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Iron Mountain DC Ltd

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Environmental Permit Application: Operational Report

LON3 Data Centre, 111 Buckingham Avenue, Slough, Berkshire, SL1 4PF.

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Prepared by	**Lydia Hall / Aakanksha Sinha**
Checked by	**Marcus Reynolds**
Approved by	**Marcus Reynolds**

Ramboll
1 Broad Gate
The Headrow
Leeds
LS1 8EQ
United Kingdom

T +44 113 245 7552
https://uk.ramboll.com

Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered office:
240 Blackfriars Road
London
SE1 8NW

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Non-Technical Summary

This Part A(1) Environmental Permit application (application reference EPR/YP3722SR/P001) is submitted by Iron Mountain Data Centres Limited (referred to hereinafter as "IMDC" or "the Client") for the operation of a combustion plant comprising electricity generators present at the LON3 Datacentre to be located at 111 Buckingham Avenue, Slough, Berkshire, SL1 4PF ("the Installation").

The LON3 data centre campus is a 1.008-hectare site, with a datacentre building spanning four floors planned for the site. The campus will contain 17 diesel/HVO-fired generators to produce electricity. These are to be located on a 3-storey gantry structure adjacent to the datacentre building, with 16 of the generators planned for Level 2 and one for Level 0. The generators are intended as emergency generation provision to the datacentre 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 22-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 less than 50 hours per year for testing and maintenance.

In total 17 generators will be present at the site, with an aggregated net rated thermal input capacity of approximately 113.4 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 diesel or HVO fuel, which is used to power the generators, lubricants, and coolants. All materials are provided with suitable containment measures.

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/HVO is used as the predominant primary energy source for the facility; however, a limited amount of electricity would also used by the generator plant control equipment. All plant being installed is new and highly efficient.

Emissions to air

The flue stacks for the sixteen generators on Level 2 of the gantry will be located at the roof level; each with its own emission point, which has the potential to generate emissions of oxides of nitrogen (NOx). The flue stack of the office generator will be located above the generator container. 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 are planned to operate

for less than 500 hours per year the emission limit values applicable under this Schedule are not applicable to the site.

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 insignificant.

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

Emissions to Water and Sewer

There are no process emissions to surface water planned for the site. The proposed surface water drainage network will tie into a new below ground drainage system which will collect water from the drainage stack and ground floor gully situated above ground. This underground drainage system is planned to link to the proposed containment systems and will discharge into the municipal main sewer located north of the site.

Several features associated with the drainage are planned for the site. These include separate process water drainage connection tying into the foul drainage for the discharge of condensate, sprinkler test water and water from the plant room gullies. The manholes are to be equipped with anti-surge valves in order to deter back flows and odour. Any potential fire water will also be routed to the drainage system via gullies and drains and rainwater will be collected in attenuation tanks before controlled release to surface water sewer.

A containment system will be in place as part of the drainage to prevent fuel release off-site. This will comprise a gully at the gantry perimeter, a full retention interceptor which will process water from the service yard and a high-level overspill which will see water from the service yard be collected in the fire water tanks in the event that the fuel interceptor reaches capacity.

The sites surface water is planned to be discharged via the local surface water sewer system operated by Thames Water.

Emissions to Land

The Installation will comprise a concrete base with impermeable surfacing in the yard area of the site, 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 and found that during normal operation, noise levels from the facility under all scenarios would result in a low impact. Expected operational noise levels do not exceed the typical noise control requirements of SBC under each scenario. The proposed development therefore is in line with national and local planning policy objectives relating to noise.

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 in place prior to commencement of operations, to manage the environmental aspects of the operation of the Installation.

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/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 appropriately sized containers.

1. Introduction

This document supports the application submitted by Iron Mountain Data Centres Limited (referred to hereinafter as "IMDC" 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/YP3722SR/P001) for the operation of a combustion plant at the LON3 Datacentre located at 111 Buckingham Avenue, Slough, Berkshire, SL1 4PF (the "site" or the "Installation"). An overview of the location of the site is provided in Figure 1 in Appendix 1.

The development comprises one main building, which is proposed to be used as a datacentre (LON3). The datacentre will be powered using electricity from the national grid under normal operational conditions. The datacentre will have provision for emergency backup electricity generators to provide electricity in the event of an interruption to the national grid supply. The generators will be fuelled using diesel or Hydrogenated Vegetable Oil (HVO).

Seventeen generators will be installed, sixteen of which (critical and house generators) with an electrical output of 3.2 MW_e each and a net rated thermal input of 7 MW_{th}. The office generator will have an electrical output of 0.5 MW_e and a net rated thermal input of 1.15 MW_{th}. When aggregated, the net thermal input capacity of all seventeen generators at the Installation will be approximately 113.4 $MW_{th,}$ and the thermal input is therefore higher than 50 MW_{th}. The LON3 generator plant 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.

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

2. Process Description

2.1 Proposed Activity

The proposed Installation will comprise seventeen diesel/HVO fired generators to provide emergency power to the datacentre. The total thermal input to the generators is approximately 113.4 MW_{th}, whilst the electric output will be 51.7 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 for regular testing and maintenance purposes will not exceed 50 hours.

The generators will be located on a three-storey gantry adjacent to the main data centre building comprising four floors. Sixteen of the generators (fourteen of which are critical generators and two of which are house generators) will occupy Level 2 of the gantry whilst one generator (the office generator) will be located on Level 0. Each generator is provided with a diesel/HVO fuel storage tank (belly tank) situated at the base of each generator.

The generators will be located within individual acoustic enclosures, which will also house all associated ancillary systems such as bulk fuel storage, fuel polishing and transfer systems,

exhaust flues, remote cooling radiators and fans, lighting, small power, heating, fire detection and fire suppression systems for the generator unit.

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 17 emergency standby generators with a total thermal input of approximately 113 MW_{th}. The generators will burn diesel or HVO 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. 17 x 3.31 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 W1) and foul sewer (emission point S1).

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 one datacentre which is planned for construction. Seventeen electricity generators will be installed and commissioned in line with the construction schedule for LON3.

The datacentre will comprise one main building. The seventeen electrical power diesel/HVO generators will be located on a gantry adjacent to the data centre building and will each have a belly tank with integrated spill containment features for fuel storage. There will be no fuel storage at the installation other than that in the belly tanks and the fuel transfer system tanks. Selective Catalytic Reduction (SCRs) systems will be installed on an individual generator basis, with urea tanks installed within respective generator enclosures.

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.

Each generator will be provided with a belly tank, with each tank having a capacity of 42m^3, providing the generators with a minimum of 48-hour fuel storage capacity. The belly tanks will be filled directly via road tankers from a dedicated fill point. Fuel will be delivered by tanker and off-loaded via a fuel transfer station with infill points situated adjacent to the entrance of the loading bay. Two fuel transfer tanks of 1.8m^3 capacity will be in place to store delivered fuel pending transfer to the individual belly tanks; these tanks will not provide additional fuel storage capacity to that provided by the belly tanks. The belly tanks of the sixteen generators located on Level 2 of the gantry will be connected to a central fuel transfer system, equipped with spill containment features. The office generator however will receive fuel directly via a fill point and therefore be independent of the transfer system.

The total fuel stored at the installation will therefore be limited to that in the belly tanks. The installation will not comprise any additional bulk storage tank(s). Therefore, activities directly associated with the regulated activity at the site are limited to the storage, handling (e.g., receipt, distribution 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].

[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

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].

2.3 Process Description

2.3.1 General Overview

IMDC intends to operate seventeen diesel/HVO-powered generators located on a gantry adjacent to the main datacentre building as an emergency power supply for the LON3 datacentre.

The sixteen generators located on gantry level 2 will be identical, whilst the office generator situated on level 0 of the gantry will be of a different model. The following specifications for each generator type has been summarised in Table 2.1 below (the manufacturers specification sheets have also been provided as Appendix 2):

Table 2.2: Generator Specification

Generator Ref	Manufacturer	Model	Net Rated Thermal Input (MWth)	Fuel
1 – 16/ Main Generators(1)	Rolls Royce	20V4000G94LF	7.01	Diesel/HVO
17/ Office Generator(2)	Rolls Royce	12V1600G10F	1.15	Diesel/HVO

Notes:

(1) The sixteen generators will be located on gantry level 2.

(2) The office generator will be located on ground level (gantry level 0).

(3) The electrical efficiency of the units is not defined in the specifications and has been assumed to be 45.6% based on similar units.

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.

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 after the National Grid power supply has been interrupted. Once started the generators will remain operational until the mains restoration detection equipment

[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

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 back-up generators will be situated on an adjacent gantry comprising 3 levels (including level 0). Each generator will be situated in enclosures designed with noise attenuation and weatherproofing measures. The generator enclosures will each maintain an attenuated air intake and discharge ventilation with ventilation fans.

Each generator unit will consist of its own flue stack. Flue stacks for the sixteen main generators will be located above the roof level of the gantry structure adjacent to each other. The flue heights are 1.88m above the maximum building height of 20.81m meaning the effective stack height is 3.11m. The office generator will also have its own flue stack which will discharge above the level of the generator enclosure; the effective stack height for the admin generator is assumed to be 0m.

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 tank) containing sufficient fuel for the units to operate for a minimum of 48 hours, with each tank operating independently. Each belly tank will be a sub-base UL 142 certified tank, with fuel being transferred from the tanks to the generating sets using pumps located within tank. The belly tanks will be equipped with leak detection and integral bunding having a capacity of 110% of the tank volume.

2.3.3 Stability of Electricity Supply

The power supply to the site is protected by an uninterruptable power supply (UPS). The generators are automatically triggered to start once the power supply has been interrupted, providing power quickly following 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 a 2N level of resilience for electrical supply from the mains, where N is the power demand of the Installation.

As such, 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].

[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 12th March 2024

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.

The generators will be commissioned in two phases, 10 of the main generators and the office generator in Phase 1 and the remaining 6 main generators in Phase 2. The commissioning hours and annual testing hours are assumed to be additional and occur in a single year. This is a worst-case assumption as it would not be possible to commission all of the generators and undertake the full routine testing scenario in a single year.

During Phase 1 commissioning the 'main' generators are anticipated to be tested for a total of 416 hours and the office generator 36 hours. During Phase 2 commissioning, the main generators are expected to be tested for a total of 276 hours. The overall commissioning hours for the generators are therefore 728 hours.

Based on the commissioning and testing scenarios, and assuming that Phase 1 commissioning and testing occurs in one year and Phase 2 commissioning and all generators tested in a second year, the maximum annual operating hours for a single generator are 636 hours for the main generator and 57 hours for the admin generator. These are worst-case values; once commissioned the total testing hours for the generators will reduce to 352 and 21 hours per year respectively. The testing will not all be undertaken at full load. Based on the testing schedule the average loading of the main generators will be approximately 60%, and the admin generator approximately 61%.

Table 2.3: Testing schedule

Generator	Frequency	Number	Load	Annual hours	Total
Main Power Stream (4000kVA)	0.5 hours every 2 weeks	16	45%	13	208
Admin (500kVA)		1	45%	13	13
Main Power Stream (4000kVA)	1 hour every 3 months	16	45%	2	32
Admin (500kVA)		1	45%	2	2
Main Power Stream (4000kVA)	1.5 hours every 6 months	16	100%	3	48
Admin (500kVA)		1	100%	3	3
Main Power Stream (4000kVA)	4 hours per year simultaneously	12	99%	4	48
Main Power Stream (4000kVA)		2	51%	4	8
Main Power Stream (4000kVA)		2	25%	4	8
Admin (500kVA)	1.5 hours every 6 months	1	100%	3	3

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 (see Appendix 3).

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 diesel/HVO to the site.

Due to the height of the generators and the associated belly tanks, it is proposed to provide resiliency for the fuel delivery process and not rely on the capability of fuel delivery vehicle(s). The general process of delivery of diesel/HVO will be by road tanker and will comprise attaching a flexible hose to the fuel transfer station fill point to supply two tanks of 1.8m^3 capacity using a pump mounted on the delivery vehicle. Fuel will then pumped into the belly tanks of the sixteen generators on gantry level 2 from the fuel transfer system. The office generator is independent from this system and fuel is supplied directly to the unit mounted fill point. The lines associated with fuel delivery from the tanks to the generators will have Class I proprietary leak detection systems and have double walls.

The fuel transfer tanks have been sized to accommodate the inflow rate of the fuel delivery supply only, and do not provide a bulk storage system for the installation. The fuel transfer system will comprise a resilient pumping configuration to be able to distribute fuel to each generator.

The controls philosophy for the transfer of fuel from the fuel transfer tanks to the individual belly tanks will include, amongst others, the following measures at the fill point controls panels and user interface:

- Information related to the fill level of each generator belly tank;
- Ability to select which generator belly to undertake fuel transfer to;
- Operate automatic pumping to selected belly tank without automatic stop on full;
- Allow refilling operator to fill the transfer tank with safeguards to prevent overfilling; and
- Select the transfer tank using an automatic switch.

The building control system (BMS) shall monitor the status of the above parameters.

The isolation valve for each generator belly tank will be located within the generator enclosure, therefore covered by the enclosure bunding and sensors for leak detection. The Generator Fuel System will include level alarms for both the fuel transfer system and the belly tanks, which will both be connected to the building management system (BMS), which will continuously monitor the fuel levels in the fuel transfer tanks (whilst fuel delivery and/ or distribution is being undertaken) as well as tank temperature.

The fuel delivery area (or the service yard) will consist of a full retention interceptor. The interceptor will automatically shut down and prevent further inflow of fuel (or water) once the

interceptor is full. The perimeter of the gantry is planned to be bound by a central liner gully and the service yard drains to a full retention interceptor in case of spillages. When the interceptor's oil capacity reaches a maximum, it shuts off causing any further oily water to overspill into the fire water containment vessels. As a final measure, the service yard itself will be designed to be able to retain some level of contaminated water.

2.4.2 Fire Protection System

An addressable and fully automatic fire and smoke alarm system will be provided throughout the Installation. All fire alarm circuits will be electronically supervised. The fire and smoke detection system will alert facility personnel via the Building Management System (BMS), with the main and repeater fire alarm panels and visual and audible annunciators located strategically throughout the facility. The fire and smoke detection system will be integrated with the fire suppression system.

The installation will include fire protection sprinklers and smoke detection systems to provide early warning of any combustion events. The water demand for the fire suppression system will be provided from two water storage tanks and a pump house set to meet the pressure and flow requirements of the sprinkler system.

Sprinkler system water flow, and the status of the common fire alarm will be monitored by the building monitoring system. The fire alarm system will also provide detection and releasing for the pre-action sprinkler systems.

Fire hydrants will be located around the perimeter of the facility. The Installation will be fitted with fire rated panels and steel structures with appropriately designed fire resistance.

2.4.3 Drainage System

The Installation will not have any process emissions to controlled waters due to the nature of operations. The main drainage system at the Installation will comprise of surface water drainage. The storm sewer system for the facility will consist of a combination of roof drainage network, drain inlets, storm drainage network, and underground attenuation.

Stormwater will be collected across the site via number of ways, through a network of drains, gullies and roofline drainage. The proposed surface water drainage network will tie into a new below ground drainage system feeding into rainwater attenuation tanks with a total capacity of 200,000 litres which links with the sewer located north of the site. This sewer then discharges into the local surface water outfall systems from the site.

2.4.4 Process Control System

The generator system shall be equipped with the engine instrumentation and protection functions. A fully supervised Building Management System (BMS) with a central control centre swill provide the site with monitoring capabilities including the monitoring of conditions and alarms associated with the generator and fuel transfer system. The BMS will enable remote monitoring and control of the plant and equipment associate with the installation operation.

The BMS will include engine controls, including but not limited to fuel consumption rate, fuel levels within the belly tanks, leak detection, alarm management, parameter management, and access to long term data recording.

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. 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.

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

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

IMDC 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 Operations and Maintenance 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.

All generator enclosures will be designed to ensure full access can be gained to the engine and associated plant and equipment for safe and effective maintenance in situ.

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 (litres)	Maximum Storage Capacity	Environmental Hazard Statements
Diesel/HVO	Generator Fuel	Liquid	174,250 (1)	588,000 litres	H411 – Toxic to aquatic life
Lubricant Oil (Mineral)	Lubrication on generators	Liquid	6,313 (2)	6,313 litres (3)	Not Classified
Glycol (70/30 solution)	Generator coolant	Liquid	280 (4)	850 litres (5)	No Environmental classifications

Notes:

1) Based on the testing regime shown in Table 2.3 and fuel consumption rate shown in the generator specification (see Appendix 2); 818 litres/hour per generator at 100% load for the main generators and 117 litres/hour per generator at 100% load for the office generators.
2) Based on the lubrication oil being changed on an annual basis.
3) Based on a lubrication oil capacity of 390 litres per generator (main) and a lubrication oil capacity of 72.5 litres for the office generator.
4) Based on coolant capacity of 50 litres being changed every three years.
5) Based on seventeen generators each with a capacity of 50 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 a Operator 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 enclosure. The generator container is designed to provide adequate secondary containment for coolant and lubrication oil held within the generator set.

At the sub-base of each generator is an integrally bunded (110%) belly tank, containing diesel/HVO for the operation of the specific generator. Individual fuel polishing systems will be installed within each generator enclosure.

The belly tanks will be automatically refuelled from the delivery road tankers, providing 48-hours fuel storage capacity and a redundancy of N+1. The total fuel storage capacity of the site is 588,000 litres, on the basis of fuel contained in the belly tanks associated with the seventeen generators. This is considered sufficient capacity to enable the operation of all generators at the site on full load for a maximum period of 48-hours without the need to refuel. The tanks shall have an access hatch to allow for inspection, a tank vent and a fill point connection to allow for the delivery of fuel to each tank from the fuel transfer tanks.

The belly tanks are equipped with overfill and leak protection as well as level detectors.

The tanks will be appropriately designed in accordance with relevant construction standards, including being corrosion protected.

The fuel transfer station will include the fuel infill points and will be located at ground floor of the gantry adjacent to the datacentre building's delivery bay. The fuel transfer station will include dual fuel transfer tanks sufficient in size to accommodate the inflow rate of the fuel delivery supply and a resilient pumping configuration sufficient to distribute the fuel to each main generator. The Office generator will have a direct fuel fill point and shall not depend on the fuel transfer system.

All fuel fill lines will be class I proprietary leak detection system with double walls, and leak detection based on pressurisation levels maintained within the interstitial space between the walls. Pipelines will be continuously of this type throughout the gantry area from the fill/transfer tank location to each generator isolation valve which will be located within the generator enclosure and protected by both bunding and leak detection sensors.

The fuel transfer system will include a gravity drainage system to allow all belly tanks at Gantry level 02 to be drained without the need for pumping. All belly tanks will be connected to a belly tank drainage network, with a connection point adjacent to each belly tank access hatch, and run back to a common outlet mounted above the fill cabinet at ground level. The belly tank drain shall be positioned within the bund area of the tank and connected into the inner tank only. The belly tanks will be provided with a watertight, sealed and bolted hatch within the wall of the outer bund suitable for passing a flexible drain hose through to make connection to the drain down provisions.

The fuel transfer station will be located within the service yard for the installation which will be designed to provide for sufficient collection volume and will drain to a below ground class 1 full retention interceptor. The installation drainage system has been designed such that the fuel spill containment in the full retention interceptor is separate to fire water containment and rainwater containment provision, with the fire water containment tanks providing additional fuel spill containment. The drainage design will ensure that fuel and similar spills will not drain to the rainwater attenuation tanks.

A drainage plan is provided within Appendix 1.

Emergency equipment including emergency spill kits and emergency flood barrier equipment will be available on site. Additional protection from accidental damage to the fuel transfer and storage systems will be via bollards to protect the gantry structure and a crash barrier protection to the fuel transfer station.

3.1.3 Raw Material Efficiency Measures

Raw material use at the installation is limited to the use of diesel/HVO, lubrication oil, glycol-based coolant and urea. 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 will ensure that use of these substances is kept to a minimum.

Diesel/HVO and urea use at the site is primarily associated with the testing and maintenance schedule for the generator sets. This has been developed to allow for the optimal performance of the generator sets. The Operator proposes to maintain records of run-hours for each generator and associated fuel consumption to enable consumption of diesel/HVO 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 wastes associated with the regulated activity are 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	6,313 litres(1)	Hazardous
Glycol (70/30 solution)	Generator coolant	Liquid	280 litres(2)	Hazardous

Notes:

(1) Based on the total estimated lubrication oil use for 17 generators and the lubrication oil being changed on an annual basis.

(2) Coolant is assumed to be 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 and oil on generators	Liquid	Hazardous

Description of Waste	Source	State (Solid/ Liquid / Gas)	Classification
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 limited in volume and will be stored in a suitable sealed container and provided with secondary containment. Wastes arising from maintenance and abnormal conditions shall not 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 174,250 litres or 135,915 tonnes[9]. Based on an annual operation of up to 50 hours on the basis of a conservative approach, it is expected that the Installation will have an energy consumption of just over 2,700 MWh (based on operation of 16x3.31 MW_{th} and 1x1.15MW_{th} generators). 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	2,700	2,700	>99

4.2 Energy Efficiency Measures

4.2.1 Operating & Management Procedures

The generators will be maintained and serviced in accordance with the manufacturer's 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.

[9] Based on the assumption that the fuel will be HVO having a density of 0.78 kg/litre based on Crown HVO Brochure 2023, Crown Oil Fuels and Lubricants, available online at https://cdn.crownoil.co.uk/wp-content/uploads/2023/03/Crown-HVO-Brochure_2023.pdf accessed on 22nd October 2023

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.

When in use in an emergency, all the generators could be operational and therefore the impacts during an emergency are higher than those when individual or groups of generators are being routinely tested. The impacts during an emergency have been assessed as well as the impacts during routine testing.

The generators will be commissioned in two phases, 10 of the main generators and the office generator in Phase 1 and the remaining 6 main generators in Phase 2. The commissioning hours and annual testing hours are assumed to be additional and occur in a single year. This is a worst-case assumption as it would not be possible to commission all of the generators and undertake the full routine testing scenario in a single year.

The proposed engines are sixteen Rolls Royce mtu20V4000DS4000 derated to 3950 kVA – 4000 kVA as main generators and one Rolls Royce 20V4000G94LF as an office generator.

5.1.1 Point Source Emissions to Air

Combustion gases from the operation of each of the generators will be emitted to air via 17 separate flues. Sixteen of the flues will be located above roof height whilst the flue associated with the office generator will be above its container height. Combustion gases would only be released in the event of an interruption to the Installation's electricity supply from the National Grid or running the engines for maintenance and testing.

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 5.1: Schedule of Electricity Generation Plant Emission Points

Combustion Plant (source)	Thermal Input (MW_{th})	Emission Point Reference	Co-ordinates (X,Y)	Stack Position	Stack Height (from ground level)	Parameters
Generator 1	3.31	A1	495872.45, 181073.93	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 2	3.31	A2	495871.39, 181070.35	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 3	3.31	A3	495869.84, 181065.09	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 4	3.31	A4	495868.78, 181061.47	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 5	3.31	A5	495867.23, 181056.2	Vertical	23.36m	NO_x, CO, PM, SO_2

Combustion Plant (source)	Thermal Input (MW_{th})	Emission Point Reference	Co-ordinates (X,Y)	Stack Position	Stack Height (from ground level)	Parameters
Generator 6	3.31	A6	495866.22, 181052.63	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 7	3.31	A7	495864.62, 181047.36	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 8	3.31	A8	495863.61, 181043.79	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 9	3.31	A9	495862.06, 181038.52	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 10	3.31	A10	495860.95, 181034.85	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 11	3.31	A11	495859.4, 181029.58	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 12	3.31	A12	495858.39, 181026.06	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 13	3.31	A13	495856.84, 181020.84	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 14	3.31	A14	495855.73, 181017.22	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 15	3.31	A15	495854.14, 181011.9	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 16	3.31	A16	495853.17, 181008.28	Vertical	23.36m	NO_x, CO, PM, SO_2
Generator 17	3.31	A17	495876.66, 181079.38	Vertical	4.5m	NO_x, CO, PM, SO_2

Annual impacts have been factored by the maximum testing hours of 57 hours per year for the admin generator and 636[10] hours per year for the main generators. As the testing is undertaken separately the impacts are assumed not to be additive from each type of generator. The testing schedule is shown in Table 2.3.

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.

[10] The 636 hours corresponds to commissioning Phase 1 generators and undertaking the full testing schedule of the generators (including 4 hours for the simultaneous test) in a single calendar year. Phase 2 testing and commissioning hours amount to 628 and therefore Phase 1 is worst case.

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 emission 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 considered to represent the most appropriate limits in relation to the proposed generators at the Installation. However, as the generators 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.

5.1.2.2 Site Summary

The whole of the Slough Borough has been declared an Air Quality Management Area (AQMA) for exceedances of the annual mean NO_2.

5.1.2.3 Assessment Summary

The generators will be used to provide back-up power in the event of a loss of power to the data centre, i.e., an emergency scenario. For the purposes of the modelling, it was assumed that all of the generators would operate simultaneously at maximum load in an emergency. The likelihood of this occurring is very low given the grid reliability and redundancy in power supplies to the data centre; in addition, it is not predictable when an emergency scenario would occur.

Regular testing of the generators at the site is also required to ensure that the generators 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. The testing regime is likely to involve periods of operation at different loads on a monthly basis, but as a worst-case basis full load operation can be assumed.

Annual impacts have been factored by the maximum testing hours of 57 hours per year for the admin generator and 636[11] hours per year for the main generators. This testing regime is above the individual generator testing target set out by the EA within the Data Centre FAQ Headline Approach Guidance of 50 hours/annum per generator. As the testing is undertaken separately the impacts are assumed not to be additive from each type of generator.

Air quality impacts were modelled using the Atmospheric Dispersion Modelling System (ADMS 6)[12] 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.

As the generators are only tested for a total of 57 hours per year each, the standard modelling approach of running the generators all year round and using the highest predicted concentrations

[11] The 636 hours corresponds to commissioning Phase 1 generators and undertaking the full testing schedule of the generators (including 4 hours for the simultaneous test) in a single calendar year. Phase 2 testing and commissioning hours amount to 628 and therefore Phase 1 is worst case.
[12] https://www.cerc.co.uk/environmental-software/ADMS-model.html

is very conservative. This is because it is unlikely that the generators will be operating when worst case dispersion conditions occur. Hence, the EA guidance requiring a statistical approach for assessing the likelihood of exceeding the short term NO_2 objective is considered the most appropriate approach to adopt for assessing the environmental risk.

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 generator data sheets (see Appendix 2). Flue heights and diameters were taken from the CAD layout drawings which indicated a flue height of 23.36m (2.55 m above the building) and flue diameter of 0.6m for the 16 main generators, and a flue height of 4.5m and flue diameter of 0.225m for the office generator.

The assessment takes into consideration of the emissions from the standby generators at the Lon2 datacentre located adjacent to the Lon3 datacentre development to account for the proximity of the two developments. Flue heights and diameters for Lon-2 data centre were taken from the 2021 Environmental Permit Application Air Quality Assessment which indicated a flue height of 22.69m and flue diameter of 0.35m for the two house generators, and 0.6m for the remaining 18 generators. In order to undertake the assessment, each generator was allocated its own flue, with a total of 20 generators for Lon-2 and 17 generators for Lon-3.

The Installation design shows each generator having its own flue and the flues are arranged in one row. The details of the point source emissions parameters are shown in Table 5.2. The SO_2 emission rate is based on the fuel flow of the engine assuming a maximum sulphur content in the diesel fuel of 10 ppm (note the data sheet emission rates are based on different sulphur contents in the fuel).

Table 5.2: Emission parameters for the Installation

Parameter	LON03 Main Generators	LON03 Office Generator	LON02 House Generators	LON02 Main Generators
Stack height (m above finished ground level)	23.36	4.5	22.69	22.69
Average efflux velocity (m/s)	39.82	43.5	32.46	37.46
Volumetric flow at stack exit parameters (Am^3/s)	11.26	1.73	3.12	10.59
Average stack exit Temp (°C)	474.5	511	494.3	460
Approx. flue diameter (m)	0.6	0.225	0.35	0.6
Assumed maximum operating hours / year for assessment purposes	636			
Oxides of nitrogen (NOx), mg/Nm^3	2,362	2,006	1,787	2,364
Oxides of nitrogen (NOx) emission rate (g/s)	6.06	0.71	1.31	5.6
Carbon monoxide (CO), mg/Nm^3	115	203	76.2	51.0

Parameter	LON03 Main Generators	LON03 Office Generator	LON02 House Generators	LON02 Main Generators
Carbon monoxide (CO), emission rate (g/s)	0.29	0.07	0.15	0.32
Particulate matter (PM), mg/Nm^3	7.16	15.8	9.41	4.0
Particulate matter (PM), emission rate (g/s)	0.018	0.006	0.02	0.03
Sulphur dioxide (SO_2), mg/Nm^3	1.53	1.44	1.35	1.45
Sulphur dioxide (SO_2), emission rate (g/s)	0.0039	0.0005	0.001	0.0034

Notes:

Emissions have been normalised to 273K, dry gas and 5% oxygen

5.1.3 Fugitive Emissions to Air

Fugitive emissions to air at the Installation are limited to the venting of fuel tanks. It is not anticipated that the fugitive emissions from the tank vents will be significant.

5.1.4 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 B), which is the intended typical operational load. Therefore, a detailed cost benefit analysis (CBA) to justify using these engines is not required.

5.2 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/HVO 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. As a conservative assessment, HVO is considered to have the same emissions profile as diesel, therefore the same carbon dioxide emission factor[13] has been used.

[13] Assess the impact of air emissions on global warming, Environment Agency and Department for Environment, Food & Rural Affairs, Published 1 February 2016, available online at https://www.gov.uk/guidance/assess-the-impact-of-air-emissions-on-global-warming accessed on 22nd October 2023

Table 5.3: Primary Energy Consumption

	Primary Energy Consumption		
Energy Source	**MWh**	**CO_2 emission factor (t/MWh)**	**Annual CO_2 emissions (tonnes)**
Diesel/HVO	2,700	0.26	702
Total	-	-	**702**

5.3 Emissions to Surface Water

5.3.1 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. The surface water drainage system will consist of appropriate oil/water interceptors to ensure only uncontaminated water is discharged to the sewers.

The operation of the Installation will not result in any discharges of wastewater to surface water.

5.3.2 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.

5.4 Emissions to Groundwater

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

5.5 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.

5.6 Emissions to Land

There will be no emissions to land associated with the regulated activity at the Installation.

5.7 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.

5.8 Noise Emissions

5.8.1 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. A summary of the noise assessment is provided below.

The Installation will include several key plant and equipment which could lead to noise emissions from the site without appropriate mitigation. The datacentre will include chiller equipment, generators and ancillary plant such as air handling and extract. The chillers and other ancillary plant would operate continuously during daytime and night-time periods. Generators would only be required to be operational during power failures and briefly for testing and maintenance during the day. Whilst the generators will be situated on a gantry outdoors, in a weatherproof and sound attenuated walk-in enclosure.

The assessment considers the noise sensitive receptors (NSRs) listed in Table 5.4 below.

Table 5.4: Noise sensitive receptors considered in the assessment

Location	Description	Distance from site (m) at closest point
NSR1	79–80 Buckingham Avenue	35
NSR2	5–11 Buckingham Avenue East	350
NSR3	5–38 Montrose Avenue	380
NSR4	Premier Inn Slough West	250

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 (office hours 7am-11pm) and night-time periods(11pm-7am). Operational noise limits for the Installation will be set based on the background noise levels measured during the baseline survey.

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, the following background noise levels have been used to set noise limits for 24 hour operation.

Table 5.5: Background noise levels

Location	Description	Representative day-time background noise level dB LA90	Representative night time background noise level dB LA90
NSR1	79–80 Buckingham Avenue	56	N/A
NSR2	5–11 Buckingham Avenue East	58	50
NSR3	5–38 Montrose Avenue	56	50
NSR4	Premier Inn Slough West	60	47

Of the NSRs identified above, NSR01 has been classified as a medium sensitivity receptor whilst the remaining three receptors are high sensitivity receptors. Section 6 of the Noise Impact Assessment provides detailed assessment of the Rating levels for each of the equipment identified as having significant noise emissions and the anticipated impact on the receptors. No assessment

is presented for night-time on the assumption that as an office building, the NSR01 receptor building would not normally be occupied or noise-sensitive at night.

Noise assessment was undertaken for the north and south of the installation site for completeness. Three operational scenarios were assessed as part of the noise assessment – normal operations without generator testing, normal operation with no generator testing and emergency operations. In the Normal Operation Scenario, operational noise predominantly originates from the chillers located on Level 03. Rooftop condensers provide a secondary contribution, with other plant items resulting in comparatively lower sound levels. In the Emergency Operation Scenario, the emergency generators represent a secondary noise contribution at the nearest residential receptors, with the Level 03 chillers remaining the dominant noise source. The generators are the dominant noise source at the commercial office building to the north of the site (79-80 Buckingham Avenue). The predicted specific sound levels at the NSRs for each operational scenario is shown in Table 11 of the Noise Assessment (see Appendix 4) and has not been repeated here.

Noise levels from the Installation has been calculated using proprietary modelling software (CadnaA), based on manufacturers noise data for each item of plant. Details of the noise sources at the Installation and the data centre building and the assumptions made to undertake the noise assessment are provided in Section 6.2.2. of the Noise Assessment report in Appendix 4.

An assessment in accordance with BS 4142 requires that the level of operational noise at nearest noise-sensitive receptors is quantified in terms of the rating level. The rating level includes a correction to account for acoustic characteristics that could draw more attention to the noise. Accounting for the tonality, impulsivity and intermittency of the noise emissions, the resulting rating levels and the initial assessment of impact are presented below in Table 5.6 for the Normal Operation Scenario, the Normal Operation with Generator Testing Scenarios and Emergency Operation.

Table 5.6: Plant noise rating level limits

Receptor	Scenario and Time	Predicted specific sound level at receptor [dB LAeq,T]	Representative background noise level dB L_{A90}	Plant noise rating level dB L_{Ar} at sensitive receptors
NSR01: 79-80 Bucking-ham Avenue offices	Normal operation (daytime)	61	56	61
	Normal with Generator Testing (daytime only)	61	56	61
	Emergency operation (daytime only)	62	56	62
NSR02: 5 – 11 Buckingham Avenue East dwellings	Normal operation (daytime)	48	58	48
	Normal operation (night-time)	48	50	48
	Normal with Generator Testing (daytime only)	49	58	49
	Emergency operation (daytime)	50	58	50

Receptor	Scenario and Time	Predicted specific sound level at receptor [dB LAeq,T]	Representative background noise level dB L_{A90}	Plant noise rating level dB L_{Ar} at sensitive receptors
	Emergency operation (night-time)	50	50	50
NSR03: 5 – 38 Montrose Avenue dwellings	Normal operation (daytime)	44	56	44
	Normal operation (night-time)	44	50	44
	Normal with Generator Testing (daytime only)	44	56	44
	Emergency operation (daytime)	45	56	45
	Emergency operation (night-time)	45	50	45
NSR04: Premier Inn Slough West	Normal operation (daytime)	47	60	47
	Normal operation (night-time)	47	47	47
	Normal with Generator Testing (daytime only)	47	60	47
	Emergency operation (daytime)	48	60	48
	Emergency operation (night-time)	48	47	48

Table 5.6 shows that the operational noise rating levels during the normal operation scenarios exceeds the background sound level at NSR1 by 5 dB, and during emergency operation (when all generators are active) exceeds the background sound level by 6 dB. Considering the receptor sensitivity, this outcome is an indication that operational noise would have a low impact. This also meets the typical noise control requirements of Slough Borough Council (SBC) (the applicable local authority) (a rating level of no more than 5 dB above the existing background sound level during both normal operational conditions and emergency operations. The receptor building NSR01 is a sealed façade, and it is assumed that the office areas are mechanically ventilated. This building envelope is likely to provide a sound level difference (from outdoors to indoors) of at least 25 dB. Therefore, indoor sound levels due to the proposed development would be no more than 36 dB $L_{Aeq,T}$ during any normal operation scenario and no more than 37 dB $L_{Aeq,T}$ during emergency operations. These indoor sound levels are close to the lower end of the indoor noise level guidelines in BS 8233:2014 and are unlikely to result in any adverse effects on study or work requiring concentration. Therefore, operational noise is not expected to result in any adverse effects at medium sensitivity receptors (such as disruption of work required concentration) and does not exceed the typical requirements of SBC.

The assessment also shows that the operational noise rating level during the normal operation scenarios is not expected to exceed the existing background sound level at any high sensitivity receptor (NSR2-4) during the night-time, and is expected to be at least 10 dB below the existing

background sound level during the daytime. This is an indication that operational noise from the proposed development during normal operations would have a low impact, and meets the typical noise control requirements of SBC. The predicted operational noise rating level is closest to the existing background sound level at NSR4 (hotel). It is noted that the façade to the receptor building is sealed due to the proximity to the adjacent road network, with ventilation provided mechanically. This building envelope is likely to provide a sound level difference (from outdoors to indoors) of at least 25 dB. Therefore, operational noise from the proposed development would be no more than 22 dB $L_{Aeq,T}$ indoors. This indoor operational noise level is not expected to result in any adverse effects in terms of sleep disturbance or annoyance. Therefore, operational noise during all normal operation scenarios is not expected to result in any adverse effects and does not exceed the typical requirements of SBC.

The operational noise rating levels during the emergency operation scenario (when all generators are active) are not significantly different to the rating levels expected under normal operation. This indicates that the operational noise from the proposed development during emergency operations would have a low impact at most receptors. This also meets the typical noise control requirements of SBC (a rating level of no more than 10 dB above the existing background sound level).

5.8.2 Noise Assessment Conclusions

The noise assessment concludes that, based on input data and assumptions presented above, operational noise from the proposed development under all scenarios would result in a low impact. Expected operational noise levels do not exceed the typical noise control requirements of SBC under each scenario.

It is anticipated that in order to achieve the operational noise level presented in the assessment, measures including architectural measures as well as specifications for the primary plant systems would be required. These have been incorporated within the design of the plant and are considered to appropriately mitigate the impact of the noise emissions from the installation. Details of the specific mitigation measures are provided in Section 7 of the Noise Assessment (Appendix 4).

6. Monitoring

6.1 Monitoring Emissions to Air

As discussed in Section 5.1 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.

Monitoring of the emissions from the generators will be undertaken as per EA guidance for low-risk generators[14]

[14] Guidance: Monitoring stack emissions: low risk MCPs and specified generators, Environment Agency, updated on 04th June 2024, accessed online at https://www.gov.uk/government/publications/monitoring-stack-emissions-low-risk-mcps-and-specified-generators/monitoring-stack-emissions-low-risk-mcps-and-specified-generators on 06th August 2024

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[15]; and
- Emergency backup diesel engines on installations: best available techniques (BAT)[16].

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.

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

[15] Data Centre FAQ Headline Approach, Draft version 21.0, EA, H.Tee 15/11/22

[16] Emergency backup diesel engines on installations: best available techniques (BAT), EA, Published: 21 August 2023

Backup power source	Advantages	Disadvantages	Decision
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 application still requires a BAT discussion detailing the choice of engine, the particular configuration and plant sizing meeting the standby arrangement (e.g. 2n).	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.
Standby engine capacities are aggregated in MW thermal input at the quoted standby rating, being usually 110% of the continuous rating.	In total 17 generators will be present at the site. The critical and house generators will have a net rated thermal input of 7.01 MW_{th} and the office generator will have a net rated thermal input of 1.15 MW_{th} (based on an assumed thermal efficiency value of 45.6%.). Therefore, the aggregated net rated thermal input capacity of the installation is 113.4 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 critical and house generator units is 3.2 MW_e, based on a power factor of 0.8. The electrical output for the office generator is 0.524 MW_e. Based on these values the MW_{th} rating of each critical and house generator has been calculated to be 7.01 MW_{th} and the office generator to be 1.15 MW_{th}.	The critical and house generators each have a net rated thermal input of 7.01 MW_{th} and the office generator has a net rated thermal input of 1.15 MW_{th} based on the provided methodology.
The sum of generator plant capacities is based only on $MW_{thermal}$ inputs of all plant regardless of the standby configuration. MW_{elec} output constraints such as realistic customer load or other practical output limiting factors do	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.

Requirement	Installation Arrangements	Conclusion
not constitute a limit to the MWth input as defined in the EA's guide RGN02.		
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 as 'same site – same operator' as per RGN02.	The Installation comprises the combustion plant for LON3 which is located within the same boundary as the generator building and considered a single site.	The proposed Installation is a separate site to other sites operated by IMDC in the vicinity and does not meet the requirements set out in RGN02 requiring the sites to be considered as a single site.
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 2.3.4 of this report the testing regime for all generators will equate to 374 hours of operation. This equates to 22 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.

Requirement	Installation Arrangements	Conclusion
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-emergency role under maintenance and testing.	The planned operational scenarios for the site will be 22 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 emergency operations limit is highly unlikely.	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.
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 will be 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. 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 EPA Tier 2 (or equivalent standard). A detailed cost benefit analysis (CBA) is otherwise needed existing, old plant 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. Anticipated emergency loading for the main generators is 12 x 99%, 2 x 25% and 2 x 51%, or an average of	The generators procured for the site meet the 2g-TA Luft standard at 75% load. Additionally, the air quality assessment has concluded that the proposed engines will not have a significant impact on NO_2

Requirement	Installation Arrangements	Conclusion
	83.75% loading. As shown in Appendix B, this equates to an average NO_x emission rate per generator of approximately 81.6% of the full load emission rate.	concentrations at the nearest residential receptor.
CBA for improved exhaust emissions, dispersion and mitigations from the plant is expected for the 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.	The local air quality modelling completed for the site demonstrates that the proposed generators would not 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. The allowable operating hours for a 1% probability of exceeding the objective would be 57 hours. If the generators were to operate for 65 hours the probability of exceedance would be 5% indicating that exceedances are unlikely provided the lifetime of the generators is less than 20 years.	Emissions from the site are not considered to have a significant impact on short term local air quality at residential and 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,	The testing regime for the Installation has been designed to meet the manufacturers recommendation and ensure that the generator	The testing regime for the Installation will not negatively impact local air quality.

Requirement	Installation Arrangements	Conclusion
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.	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.	
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' 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 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.
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. IMDC, 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.
5-yearly GW sampling & 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.	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.

Requirement	Installation Arrangements	Conclusion
	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. A qualitative environmental risk assessment has been completed for the installation and included as part of the application pack.	
The permit application must assess and provide evidence of actual reliability data for the 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).	The power supply to the site is protected by an uninterruptable power supply (UPS), 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, 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 99.999981% over the period 2022 - 23[17].	The likelihood of the Installation needing to operate for prolonged periods in an emergency mode is considered highly unlikely.

[17] National Electricity Transmission System Performance Report 2022-23, NationalGridESO, published 28th September 2022, available at https://www.nationalgrideso.com/industry-information/industry-data-and-reports/system-performance-reports accessed on 15th March 2024

Requirement	Installation Arrangements	Conclusion
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) 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 shortly after 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 proposes 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.
AQ modelling for permitting split into two parts: 1) for the routine planned testing regime, including scheduled on-load use supporting maintenance works like UPS or HV – if no other details are known the default is 50 hours/gen/year; Commissioning of significant new plant may be included or possibly assessed separately as a 'one off' under a permit 'pre-op condition 2) A prolonged reasonable maximum full load outage (so accepting not all installed engines will run) which the default is assumed 72 hours. Looking at ambient AQ and potential areas for Acute exposure (AEGL)	Air quality modelling undertaken as part of this application fulfils both the expected maintenance regime and the 72 hours scenario.	Air quality modelling undertaken as part of this application meets the required specification.
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	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	The notification to the EA of unplanned and pre-notification of

Requirement	Installation Arrangements	Conclusion
exceeding 18 hours with 5 or more engines operating together is required' (i.e. model shows 4 or less engines unlikely to breach LAQ).	operation of the installation will have no significant impact on local air quality.	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 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.	There are no uses of F-gases at the Installation, which are directly associated with the combustion activities and therefore F-Gas notification requirements under the permit are not considered to be necessary.	This element of BAT is not applicable to the proposed Installation.
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 6,000 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.

Requirement	Installation Arrangements	Conclusion
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'.	IMDC 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.

Appendix 1
Figures

Figure 1 – Site Location
Figure 2 – Site Layout Plan
Figure 3 – Drainage Plan

Appendix 2
Generator Specification

Appendix 3
Air Quality Assessment

Appendix 4
Noise Assessment

Appendix 5
Application Checklist

Question reference	Document title	Document reference
Part B2, Q3d	Management System	Section 2.5, Operations Report (REH2023N04112-RAM-RP-00001)
Part B2, Q5a	Site Plan	Figure 2, Appendix 1, Operations Report (REH2023N04112-RAM-RP-00001)
Part B2, Q5b	Site Condition Report	Site Condition Report (REH2023N04112-RAM-RP-00003)
Part B2, Q5c	Non-Technical Summary	Non-Technical Report, Operations Report (REH2023N04112-RAM-RP-00001)
Part B2, Q6	Environmental Risk Assessment	Environmental Risk Assessment (REH2023N04112-RAM-RP-00004)
Part B3, Q2	Emissions to Air, Water, Sewer and Land	Section 5.1, 5.3- 5.7, Operations Report (REH2023N04112-RAM-RP-00001)
Part B3, Q3a	Technical Standards	Section 2.2.2, Operations Report (REH2023N04112-RAM-RP-00001)
Part B3, Q3c, Q6d	Raw Materials, Water	Section 3.1, 3.2, Operations Report (REH2023N04112-RAM-RP-00001)
Pt B3, Q4a, Appendix 1, Q10	Monitoring	Section 6, Operations Report (REH2023N04112-RAM-RP-00001)

Question reference	Document title	Document reference
PtB3, 6a, 6c, App1,Q11,12	Energy Efficiency Measures	Section 4.2, Operations Report (REH2023N04112-RAM-RP-00001)
Part B3, Q6b	Energy Consumption	Section 4.1, Operations Report (REH2023N04112-RAM-RP-00001)
Part B3, Q6e	Waste	Section 3.3, Operations Report (REH2023N04112-RAM-RP-00001)
Part B3, Q7a, Appendix 1, Q13	List of Combustion Plant	Table 5-1, Operations Report (REH2023N04112-RAM-RP-00001)
Part B3, Appendix 1, Q11	Cost Benefit Assessment	Section 5.1.4, Operations Report (REH2023N04112-RAM-RP-00001)