accidents, incidents and non-conformances specific to the proposed plant.

The EMS will cover the operation of the emergency generators and associated infrastructure, including but not limited to, the bulk fuel tanks; the EMS will include a detailed overview of the installation operation. The operator will develop a maintenance plan for the installation and all associated plant and equipment prior to commencement of operations; the maintenance plan will include the frequency of maintenance and will be based on Original Equipment Manufacturer (OEM) recommendations. The EMS will include an Emergency Plan identifying potential risks of accidents from the installation and the mitigation and management measures to prevent and control accidents.

The generators are intended to be used in the case of emergencies only, with operations typically limited to 50 hours a year, therefore, the impact of the operation on the surrounding environment is expected to be minimal. However, the operator will regularly review the operation to identify options to improve the environmental impact of the installation. The EMS will include an external complaints procedure to allow anyone aggrieved by the operations to file a complaint with the operator. The complaint procedure will describe the follow-on process after a complaint is filed, including communications to be relayed to the complainant outlining the actions undertaken to resolve the complaint. All employees of the installation, both temporary (such as contractors) and permanent, will be trained regarding the requirements of the environmental permit and the EMS. All relevant records related to the operation of the installation required by the environmental permit will be retained by the operator for the period required by law.

The management system and procedures will be available for inspection at the facility and will be applicable to all staff, contractors, and visitors to the facility. The management system will be developed to enable compliance with the Environmental Permit and other legislative requirements for the protection of the environment and human health.

The management system will include a review of risks from climate change on the operations in line with EA guidance[8] and will have integrated climate change adaptation measures. A review of climate change related risks to the operation has been undertaken and included in the Environmental Risk Assessment document; this will be reviewed regularly and updated as necessary. A climate change adaptation plan of action will be developed in line with ISO 14090:2019. as part of the management system. The installation shall record environmental near misses and extreme weather events and these will be reviewed to inform the future planning process related to climate change risks; these will be logged appropriately and the record retained on site.

Written procedures clearly describing responsibilities, actions and communication channels will be available for operational personnel dealing with emergencies.

The systems and procedures will be externally audited and contingency plans written in preparation for any unexpected complications. Internal review of the management system (or relevant parts therein) will be undertaken at least on an annual basis or in the event of a change in operations / site processes.

Internal audits will be undertaken to ensure compliance with the management system, relevant legal requirements, environmental and management performance and to identify preventative / corrective actions to minimise the risk of breach / non-compliance. The findings of any such review and audits will be communicated to all staff and relevant external contractors and, where appropriate, improvement works / corrective actions will be implemented. All internal reviews, audits, amendments to the management system and improvement measures implemented will be recorded for reference and inspection purposes.

2.6 General Maintenance

VDC will produce Operations and Maintenance (O&M) Manuals for the Installation and associated ancillary infrastructure. The site will have a service and maintenance schedule in place with an accredited contractor.

As such all plant, equipment, and infrastructure shall be inspected regularly, which will be developed for the site as part of the O&M regime. Any issues identified during the inspections will be actioned following the inspection. The installation maintenance and inspection procedures will include asset review and management activities (i.e., bunds, drainage etc.), and will be reviewed periodically.

[8] Climate change: risk assessment and adaptation planning in your management system, Environment Agency, Published: 03 April 2023

Routine maintenance will be undertaken annually with major maintenance events undertaken periodically on each major unit. As the plant is not intended for continuous use, the frequency of regular required maintenance is expected to be low. Any materials required for maintenance works at the installation will be brought to site by maintenance contractor and removed for appropriate treatment and/or disposal off-site on completion of works. No materials, including chemicals, required for maintenance works will be stored on site.

Any effluent and other wastes generated from maintenance works will normally be disposed of to an appropriate disposal facility off site.

3. Raw Materials, Water & Waste

3.1 Raw Materials

3.1.1 Raw Material Use

Raw materials use associated with the operation of the generator plant is detailed in the table below.

Table 3.1: Summary of Raw Material Use

Substance	Reason for use	State (Solid/ Liquid / Gas)	Estimated Annual Use	Maximum Storage Capacity	Environmental Hazard Statements
Diesel/ HVO	Generator Fuel	Liquid	412,254 litres(1)	429,000 litres	H411 – Toxic to aquatic life
Lubricant Oil (Mineral)	Lubrication on generators	Liquid	23,900 litres(2)	24,000 litres(3)	Not Classified
Glycol (70/30 solution)	Generator coolant	Liquid	11,350 litres(4)	34,040 litres(5)	No Environmental classifications
Urea Solution (AdBlue or similar)	SCR reagent	Liquid	23,940 litres	47,880 litres	Not classified

Notes:

1) Based on 12 hours under 25% load (213.7 litres/hour per generator) and 12 hours under full load (100%) (714.8 litres/hour per generator).
2) Based on the lubrication oil being changed on an annual basis.
3) Based on a lubrication oil capacity of 647 litres per generator.
4) Based on coolant being changed every three years.
5) Based on thirty-seven generators each with a capacity of 920 litres within coolant systems and associated pipework.

3.1.2 Storage & Containment

Lubricating oils and glycol coolants are both present within the generator sets. These substances are maintained at the optimal level for the operation of the generator sets by the Operators nominated maintenance contractor. There is no routine storage of lubricant or coolant at the installation other than within the generator plant. As the lubrication oil and the coolant are located

within the generator plant, secondary containment is provided by the generator container, which is of mild steel construction. The generator container is designed to provide adequate secondary containment for coolant and lubrication oil held within the generator set.

Adjacent to each generator is an integrally bunded (110%) mild steel belly/ day tank, containing fuel for the operation of the specific generator, and a similar sized tank containing SCR reagent (AdBlue or similar). The tanks have a nominal capacity of 1,000 litres each. A common overfill and drain line connected to an external dump tank shall be provided. The drain line shall feature a fusible link valve arrangement to allow the fuel to quickly drain to the dump tank in the event of an emergency.

The belly/ day tanks will be automatically refuelled from the main fuel bulk storage system comprising four 90,000 litre underground storage tanks each having a minimum secondary containment system capacity of 110%. The total fuel storage capacity of the site is 394,000 litres. This is considered sufficient capacity to enable the operation of all generators at the site on full load for a maximum period of 24-hours without the need to refuel (providing redundancy of N+1). The bulk tanks shall have three access hatches, one for inspection, one for the tank vent and secondary fill point connections to allow for the delivery of fuel oil to each tank from a road tanker and one for the submersible turbine pumps which shall transfer fuel to the generator building.

The tanks are designed in accordance with BS EM 12285-1, and the surface of the tanks are corrosion protected in accordance with EN ISO 12944 (Corrosion Class C3 (Medium) / Durability: Very High (>25 years)) and applying a protective paint layer consisting of zinc rich rust inhibiting primer, epoxy intermediate and polyurethane finish.

A 10,000 litre below-ground double-skinned tank for urea (AdBlue) will also be installed, providing storage to supply the bunded SCR reagent belly/day tanks on each of the generators.

All below ground pipework will be double-walled and comprise leak detection and interstitial monitoring. The external bulk storage tanks shall be filled centrally from a security cabinet housing the tank fill points, level gauges and overfill alarms. The security cabinet shall have spillage containment and be fitted with a lockable roller shutter, or a similar secure access door. The fill point cabinet will be located on concrete foundation plinth adjacent to a vehicle hard standing, which will be bound by slot drainage leading to a below ground class 1 full retention interceptor.

The generator sets are present inside a generator building for LHR11 (17 generators) and within dedicated acoustic enclosures on a gantry for LHR12 (20 generators). No drainage exists within the structures accommodating the generator units.

A drainage plan is provided within Appendix 1 (drawing ref. LHR12-RHD-WS3-SP-DR-C-1400).

3.1.3 Raw Material Efficiency Measures

Raw material use at the installation is limited to the use of fuel (comprising either diesel or HCO), lubrication oil and glycol-based coolant. Annual consumption of lubrication oil and glycol are based on maintaining the generator plant in accordance with the manufacturer’s specification for optimal performance of the plant. In addition, regular maintenance of the generator plant ensures that use of these substances is kept to a minimum.

Fuel use at the site is primarily associated with the testing and maintenance schedule for the generator sets. The Operator proposes to maintain records of run-hours for each generator and associated fuel consumption to enable consumption of diesel to be monitored.

3.2 Water

3.2.1 Use

Water will not be routinely used across the Installation; however, it may be used during scheduled maintenance activities to ensure that the engine coolant level within the engines is maintained at a suitable level by the operators nominated third-party maintenance contractor.

3.2.2 Efficiency Measures

As water use is not considered to be routine efficiency measures are not considered to be appropriate to the Installation.

3.3 Waste

3.3.1 Wastes Generated

Under normal operating conditions waste associated with the regulated activity are expected to be limited to oil contaminated absorbents, which may arise during small releases during refuelling (e.g., clean-up of drip trays etc.).

Under testing and maintenance operations of the generator plant (i.e., testing, maintenance and emergency power generation) the wastes arising from the regulated activity at the Installation will comprise:

Table 3.2: Summary of Wastes: Testing and Maintenance Operations

Description of Waste	Source	State (Solid/ Liquid / Gas)	Estimated Annual Quantity	Classification
Filters	Filtration of fuel and oil on generators	Solid containers with fuel/oil saturated filter material	<5 tonnes	Hazardous
Lubricant Oil (Mineral)	Lubrication on generators	Liquid	23,941 litres(1)	Hazardous
Glycol (70/30 solution)	Generator coolant	Liquid	11,350 litres(2)	Hazardous

Notes:

(1) Based on the lubrication oil being changed on an annual basis.

(2) Coolant is changed on three-yearly cycles

Under abnormal conditions, such as a breakdown, fuel polishing or periodic overhauls wastes arising from the regulated activity at the installation will occur infrequently and will comprise:

Table 3.3: Summary of Wastes: Abnormal Operations

Description of Waste	Source	State (Solid/ Liquid / Gas)	Classification
Oily wastes	Filtration of fuel (diesel polishing)	Liquid	Hazardous
Batteries	Generators	Solid (contain sulphuric acid)	Hazardous
Engine / alternator parts	Generators	Liquid	Hazardous/non-hazardous depending on part and contamination with fuel / oil.

In addition to these wastes oil/fuel contaminated wipes and absorbents may arise on an ad-hoc basis resulting from unintended small-scale releases during maintenance and refuelling operations.

3.3.2 Storage & Containment

Wastes arising under normal operating conditions are anticipated to be limited in volume and will be stored in a suitable sealed container and provided with secondary containment. Wastes arising from maintenance and abnormal conditions are not going to be routinely stored on-site and will be removed by the third-party contractor undertaking these works. Liquid wastes stored on-site during maintenance / abnormal works will be suitably contained within adequate secondary containment.

3.3.3 Waste Minimisation

Wastes arising from the regulated activity at the Installation will be limited to the maintenance of the generators. Maintenance will be undertaken in accordance with the manufacturers specification and is intended to prolong the life and efficiency of the generator sets, as such waste minimisation measures are not considered to be appropriate to the Installation.

4. Energy Use & Efficiency

4.1 Energy Consumption

This application for an environmental permit is made for the proposed regulated activity of burning of any fuel in an appliance with a net rated thermal input of 50 or more megawatts, when the National Grid supply is interrupted. Therefore, the focus of energy consumption under the permit is in relation to the generators alone, rather than the energy consumption of the data centre operations, which are not considered to be a regulated activity under the environmental permitting regime and are outside the permit boundary.

The annual fuel oil consumption associated with the testing and maintenance of the generators is estimated to be 1,302,400 litres or 1,107 tonnes. Based on an annual conservative operation of up to 50 hours it is expected that the Installation will have an energy consumption of approximately 13,800 MWh. Electricity consumption will be relatively small and based around pre-heating the engines, monitoring and control systems.

Table 4.1: Summary of Energy Consumption

Energy Source	Approximate Annual Energy Consumption		
	As Delivered (MWh)	At Primary Source (MWh)	% of total (primary)
Electricity	Nominal	Nominal	<1
Diesel/ HVO	13,805[9]	**13,805**	>99

4.2 Energy Efficiency Measures

4.2.1 Operating & Management Procedures

The generators will be maintained and serviced in accordance with the OEM recommended maintenance schedule to ensure the efficiency of the engines is maintained.

Given the infrequent, intermittent, and unplanned nature of the operation of the generators other energy efficiency measures are not considered appropriate.

4.2.2 Energy Efficiency Directive – Article 14

Article 14 of the Energy Efficiency Directive (2012/27/EU) requires a cost-benefit analysis in relation to measures for promoting efficiency in heating and cooling at industrial installations with a thermal input exceeding 20MW_{th}. Whilst this capacity is exceeded at the Installation, the operating hours for the plant are significantly below the 1,500 hours a year threshold which also applies. Therefore, the generators are exempt from the requirement to provide a cost-benefit analysis on recovery of heat as part of the application.

5. Emissions to Air, Water, Sewer & Land

5.1 Emissions to Air

Emissions to air from the installation will principally comprise combustion gases arising from the operation of the generation plant under emergency, testing and maintenance scenarios. 17 generators will be installed initially in Phase 1 (LHR11) in 2024 followed by a further 20 generators in Phase 2 (LHR12) in 2025. The engines will be fitted with SCR to reduce NO_x emissions to ensure the engine emissions will meet MCPD emission limits for NO_x. The SO_2 emission rate is based on the fuel flow of the engine assuming a maximum sulphur content in the fuel of 5mg/kg (0.0005%) as advised by the supplier; this is consistent with both low sulphur diesel and HVO. The ammonia emission rate (due to slip from the use of SCR) is assumed to be equivalent to the BAT upper emission concentration of 15 mg/Nm^3 on a conservative basis.

[9] Based on net calorific value for Diesel (Biofuel Blend) of 10.60kWh/litre set out in Department of Business, Energy & Industrial Strategy Conversion Factors 2019.

5.1.1 Point Source Emissions to Air

Combustion gases from the operation of each of the generators will be emitted to air via individual flues and would only take place in the event of an interruption to the Installation's electricity supply from the National Grid or running the engines for maintenance and testing.

For LHR 11, each of the stacks comprise a common windshield with four or five flues present within the windshield (there are seventeen flues present at LHR 11 – one flue per generator). For LHR12, the stacks were arranged in two rows of 10 stacks parallel to one another, giving a total of 20 stacks. The co-ordinates of the individual flue stacks for the 37 generators are shown below.

Table 5.1: Location of emission stacks

Generator reference	Flue location co-ordinates (m)		Stack reference[1]
	X	Y	
LHR-11_1	521089.73	182398.14	A1
LHR-11_2	521090.57	182397.71	A2
LHR-11_3	521091 .23	182398.41	A3
LHR-11_4	521089.89	182399.12	A4
LHR-11_5	521090.79	182399.26	A5
LHR-11_6	521096.77	182404.04	A6
LHR-11_7	521096.76	182405.26	A7
LHR-11_8	521096.18	182404.72	A8
LHR-11_9	521097.42	182404.77	A9
LHR-11_10	521105.43	182412.51	A10
LHR-11_11	521105.46	182413.76	A11
LHR-11_12	521104.85	182413.12	A12
LHR-11_13	521106.08	182413.07	A13
LHR-11_14	521108.26	182416.36	A14
LHR-11_15	521108.87	182415.71	A15
LHR-11_16	521108.9	182417.00	A16
LHR-11_17	521109.45	182416.35	A17
LHR-12_1	521159.22	182373.48	A18
LHR-12_2	521159.91	182374.13	A19
LHR-12_3	521160.61	182374.79	A20
LHR-12_4	521161.27	182375.4	A21
LHR-12_5	521161.93	182376.06	A22
LHR-12_6	521162.63	182376.71	A23
LHR-12_7	521163.35	182377.41	A24
LHR-12_8	521164.03	182378.06	A25
LHR-12_9	521164.68	182378.72	A26
LHR-12_10	521165.44	182379.46	A27

Generator reference	Flue location co-ordinates (m)		Stack reference[1]
	X	Y	
LHR-12_11	521160.35	182372.23	A28
LHR-12_12	521161 .09	182372.89	A29
LHR-12_13	521161 .71	182373.54	A30
LHR-12_14	521162.45	182374.24	A31
LHR-12_15	521163.09	182374.85	A32
LHR-12_16	521163.8	182375.51	A33
LHR-12_17	521164.48	182376.17	A34
LHR-12_18	521165.16	182376.84	A35
LHR-12_19	521165.86	182377.48	A36
LHR-12_20	521166.6	182378.22	A37

The emission point reference and the method of emissions are as shown on the table below, these emission points are also shown on Figure 2 provided in Appendix 1 with the same reference number for convenience.

Table 5.2: Schedule of Electricity Generation Plant Emission Points

Associated Data centre	Combustion Plant (source)	Emission Point Reference	Stack Position	Stack Height (from ground level)	Parameters
LHR11	Generators 1 – 5	A1-A5	Vertical	50 m	NO_x, CO, SO_2, NH_3, PM_{10}, $PM_{2.5}$
	Generators 6 - 9	A6-A9	Vertical	50 m	NO_x, CO, SO_2, NH_3, PM_{10}, $PM_{2.5}$
	Generators 10 - 13	A10-A13	Vertical	50 m	NO_x, CO, SO_2, NH_3, PM_{10}, $PM_{2.5}$
	Generators 14 - 17	A14-A17	Vertical	50 m	NO_x, CO, SO_2, NH_3, PM_{10}, $PM_{2.5}$
LHR12	Generators 18 - 37	A18– A37	Vertical	50 m	NO_x, CO, SO_2, NH_3, PM_{10}, $PM_{2.5}$

The total planned operating hours for testing of all generators is 888 hours (37 generators, 24 hours each) per annum.

5.1.2 Assessment of Emissions to Air

5.1.2.1 Emission Limit Values

As each of the generators at the site has a rated thermal input of below 15MW, the installation is not classified as a Large Combustion Plant, and the emission limit values specified under Chapter III of the Industrial Emissions Directive (2010/75/EU) are not applicable; however, the requirements set out in Chapter II of the IED are considered to apply, although there are no specific emissions limit values relevant to the Installation under this Chapter.

As the generators are subject to the provisions of Chapter II of the IED the generator plant is considered to be an excluded generator for the purposes of Schedule 25B of the Environmental Permitting (England and Wales) Regulations 2016 (as amended) for specified generators, and the emission limits and rules set out therein do not apply.

The emissions limit values set out under the medium combustion plant requirements of Schedule 25A of the Environmental Permitting (England and Wales) Regulations 2016 (as amended) are applicable to the Installation. However, as the generators, individually and simultaneously, are planned to operate for less than 500 hours per year the emission limit values set out in this Schedule are not applicable to the site.

Whilst there are no specified emission limit values, which are applicable to the site, the default engine specification for new plant to minimise the impacts of emissions to air from oxides of nitrogen (NO_X) is the 2g TA-Luft standard (or equivalent), which consists of NOx emissions of 2,000 mg/Nm^3 at oxygen concentration of 5%. According to the specification information provided by the manufacturer the engines meet this standard at operational loads of 75%. As the emergency generators are expected to run at 80%+ loading in the event of a grid failure, SCR has been installed as a precautionary measure to ensure the units achieve the 2g TA-Luft standard.

5.1.2.2 Site Summary

The whole of the London Borough of Ealing (LBE) has been declared an Air Quality Management Area (AQMA) for exceedances of the annual mean NO_2 and daily mean PM_{10} national air quality objectives (AQOs). The same applies to the east of the site, where the whole of Hammersmith and Fulham has similarly been declared an AQMA.

5.1.2.3 Assessment Summary

Air quality impacts were modelled using the Atmospheric Dispersion Modelling System (ADMS 6)[10] air quality dispersion model, originally developed for regulatory authorities in the UK. The model uses representative meteorological data for the local area and plant emissions data to predict ambient concentrations of pollutants in the vicinity of the site.

For dispersion modelling purposes it is assumed that the generators will be operational all year round and the annual average impacts can be factored by the calculated allowable operating hours for emergency operation. The allowable operating hours for emergency operation are primarily estimated from a statistical analysis of the likelihood of breaching the 1-hour objective for NO_2 concentrations.

[10] https://www.cerc.co.uk/environmental-software/ADMS-model.html

The statistical approach allows for the fact that operation will only occur for a limited number of hours per year, and therefore operation is unlikely to occur during the meteorological conditions giving rise to the highest hourly average concentrations.

Emission rates and volumetric flowrates have been based on data contained in the Kohler KD3500E sheet (Appendix 2) using the emission concentrations corresponding to Emergency Standby Power (ESP), which represents the worst-case emission.

The Installation design shows each generator having its own flue; in LHR 11, the flues are arranged five in one stack and four in three other stacks (making a total of 17 generators for LHR11) whilst the 20 generators in LHR 12 have individual stacks for each generator, arranged in two rows of 10 stacks parallel to one another.

The SO_2 emission rate is based on the fuel flow of the engine assuming a maximum sulphur content in the HVO fuel of 5mg/kg (0.0005%) as advised by the supplier. The ammonia emission rate (due to slip from the use of SCR) is assumed to be equivalent to the BAT upper emission concentration of 15 mg/Nm^3 on a conservative basis.

The details of the point source emissions parameters are shown in Table 5.3.

Table 5.3: Emission parameters for the Installation

Parameter	Value (per flue)
Stack height (m above finished ground level)	50.0
Average efflux velocity (m/s)	36.3
Volumetric flow (Nm^3/s)(1)	6.5028
Volumetric flow at stack exit parameters (Am^3/s)	10.266
Average stack exit Temp (°C)	510
Approx. flue diameter (m)	0.6
Assumed maximum operating hours / year for assessment purposes	8,760
Oxides of nitrogen (NOx), mg/Nm^3	186
Oxides of nitrogen (NOx) emission rate (g/s)	1.22
Carbon monoxide (CO), mg/Nm^3	0.17
Carbon monoxide (CO), emission rate (g/s)	25
Particulate matter (PM_{10} and $PM_{2.5}$), mg/Nm^3	1.3
Particulate matter (PM_{10} and $PM_{2.5}$), emission rate (g/s)	0.01
Oxides of sulphur (SO_2), mg/Nm^3	0.25
Oxides of sulphur (SO_2), emission rate (g/s)	0.0017
Ammonia (NH_3), mg/Nm^3	15
Ammonia (NH_3), emission rate (g/s)	0.10

Notes:

(1) Emissions have been normalised to 273K, dry gas and 15% oxygen

5.1.3 Fugitive Emissions to Air

Fugitive emissions to air at the Installation are limited to the venting of the bulk fuel tanks. The tanks shall have three access hatches, one for inspection, one for the tank vent and secondary fill point connections and one for the submersible turbine pumps which shall transfer fuel to the generator belly/ day. It is not anticipated that the fugitive emissions from the tank vents will be significant.

5.2 Generator Cost-benefit Analysis

Published EA guidance for datacentres states that in order to minimise the impact of NO_x emissions from electricity generators the default engine specification is 2g TA-Luft (or equivalent standard), consisting of NOx emissions of up to 2,000 mg/Nm^3 (at 5% O_2 content). The generators proposed for the installation meet this specification at 75% load (see Technical Specifications shown in Appendix 2), and SCR has been installed as a precautionary measure to cover operation above 75% loading. Therefore, a detailed cost benefit analysis (CBA) to justify using these engines is not required.

5.3 Global Warming Potential

The release of greenhouse gas emissions at the Installation is anticipated primarily from direct emissions produced or associated with operation of the emergency generators. This is diesel/HVO combustion at the installation.

The anticipated emission of carbon dioxide resulting from the Installation as a consequence of the consumption of diesel is presented below. Note that this data is based upon the regulated activity only (electricity generators). Other greenhouse gas emissions associated with the operation of the data centre are excluded from this assessment.

Table 5.4: Primary Energy Consumption

	Primary Energy Consumption		
Energy Source	**MWh**	**CO_2 emission factor[11] (t/MWh)**	**Annual CO_2 emissions (tonnes)**
Diesel/ HVO	5,417[12]	0.25	1,355
Total	-	-	**1,355**

5.4 Emissions to Surface Water

5.4.1 Point Source Surface Water

Surface water runoff from the generator areas is routed across the site through a dedicated surface water drainage system to a flow attenuation system before being pumped into the municipal surface water drainage system maintained by Thames Water via emission point SW1; the drainage system is a combined sewer system. Surface water runoff from the roadways leading to and around the area proposed to be used for fuel delivery, is routed through a Petrol/ oil interceptor and an automatic drain closure valve is installed to prevent spillages from leaving site through the drainage system.

[11] Assess the impact of air emissions on global warming, EA and DEFRA, Published 1 February 2016, accessed online at https://www.gov.uk/guidance/assess-the-impact-of-air-emissions-on-global-warming on 15 January 2024

[12] Based upon 37 generators operating for 24 hours a year each

5.4.2 Fugitive Emissions to Surface Water

The operation of the Installation will not result in any fugitive discharges of process water to a surface water body.

5.5 Emissions to Groundwater

There will be no process emissions to groundwater from the installation.

5.6 Emissions to Sewer

There will be no process emissions to the foul or surface water municipal sewers associated with the regulated activity undertaken at the Installation.

Only uncontaminated surface water run-off will be discharged from the installation to the combined sewer, via discharge point SW1 (see Figures 2 and 3).

5.7 Emissions to Land

There will be no emissions to land associated with the regulated activity at the Installation. The surface water drainage at the site is directed to soakaway but will be uncontaminated and protected through the presence of interceptors and drain closure valves.

5.8 Odour Emissions

There will be no significant sources of odour from the permitted operations at the Installation, therefore odour is not considered further in this application.

5.9 Noise Emissions

The intermittent (and infrequent) short-term operation of the proposed generator plant presents a potential noise issue at the installation.

5.9.1 Noise Assessment

A noise assessment was undertaken by Ramboll for the Installation as part of the Planning process. The assessment was undertaken in line with BS 4142:2014+A1:2019 and is therefore considered to demonstrate the environmental risk assessment from the Installation for the purpose of the permit application. As only the operation of the Installation i.e., the generators is a regulated activity, only this has been discussed here. A copy of the assessment is provided in Appendix 4.

The Installation will include several key plant and equipment which could lead to noise emissions from the site without appropriate mitigation. The assessment considers the noise sensitive receptors (NSRs) listed in Table 5.5 below.

Table 5.5: Noise sensitive receptors considered in the assessment

Location	Description	Distance from site (m) at closest point
R1	Bashley Road Traveller's Site	19
R2	Residential dwellings along Midland Terrace	75

Location	Description	Distance from site (m) at closest point
R3	Residential dwellings along Midland Terrace	95
R4	Residential dwellings along Shaftesbury Gardens	105

A baseline noise survey was carried out at the identified NSRs and across the application site, to quantify the prevailing ambient and background noise levels during daytime and night-time periods. Operational noise limits for the Installation will be set based on the background noise levels measured during the baseline survey. Plant noise limits have been set in line with Local Authority requirements based on prevailing background noise levels at noise sensitive receptor locations. The operational plant rating noise limit for the emergency and testing/maintenance of standby generators has therefore been set as +5 dB over the typical background noise level (L_{A90}); and the Installation will be designed to meet these limits.

Based on the noise survey results, and statistical analysis of the measured background noise levels in accordance with guidance set out in BS 4142:2014+A1:2019, a noise level of 41 dB $L_{A90,15mins}$ is deemed to be the typical background noise level to be used at the northern and south-eastern boundaries of the datacentre site. The plant noise rating and representative background noise levels are shown below in Table 5.6.

Table 5.6: Background noise levels and design plant noise ratings

Operating condition	Representative background noise level dB LA90	Plant noise rating level dB L_{ar} at NSRs
Emergency operation(1)	41	46
Testing of emergency plant (daytime only)	43	48

Notes:

(1) Limit based on typical night time (23:00-07:00) background level

Noise levels from the Installation has been calculated using proprietary modelling software (CadnaA), based on manufacturers noise data for each item of plant. The following elements of the Installation are considered to present sources of noise:

- 37 generators (17 generators in LHR11 generator building and 20 generators in LHR12 generator gantry located within acoustic enclosures); and
- generator exhaust stacks (A1 – A37).

In addition to the above plant, noise generated by the main chillers associated with the operation of the data centres has been included in the assessment, as they represent the other key source of noise emissions associated with the installation.

The noise assessment concludes that additional attenuation of specific plant or buildings would be needed to achieve the defined noise criteria. The assessment is based on implementation of attenuators on the generator air inlets and exhausts for the LHR11 generators as well as containment of the LHR12 generators within acoustic enclosures.

Noise from all generators operating simultaneously is predicted to be 46 dB $L_{Aeq,T}$ at the entrance of R1 and 43-46 dB LAeq,T at Midland Terrace/Shaftsbury Gardens (R2-R4); this meets the guideline criterion of ≤46 dB $L_{Aeq,T}$. This is based on the worst case of all generators in operation (as well as both data centres and associated chillers, air handling unit and smoke extract fans).

The assessment also assesses the implications of the noise emissions associated with the regular testing of the generators. It should be noted that testing of the generators will be undertaken one at a time, and will be scheduled to be undertaken during working hours (day time) to minimise the impacts. With one generator running for testing (plus the main chillers and other plant on the roof of the data centre) the noise level at the nearest properties is predicted to be around 40 dB $L_{Aeq,T}$, which is lower than the daytime background level and is likely to be acceptable for short term running or testing.

The noise assessment was undertaken based on the generator manufacturer's noise data.

A summary of the calculated noise levels at the identified NSRs and a comparison against the applicable noise ratings (see Table 6 above) is shown below.

Table 5.7: Summary of calculated plant noise levels

Operating condition	Receptor	Calculated noise level dB(A)	Rating Noise limit dB(A)
Emergency operation(1)	R1	46	46
	R2 – R4	46	
Testing of emergency plant (single generator)	R1	40	48(a)
	R2 – R4	≤40	
Notes: (a) daytime operation only			

5.9.2 Conclusions

The results of the noise assessment found that:

- the predicted rating level at the nearest residential receptors will be less than the typical daytime background noise levels under the testing scenario; and
- The predicted rating level at the nearest residential receptors will be less than the typical background noise level under the emergency operation scenario.

Additionally, the noise assessment found that the acoustic design requirements of the relevant national and local planning policies would be achieved. Therefore, noise is not considered to be a significant issue at the Installation and noise impacts are not considered further in this application.

6. Monitoring

6.1 Monitoring Emissions to Air

As discussed in Section 4.1.2 there are no emission limit values applicable to the site. Furthermore, emissions from the generator plant are not anticipated on a routine basis other than for testing or short-term operation in the event of a failure of the National Grid supply. Therefore, emission monitoring will be limited to that undertaken as part of routine maintenance.

As the generators are considered to be excluded generators as per Schedule 25B paragraph 2(2) of the EP Regulations they are considered to comprise low risk specified generators, therefore, the sampling ports on the emission stacks do not require to be compliant with BS EN 15259. The sampling ports for the emission stacks will be in compliance with the published EA guidance for monitoring of emissions from low risk specified generators[13].

6.2 Monitoring Emissions to Water

There will be no process emissions to controlled waters i.e., groundwater, surface waters or sewers associated with the proposed installation and therefore no monitoring is required.

6.3 Monitoring Emissions to Land

There will be no emissions to land associated with the proposed regulated activity and therefore no monitoring is required.

7. Application of BAT

7.1 Determining Applicable BAT

The proposed regulated activity does not have an applicable specific Best Available Technique (BAT) reference document or any associated BAT conclusions. However, it is acknowledged that the EA has provided generic advice setting out the general requirements for compliance with the conditions of a Permit for emergency generators at an installation as well as those installed at datacentre developments. This generic guidance has been considered throughout the preparation of this application and therefore no specific assessment against these requirements is provided in this section.

The EA has provided the following guidance:

- Data Centre FAQ Headline Approach[14]; and
- Emergency backup diesel engines on installations: best available techniques (BAT)[15].

7.2 BAT for Technology Selection

A review of combustion technologies has been undertaken to demonstrate the decision process for the selection of the generators at the installation. The review includes an assessment of pros and cons of various combustion technologies available at present, in terms of their use for different purposes.

[13] Guidance: Monitoring stack emissions: low risk MCPs and specified generators, EA, Updated 12 July 2022
[14] Data Centre FAQ Headline Approach, Draft version 11.0, EA, H.Tee 11/5/20
[15] Emergency backup diesel engines on installations: best available techniques (BAT), EA, Published: 21 August 2023

The review and its' conclusions are shown in Table 7.1 below.

Table 7.1: Combustion Technology review

Backup power source	Advantages	Disadvantages	Decision
Diesel/ HVO generators	Rapid response time; readily available with ability to store fuel directly on site (no off-site reliance); capable of running with both diesel and HVO to provide sufficient flexibility in operations	High NOx & CO_2 emissions; storage of diesel creates additional environmental risk at the site; noise impacts.	**Selected** – reliability is critical element for back-up power
Natural gas generators	Readily available; good response time	Medium NOx emissions; CO_2 emissions; high cost; noise impacts; reliance on external supply provision adds risk to emergency scenarios	**Not selected** – cost and lack of control over fuel supply reduces reliability
Battery storage	No emissions; low noise impact	Limited capacity (maximum 3 hrs capability) – longer-term (24-48hr) capability still in R&D stage	**Selected for immediate (<6 minutes) Uninterruptable Power Supply (UPS) provision only** – current capacities not capable of meeting 24-48hr back-up requirement
Hydrogen fuel cell	No emissions; low noise impact	Limited experience in relation to data centre operation; limited capacity - longer-term (24-48hr) capability still in R&D stage	**Not selected** - current capacities not capable of meeting 24-48hr back-up requirement
Solar/wind	No emissions; low to medium noise impact	Cannot be relied on for power input required in event of grid failure	**Not selected** – cannot be relied upon during loss of power event

7.3 Summary of BAT Assessment

A BAT assessment is therefore provided in the following sections against the main applicable requirements set out within the EA's guidance listed above.

Table 7.2: FAQ Headline Approach Conclusions

Requirement	Installation Arrangements	Conclusion
Diesel generators are presently the default technology for standby generators in Data Centres. However, the permit	Generator units chosen can deliver an N+1 standby arrangement with a high efficiency (>40%).	The generator sets and configuration are appropriate for the installation.

Requirement	Installation Arrangements	Conclusion
application still requires a BAT discussion detailing the choice of engine, the particular configuration and plant sizing meeting the standby arrangement (e.g., 2n).	Selection process of the diesel/ HVO generators is shown in Table 7.1 above.	
Standby engine capacities are aggregated in MW thermal input at the quoted standby rating, being usually 110% of the continuous rating.	In total 37 generators will be present at the site. Each generator will have a net rated thermal input of 6.1 MW_{th} (based on the manufacturers thermal efficiency value of 45.6%.). Therefore, the aggregated net rated thermal input capacity of the installation is 226.9 MW_{th}.	The thermal input to the Installation exceeds 50 MW_{th} and therefore requires an environmental permit as per Schedule 1, Part 2, Chapter 1, Section 1.1 Part A(1) of the EP Regulations
If precise MWth figures are unavailable and spec sheets or faceplates are unclear, the calculation for MWth derived from MVA output is based on: power factor 0.8 and an assumed poor conversion efficiency of 0.35 for MWth to MWelec.	Although not stated on the specification sheet for the generators the efficiency of the generators has been estimated to be 45.6% on the basis of the information available in the technical specification. The specification sheet states that the electrical output of the generator units is 2.8 MWe, with typical heat losses of 3.33 MWth. Based on these values the MW_{th} rating of each generator has been calculated to be 6.13 MW_{th}.	Each of the generators has a net rated thermal input of 6.1 MW_{th} based on the provided methodology.
The sum of generator plant capacities is based only on MWthermal inputs of all plant regardless of the standby configuration. MWelec output constraints such as realistic customer load or other practical output limiting factors do not constitute a limit to the MWth input as defined in the EA's guide RGN02.	The MW_{th} capacities of the generators at the site have been calculated only on MW_{th} inputs without any constraints/limiting factors applied.	Limiting factors have not been applied to the MW_{th} capacities of the generators.
Proximity of data centres with a company campus, adjacent, neighbouring or close-by buildings in urban locations (e.g., within a common trading estate but only separated by a road width or notional distance) may constitute a single site for determining the boundary of	The Installation comprises the combustion plant for both LHR11 and LHR12 which are located within the same boundary (LHR 1 Datacentre), and the gantries which will house the generators are being considered as a single site.	The proposed Installation is a separate site to other sites operated by VDC in the vicinity and does not meet the requirements set out in RGN02 requiring the sites to be considered as a single site.

Requirement	Installation Arrangements	Conclusion
the installation as 'same site – same operator' as per RGN02		
Permits will include a maximum 500 hour 'emergency/standby operational limit' for any or all the plant producing on-site power under the limits of the combustion activity; and thereby emission limit values ELVs to air (and thus engine emissions monitoring) are not required within the permit.	The operation of the generators at the Installation is predicted to be below the 500-hour threshold for emergency /standby operation. It is noted that emission limit values are not applicable to the site under this operational scenario.	The site meets the emergency / standby operational limit and therefore no emission limit values are applicable.
Emergency hours' operation includes those unplanned hours required to come off-grid to make emergency repair of electrical infrastructure associated but occurring only within the data centre itself.	The site has a N+1 level of resilience built into the supply from the national grid, therefore the requirement to operate the generators under an emergency scenario is unlikely. However, should this be required performance will be monitored in accordance with the monitoring requirements set out in Section 6 of this report.	The use of generators to make emergency repairs of electrical infrastructure is unlikely given the inbuilt N+1 resilience of the national grid supply.
Each individual generator with its own discharge stack, can be maintained, tested and used in a planned way for up to 500 hours per calendar year each without ELVs (and hence no monitoring) under IED/MCPD. Though clearly the EA expects planned testing and generator operations to be organised to minimise occasions and durations (subject to client requirements). Ideally a target should seek to keep individual generator testing to below 50 hours/annum each as required for MCPD specified generator exclusion.	As set out in Section 1.2.4 of this report the testing regime for all generators will equate to 888 hours of operation. This equates to 24 hours per generator, which is well below the 50-hour target.	The testing regime proposed is below the individual generator testing target set out by the Environment Agency within the Data Centre FAQ Headline Approach Guidance of 50 hours/annum per generator.
The whole or part site can only operate as emergency plant up to 500 hours as an absolute limit for grid backup issues; but that individual plant (at any load) with its own stack (or a stack with multiple plant) with justification can be operated for up to 500 hours (ideally <50) each as part of its non-	The planned operational scenarios for the site will be 24 hours per generator per year. Whilst the emergency operation of the plant cannot be foreseen based on the security of the supply to the site and the stability of the national grid exceeding the 500-hour	The proposed Installation will operate for less than 500 hours per generator for maintenance, and it is anticipated that the emergency operation of the generators will be below 500 hours based on the reliability of the National Grid.

Requirement	Installation Arrangements	Conclusion
emergency role under maintenance and testing.	emergency operations limit is highly unlikely.	
For the purposes of determining operating hours, data centre diesel generators are regarded as having a minimal start-up or shut-down times. Operational hours start on the first fuel ignition.	The power supply into the Installation is constantly monitored, should the power supply be interrupted the sites UPS will ensure continuity of supply and the generators will start automatically taking over from the UPS typically within a 15 second timeframe. The run time on each generator is logged from the first ignition.	The generators at the site have minimal start-up and shut-down times. Operational hours for all generators are metered.
Data Centre permits (unless they apply and justify it in a permit application) will expressly have a limit on the activity to exclude voluntary 'elective power operation' such as demand side response (i.e. on-site use) or grid operating reserve (STOR) (i.e. off-site export of electricity) and Frequency Control by Demand Management (FCDM) for grid support. This is primarily to differentiate data centres from 'diesel arrays or MCPD specified generators' that voluntarily operate within the balancing market, and importantly a clear way to demonstrate minimisation of emissions to air as 'Emergency plant'.	The generators will only be used to meet site demand in the event of an interruption in electricity supply to the site. The generators will not be used for voluntary elective power, such as demand side response (i.e. on-site use), grid short term operating reserve (STOR) (i.e. off-site export of electricity) and frequency control by demand management (FCDM).	The generators at the Installation will not be used for voluntary elective power operation.
The default engine specification as a minimum for new plant to minimise the impacts of emissions to air (NOx) is 2g TA-Luft (or equivalent standard). A detailed cost benefit analysis (CBA) is otherwise needed justifying worse emission such as 4g TA-Luft plant or for example a justification under FCDM.	The engines procured for the site meet the 2g TA-Luft/EPA Tier II standard at 75% load; however, there is the potential for the generators to operate above this load requirement. SCR has been included within the design as a precautionary measure to maintain emissions at the 2g TA-Luft standard.	The generators procured for the site meet the 2g-TA Luft standard at 75% load; the inclusion of SCR provides an additional layer of protection in achieving emission requirements for emergency generator operation. Additionally, the air quality assessment has concluded that the proposed engines will not have a significant impact on NO_2 concentrations at the nearest residential receptor.
CBA for improved exhaust emissions, dispersion and mitigations from the plant is expected for the	The local air quality modelling completed for the site demonstrates that the proposed generators would not	Emissions from the site are not considered to have a significant impact on short term local air quality at residential and

Requirement	Installation Arrangements	Conclusion
maintenance/testing and the emergency standby roles. We would be looking for improvements particularly if Local Air Quality (LAQ) modelling (under H1) indicates anything other than an insignificant contribution to short term local air quality for the 'planned' maintenance emissions of the plant.	have a significant impact on annual mean NO_2 concentrations at the closest residential receptors. Based upon the proposed testing regime, there would be a <1% probability of exceeding the 1-hour mean objective at the nearest commercial or residential receptors to the site. Emergency operation of the generators could occur for up to 60 hours per year before there is a 1% chance of exceeding the 1-hour mean objective at the nearest commercial receptors to the site.	ecological receptors, based on the planned maintenance related emissions from the Installation.
Retrofit abatement techniques for existing installations for engine emissions such as selective non-catalytic or catalytic reduction (SNCR or SCR) would not normally be expected for standby plant to mitigate the emissions for standby/emergency operation. BAT might include improved flue gas dispersion (e.g., stack modifications, increased height) or improved low NOx engine management controls or possibly fuel choice.	N/A	N/A
Operations and management procedures should reflect the outcomes of the air quality modelling by minimising the duration of testing, phasing engines into subgroups, avoiding whole site tests and planning off-grid maintenance days and most importantly times/days to avoid adding to "at risk" high ambient pollutant background levels.	The testing regime for the Installation has been designed to meet the manufacturers recommendation and ensure that the generator provision is operational. This testing regime was considered in the air quality modelling, which determined that there is no negative impact to local air quality.	The testing regime for the Installation will not negatively impact local air quality.
When AQ modelling the emissions from the engines, the certified technical standard provided by the manufacturer should be used (i.e., likely worst-case emissions). However, any 'fit for purpose'	The data from the certified technical standard provided by the manufacturer of the generators has been used in the air quality modelling to provide a conservative assessment of impact.	The data from the certified technical standard provided by the manufacturer of the generators has been used in the air quality modelling.

Requirement	Installation Arrangements	Conclusion
monitoring of the actual emissions from installed plant will be considered as evidence of the likely real impacts as part of the permitting decision process.		
The groundwater monitoring of fuel storage tanks and distribution pipework using GW boreholes is risk based for the site condition report (SCR) and IED 5-yearly monitoring. Should GW monitoring be required for underground tanks and/or the SCR, the boreholes should be positioned for whole site surveillance (for the SCR) rather than as a very local control immediately around the buried fuel oil tanks (i.e., not be just an addition to double skinned tanks already protected by leak detection and hence ignoring distribution pipework etc).	Since the site is a new site with all tanks and other infrastructure being installed in line with current standards and guidelines, it is considered that the risk from the fuel storage tanks and associated pipework is very low. It is therefore not proposed to carry out regular groundwater monitoring. VDC, however, intends to adopt a risk-based approach to 5-yearly monitoring.	The condition of the site is based on available information and no further investigations are proposed. The Operator will adapt a risk-based approach to any future monitoring of soil and groundwater conditions.
10-yearly soil sampling under IED is normally not needed but still needs some justification.	The Operator does not intend to undertake 10-yearly soil sampling; however, a risk-based approach will be applied at that time taking into consideration the operations undertaken at the site, the management techniques implemented, records of accidents and incidents relating to losses of containment of relevant hazardous substances and associated corrective action reports. Given current controls proposed (e.g., primary, secondary and tertiary containment, impermeable hardstanding across operational areas of the site, management controls for handling hazardous substances) there is a reduced risk of the soil at the site being impacted.	Current control measures are suitable to prevent impacts to soil at the Installation. However, a risk-based approach will be taken in year ten of operations, considering the performance of the site over the preceding ten years to determine if an intrusive soil investigation is necessary.
The permit application must assess and provide evidence of actual reliability data for the	The power supply to the site is protected by an uninterruptable power supply (UPS), consisting	The likelihood of the Installation needing to operate for prolonged periods in an

Requirement	Installation Arrangements	Conclusion
local electricity grid distribution (including data centre internal electrical design) for the EA to judge the realistic likelihood of the plant needing to operate for prolonged periods in an emergency mode (especially if emissions model so as to exceed short term air quality standards).	of banks of batteries capable of meeting the full load capacity of the site for approximately 10 minutes. The generators are automatically triggered to start once the power supply has been interrupted, providing power within 20 seconds of the failure of the National Grid supply, at which point the UPS would revert to standby. The use of the generators to provide electrical power to the site is considered to be unlikely, on the basis that the site is supplied with electricity via two diverse routes and associated infrastructure (e.g., transformers) providing a 2N level of resilience, where N is the power demand of the installation. The likelihood of long periods of reliance on the generators to provide power to the site is considered to be highly unlikely given that the National Grid Electricity Transmission System, which serves the site, achieved an overall reliability of supply of 99.999612% over the period 2021 - 22[16].	emergency mode is considered highly unlikely.
Optimising grid reliability within the site as part of general BAT to minimise emergency operating hours is required – evaluation is needed within the permit application on the Tier reliability standard under ISO27001 and Uptime.	The power supply to the site is protected by an uninterruptable power supply (UPS), consisting of banks of batteries capable of meeting the full load capacity of the site for approximately 10 minutes. This allows for any fluctuations to be managed using battery backup, with the generators only being initiated after 20 seconds of failure.	Use of battery storage as back-up minimises the emergency operation of the generators.
Reporting of standby engine operational run hours and discussion of any electrical outages (planned or grid failures regardless of duration) required annually.	The Operator propose to record and report on operational run hours of all generators and electrical outages on an annual basis.	The Operator will monitor and report operational run hours in accordance with the Environment Agency's Requirements.

[16] National Electricity Transmission System Performance Report 2021-22, NationalGridESO, published 23rd September 2022, available at https://www.nationalgrideso.com/industry-information/industry-data-and-reports/system-performance-reports accessed on 13th March 2023

Requirement	Installation Arrangements	Conclusion
Assuming AQ modelling, based on operating scenarios, indicates a local air quality risk then notification to the EA of unplanned (and pre-notification of planned) continuous grid outage exceeding 18 hours LAQM (or other assessed short-term interval from modelling) is likely required under a permit schedule 5 notification.	The air quality model does not indicate that the operation of the installation will have a significant impact on local air quality therefore the notification to the EA of unplanned and pre-notification of planned continuous grid outages is not considered to be necessary.	The notification to the EA of unplanned and pre-notification of planned continuous grid outages is not considered to be necessary.
The notification requirement stated in the permit should also indicate the actual number of generators that need to be operating above which the local air quality is at risk e.g., 'notification of continuous emergency operation exceeding 18 hours with 5 or more engines operating together is required' (i.e., model shows 4 or less engines unlikely to breach LAQ).	The notification to the EA of unplanned and pre-notification of planned continuous grid outages is not considered to be necessary, on the basis that the local air quality model indicates that the operation of the installation will have no significant impact on local air quality.	The notification to the EA of unplanned and pre-notification of planned continuous grid outages is not considered to be necessary.
Assuming AQ modelling, based on emergency outage operating scenarios, indicates a very significant risk to local air quality and identified receptors, the EA will ask the operator to have a written AQ outage action plan to manage the issue for prolonged emergency running of the plant (including sensitive receptors list and mitigations, assessments and impacts evaluation against modelled risk conditions i.e. occurrence at periods of most concern in the year, possibly ambient air monitoring surveillance at very sensitive receptors). An AQ outage action plan is also likely required for sites which might operate in conjunction with other neighbouring large sites during an outage i.e., data centre hubs.	The air quality modelling, which takes into consideration emergency outage operating scenarios indicates that there is an insignificant risk to local air quality and identified receptors from the operation of the combustion plant. As such an air quality outage action plan is not considered necessary.	Based on the results of the air quality modelling an air quality outage action plan is not required.
Due to the emphasis of the permit on electrical (and cooling) systems it is noted	There are no uses of F-gases at the Installation, which are directly associated with the	This element of BAT is not applicable to the proposed Installation.

Requirement	Installation Arrangements	Conclusion
that the EA considers the F-Gas regulations as falling under the remit of the EPR permit (for notifications and management) where F-gases (or potentially any polluting potential substance) are used directly under the combustion aspects of the permitted activity (e.g., switchgear). It is important to notify the EA of any significant releases. Other uses of F-gases e.g., for server room cooling are not strictly under the EA permit but are regulated by the EA generally so it may still be prudent to make the EA aware of your F-gas releases.	combustion activities and therefore F-Gas notification requirements under the permit are not considered to be necessary.	
The permit application should detail the likely quantities of waste engine oil generated annually - EWC 13 02 waste oils following servicing for example. Although unlikely to be huge, the Pollution inventory has a reporting threshold of 1 tonne for non-hazardous waste but technically no lower thresholds for hazardous waste oil.	As discussed in section 2.3 of this report it is anticipated that approximately 23,900 litres of waste lubricating oil will be generated at the Installation each year.	The Operator will report on all relevant substances and wastes emitted from the Installation in accordance with the pollution inventory reporting requirements.
The permit application is for the combustion plant and associated environmental concerns and not for the Data Centre itself. The applicant should be aware that the permitting process and application is accessible to the public so should have regard to 'Commercial in Confidence' and Critical National Infrastructure. In the first instance discuss particular concerns directly with the EA and/or exclude such priority information from the application but indicate that such is 'available on request'.	VDC has not applied for the EA to consider aspects of the application as commercially confidential. Additionally, the proposed Installation is not regarded as critical national infrastructure.	A claim for commercial confidentially has not been made.

Requirement	Installation Arrangements	Conclusion
Regulatory requirements	The emergency generators being installed are classified as specified generators under	The installation will be compliant with the regulatory

Requirement	Installation Arrangements	Conclusion
Where appropriate, as a minimum you must meet the requirements of: • Schedule 25A of the medium combustion plant directive • Schedule 25B of the specified generators regulation	Schedule 25B of the EP Regulations and are compliant with the requirements for Tranche B specified generators.	requirements of specified generators.
Build standards Engines must be optimised to reduce emissions ('emissions optimised'). Engines that are optimised to reduce fuel ('fuel optimised') have greater emissions and will not meet BAT unless they have secondary abatement. Combustion plant specification sheets that keep to one or more of the former 2g TA Luft and United States Environment Protection Agency (EPA) Tier 2 (or equivalent) standards are acceptable proof of BAT plant. These do not need on-site exhaust emission monitoring. If you can show your engine achieves the following guidance level (which is not an ELV compliance requirement), it can be considered emissions optimised. Approximately 750mg per m^3 NO_x (as NO_2) at 15% O_2 standard temperature and pressure, dry, 273K and 101.3kPa (equivalent to 2,000mg per m^3 at 5% O_2 – commonly termed '2g') at a typical emergency load (usually greater than 67% of standby power rating). You should send copies of your engine specification sheets when you apply for your permit, as these will provide evidence of these requirements and proof of BAT. The Environment Agency may consider greater than 2g diesel engines for	The default engine specification for new plant to minimise the impacts of emissions to air from oxides of nitrogen (NO_x) is the 2g TA-Luft standard (or equivalent), which consists of NOx emissions of 2,000 mg/Nm^3 at oxygen concentration of 5%. According to the specification information provided by the manufacturer the engines meet this standard at operational loads of 75%. As the emergency generators are expected to run at 80%+ loading in the event of a grid failure, SCR has been installed as a precautionary measure to ensure the units achieve the 2g TA-Luft standard. The generator specification is shown in Appendix 2 of this document. An assessment of the emissions to air from the generators has been undertaken using dispersion modelling of the expected emissions. The assessment (see Appendix 3 of this document) demonstrates that the proposed stack design and height will be sufficient to ensure appropriate dispersion of the emissions, and the impact of the emissions from the installation will not be significant.	The installation will be emissions optimised and the facility design, in particular the stack design, will ensure adequate dispersion of emissions.

Requirement	Installation Arrangements	Conclusion
technical reasons. For example, standby diesels on nuclear installations that are critical for safety. But they should be the best available. Your stack design should ensure good flue gas dispersion. Stacks should be vertical and emissions should not be obstructed by caps or cowls.		
Operational controls Minimise how much you test diesel engines. You must test for less than 50 hours a year. Avoid testing engines when the air quality is poor. Do not test more than one engine at a time. When using backup diesel generators, you must manage the impacts on air quality to minimise harm to human health and the environment.	The generators will typically be limited to 50 hours operation per year, comprising testing and maintenance. The operator shall schedule the testing of the generators to avoid periods of poor air quality, and limit testing of one generator at a time. The air quality assessment undertaken for the installation demonstrates that the impact of the generators will not be significant. The generator operations and management will be controlled via appropriate site procedures.	The generatrs will have appropriate and adequate controls in place to minimise the environmental impact of the installation.

Appendix 1
Figures

Appendix 2
Generator Specification

Appendix 3
Air Quality Assessment

Appendix 4
Noise Assessment

Appendix 5
Planning Permission and Officers' Report

Appendix 6
List of Company Directors

Company name: VDC LHR11 Limited

Company number: OE003126

Registered office address: 44 Esplanade, St Helier, Jersey, JE4 9WG

List of Directors

Name	Role
Nicholas John Haslehurst	Director
Justin Marcus Jenkins	Director
Darren Stewart Culbard	Director

Appendix 7

Form Part B3 Appendix 1 Q13

Information to be provided by the operator to the competent authority for each Medium Combustion Plant as identified in Annex I of Medium Combustion Plant Directive (EU/2015/2193)

Generator reference	MCP specific identifier	Location reference[1]		Rated thermal input (MW_{th})	Type of MCP	Type of fuels used	Date when the new MCP was first put into operation	NACE[2] code	Annual operating hours[3]	Average load in use
		Latitude (X)	Longitude (Y)							
LHR-11_1	Kohler KD3500E	521090	182398	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_2	Kohler KD3500E	521091	182398	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_3	Kohler KD3500E	521091 .23	182398	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_4	Kohler KD3500E	521090	182399	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_5	Kohler KD3500E	521091	182399	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_6	Kohler KD3500E	521097	182404	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_7	Kohler KD3500E	521097	182405	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_8	Kohler KD3500E	521096	182405	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_9	Kohler KD3500E	521097	182405	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_10	Kohler KD3500E	521105	182413	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_11	Kohler KD3500E	521105	182414	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_12	Kohler KD3500E	521105	182413	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100

Generator reference	MCP specific identifier	Location reference[1]		Rated thermal input (MW_{th})	Type of MCP	Type of fuels used	Date when the new MCP was first put into operation	NACE[2] code	Annual operating hours[3]	Average load in use
		Latitude (X)	Longitude (Y)							
LHR-11_13	Kohler KD3500E	521106	182413	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_14	Kohler KD3500E	521108	182416	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_15	Kohler KD3500E	521109	182416	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_16	Kohler KD3500E	521109	182417	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-11_17	Kohler KD3500E	521109	182416	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-12_1	Kohler KD3500E	521159	182373	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_2	Kohler KD3500E	521160	182374	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_3	Kohler KD3500E	521161	182375	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_4	Kohler KD3500E	521161 .27	182375	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_5	Kohler KD3500E	521161 .93	182376	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_6	Kohler KD3500E	521163	182377	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_7	Kohler KD3500E	521163	182377	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100

Generator reference	MCP specific identifier	Location reference[1]		Rated thermal input (MW_{th})	Type of MCP	Type of fuels used	Date when the new MCP was first put into operation	NACE[2] code	Annual operating hours[3]	Average load in use
		Latitude (X)	Longitude (Y)							
LHR-12_8	Kohler KD3500E	521164	182378	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_9	Kohler KD3500E	521165	182379	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_10	Kohler KD3500E	521165	182379	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_11	Kohler KD3500E	521160	182372	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_12	Kohler KD3500E	521161 .09	182373	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_13	Kohler KD3500E	521161 .71	182374	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_14	Kohler KD3500E	521162	182374	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_15	Kohler KD3500E	521163	182375	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_16	Kohler KD3500E	521164	182376	6.1	Diesel engine	Diesel/ HVO	01/01/2025	D35.1	50	100
LHR-12_17	Kohler KD3500E	521164	182376	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-12_18	Kohler KD3500E	521165	182377	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100
LHR-12_19	Kohler KD3500E	521166	182377	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100

Generator reference	MCP specific identifier	Location reference[1]		Rated thermal input (MW_{th})	Type of MCP	Type of fuels used	Date when the new MCP was first put into operation	NACE[2] code	Annual operating hours[3]	Average load in use
		Latitude (X)	Longitude (Y)							
LHR-12_20	Kohler KD3500E	521167	182378	6.1	Diesel engine	Diesel/ HVO	01/07/2024	D35.1	50	100

Notes:

(1) The location of the engines/ MCPs provided is that of the flue stack.

(2) NACE code means Nomenclature of Economic Activities and is the European statistical classification of economic activities (http://www.export.gov.il/files/EEN/ListNACEcodes.pdf). The NACE code for the engines is associated with the production of electricity.

(3) The expected number of hours of operation for the engines provided here comprises the typical hours required for regular testing of the engines over the year. The engines are emergency generators and are not likely to operate frequently or for extended periods of time. As such, the engines are not going to be operated for more than 500 hours per year.

Appendix 8
Noise Management Plan