Virtus Holdco Ltd.

Saunderton Data Centre Campus

ENVIRONMENTAL PERMIT APPLICATION – NON-TECHNICAL SUMMARY

RAMBØLL Bright ideas. Sustainable change.

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Glossary

Abbreviation	**Full Text**
AQA	Air Quality Assessment
AQOs	Air Quality Objectives
BAT	Best Available Techniques
dB	Decibel
EA	Environment Agency
EMS	Environmental Management System
ERA	Environmental Risk Assessment
FM	Facilities Management
IMS	Integrated Management System
kV	Kilo Volt
MVA	Mega Volt Amperes
MWth	Mega Watt Thermal
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
OH&S	Occupational Health and Safety
OH&S&E	Occupational Health and Safety and Environmental
PM_{10} and PM_{25}	Particulate Matter ≤10µm and Particulate Matter ≤2.5µm
S1	Scenario 1
S2	Scenario 2
S3	Scenario 3
SCR	Selective Catalytic Reduction
SCRp	Site Condition Report
UPS	Uninterruptable Power Supply

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1 Introduction

1.1 Background

Virtus Holdco Ltd. (Virtus) is making an application under the Environmental Permitting (England and Wales) Regulations 2016 (as amended) for a new, bespoke environmental permit for their proposed data centre campus in Saunderton, Buckinghamshire.

The data centre will include 57 number, ultra-low sulphur gas oil (diesel) -fired generators. The generators will serve as a back-up energy supply in the event of an emergency whereby the normal supply electricity supply to the data centre is interrupted, due to failure of the electricity transmission network.

The permit application will comprise a description of operations, control measures and management systems, and will include the following reports in support of the application:

- an environmental risk assessment;
- an initial site condition report;
- an acoustic baseline and mitigation report; and
- an air quality assessment.

1.2 Operator

Virtus (the applicant) is a leading data centre provider in the UK, and they design, build and operate award winning, Tier III[1] data centres with a focus on delivering no downtime in operations for their global customers. They have been designing, building and operating data centres since incorporation in 2008. Data centres are mission critical facilities that are designed to supply uninterrupted power to tenant equipment 100% of the time, and Virtus has maintained a 99.94% operational record, where unplanned emergency use over the last three years across their nine sites equates to 0.06% of the total operational time.

1.3 Location

The site, referred to as the Saunderton Data Centre Campus will include four, newly constructed data centre buildings known as London 15, London 16, London 17 and London 18. The address of the new data centre campus is:

Saunderton Data Centre Campus,

Haw Lane,

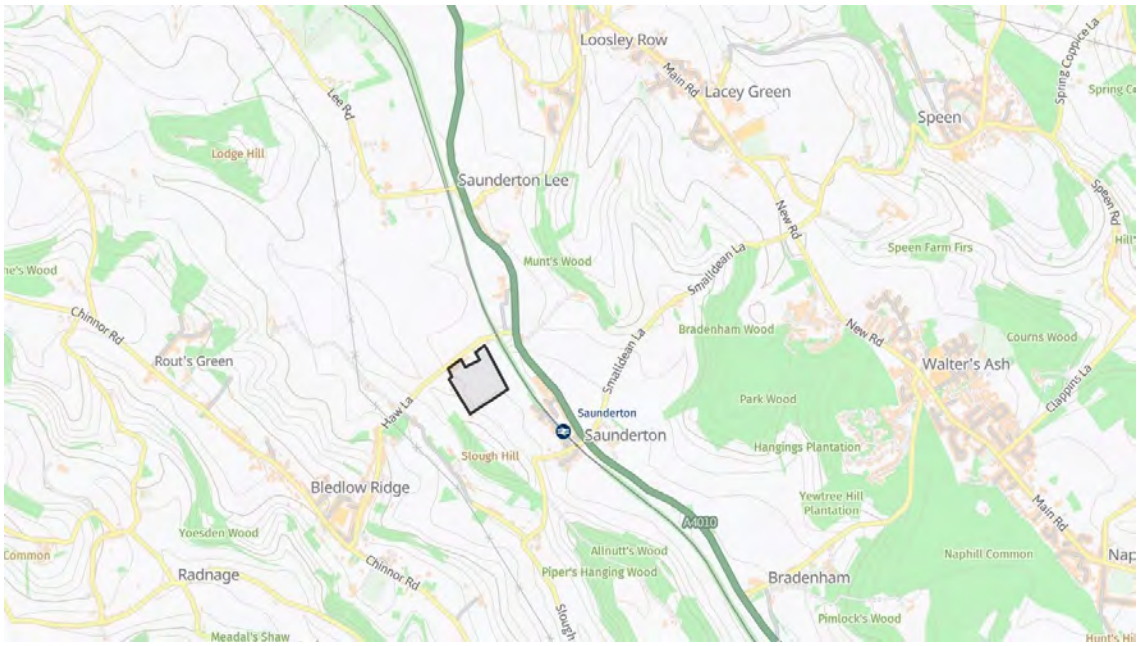
Saunderton, Buckinghamshire,

HP14 4JD.

The Ordinance Survey National grid reference for the site is: 480790 198500

A site location plan is presented in Figure 1.1 below.

Figure 1.1 Site Location



1.4 Operation

Virtus' data centres are managed in accordance with and certified to an Integrated Management System (IMS) to ensure the delivery of quality data centre services, energy, environmental performance, health and safety and data security. The scope of certification is the design, build and ongoing operation of mission critical data centre facilities.

The data centre will use electricity to operate and will be connected to the local electricity transmission network via multiple grid connections. The Saunderton Campus will be supported by an on-site 132/20kV primary substation supplied by two cables from the Amersham Grid substation providing a total firm site capacity of 120MVA.

Data centres are required to always have an available energy supply, and to achieve this, the installation includes back up diesel generators which will provide power to the site in the event of an emergency situation such as the failure of the electricity transmission network. The likelihood of such an occurrence is very low, based on given Virtus' audited

record data over the last three years across their nine sites. Virtus have reported that the audited data showed that the total emergency use over the operational period of their sites equates to 0.06% of the total operational period.

A total of 57 high power density diesel generator sets are proposed for installation across the Site. Of this total, 7 Baudouin generators are proposed for installation on building LON15; two have a power rating of 2.8 MW (engine model: 16M55G6D2/5), whilst the other 5 have a power rating of 2.4 MW (engine model: 12M55G10D2/5). The 2.4MW plant located at London 15 each have a thermal input of 6.3MWth per set, whist the 2.8MW plant have a thermal input of 7.86MWth per set.

The other 50 generator sets proposed for installation on buildings LON16, LON17 and LON18 are 2.4MW Baudouin generators (engine model: 16M55G3000/5). The 2.4MW plant located at London 16, 17 and 18 have a thermal input of 6.18MWth per set. All proposed generators are certified to the US EPA Tier II standard and therefore meet the minimum requirement for Best Available Techniques (BAT). No selective catalytic reduction has been recommended but the generators will be supplied SCR ready.

The total permitted rated thermal output of all the generators across the Saunderton Campus will be 356.22 MWth upon completion of all four data centre buildings.

The proposed site layout is presented in Figure 1.2 below.

Figure 1.2 Proposed Site Layout

1.5 Site Condition Report

A Site Condition Report (SCRp) has been prepared for the site in line with the Environment Agency's (EA) Guidance for Applicants (H5) – Site Condition Reports1, and forms part of this application, document reference 24027-TEM-ZZZ-ZZ-RP-Y-0007. The SCRp is a "live" document which will be updated during the lifetime of the installation and used to inform the surrender SCRp at the time of closure of the installation.

The SCRp describes historical activities at the site; its pollution history and any likely contaminants linked to historical land use. The report also references remediation work carried out at the site and geo-environmental assessments undertaken in 2007 (Arup), 2010 (RPS), 2014 (Hydrock), 2022 (Ramboll) as well as a geotechnical investigation completed in 2024 by Socotec.

Ramboll produced a remediation verification report for the site in 2022, which confirmed that "hot spots" of contamination were remediated via wholesale removal of made ground from the site. The Ramboll remediation verification report, report reference 16200011947-004 is included as a part of the permit application.

1.6 Environmental Risk Assessment

An environmental risk assessment (ERA) has been undertaken as a part of the application in accordance with GOV.UK guidance Risk Assessments for your environmental permit[2].

The ERA (report reference 24027-TEM-ZZZ-ZZ-RP-Y-0006) considered environmental risks from the following sources:

- Accidents;
- Noise and vibration;
- Visual Impact;
- Odour;
- Fugitive emissions;
- Discharges to surface and /or groundwater; and
- Release of bioaerosols.

[1] Environmental permitting: H5 Site condition report - GOV.UK
[2] Risk assessments for your environmental permit - GOV.UK

Based on the guidance, the environmental risk assessment scoped out visual impact, odour, fugitive emissions, discharges to surface and/or groundwater and bioaerosols as these are deemed to be not applicable to this site.

There are not considered to be any significant risks to the environment from the testing of generators. There is a low risk of nuisance to nearby properties from noise emissions and a low risk of land and water pollution because of accidental discharges as a result of the mitigation and emergency response procedures detailed within this application.

2 Emissions

2.1 Emissions to Air

The data centre will have 57 no. point sources to air numbered F1 to F57. Air quality modelling has been undertaken to determine the impact of the generator testing on local air quality and human and environmental receptors. The Air Quality Assessment (AQA) forms a part of the permit application, entitled Basis of Design Narrative, Air Quality Report, document reference: 24027-TEM-ZZZ-ZZ-RP-Y-0002.

Emissions to air from the site will vary depending on the operational scenario of the engines, and the testing regimes. The engines will only be operational during routine testing. The likelihood of the generators being used in an emergency scenario, is expected to be an rare event given Virtus currently has a 99.94% operational record, where unplanned emergency use over the last three years across their nine sites equates to 0.06% of the total operational time, and the incoming power system has been designed to minimise the potential requirement to operate the generators. This is in addition to the overall reliability of supply for the National Electricity System during 2024-25 being 99.999818%[3]

The main pollutants of concern are oxides of nitrogen (NOx), nitrogen dioxide (NO2) and particulate matter (PM10 and PM2.5).

Virtus will apply BAT in relation to the testing to ensure that impacts are minimised, for example, by spreading the tests throughout the year, avoiding peak traffic periods, and not testing engines simultaneously.

2.2 Air Quality Assessment Summary

The air quality assessment completed by Temple (now Ramboll), modelled the air quality based on Virtus' testing scenarios which are summarised below.

Virtus will undertake routine testing and servicing at the following intervals:

- **Virtus Test 1:** representative of a 15 minute "switch on" offload test; to be carried out monthly in eleven months of the year. In reality this will be limited to approximately 5 minutes.
- **Virtus Test 2:** representative of a full service onload test consisting of an initial 20 minutes at 100% load immediately followed by 120 minutes at

[3] https://www.neso.energy/document/369271/download

100% load; to be carried out once per year in the 12th month of the year. Virtus have indicated that up to three generators may operate at any one time.

It is understood that the EA expect for a theoretical failure in mains electricity lasting 72 hours to be tested.

Based on the above information, the following scenarios have been modelled using the atmospheric dispersion model ADMS-Roads (v5.1.0.2).

- **Scenario 1 (S1) – Emergency Scenario**: All generators modelled for 72 hours at 100% output.
- **Scenario 2 (S2) – Routine annual testing**: One generator modelled and factored to operate for three hours per annum at 100% load, which represents the greatest emissions rate: and
- **Scenario 3 (S3) – Routine monthly testing**: To simulate Virtus Test 2, three generators were modelled and factored to operate simultaneously for 11 hours per annum at 100% load. This load reflects the absence of data from the manufacturers indicating emissions for off-load tests.

The flue parameters, discharge conditions, emission rates and assessment receptors used for the modelling can be found in chapter three of the Air Quality assessment report.

The air quality assessment found that none of the air quality objectives (AQOs) were breached at any of the modelled human or ecological receptor locations in any of the modelled scenarios, except for the daily NOx AQO for the emergency scenario.

The emergency scenario breach is considered a rare event based on the last three years of audited record data across Virtus' nine sites where the total emergency use over the operational period of their sites equates to 0.06% of the total operational period as well as the overall reliability of supply for the National Electricity System during 2024-25 being 99.999818%[4]. This is in addition to Virtus reporting that there will be less than 72 hours of fuel storage available on site, and due to the highly unlikely scenario in which generators would operate simultaneously for a period approaching or exceeding a day. No selective catalytic reduction has been recommended however the generators will be supplied SCR ready.

Due to the above, it is considered that the generators will not have a significant effect on air quality at local receptors.

[4] https://www.neso.energy/document/369271/download

2.3 Emissions to Water

There are no proposed emissions to surface or groundwater at the installation. The proposed surface water drainage system will divide the site into two areas, each of which will be drained by a separated road and roof pipe network and attenuated in below ground storage tanks. The two areas will then discharge into an infiltration basin which will be located in the landscaping in the northeastern part of the site.

Surface water run-off from the impermeable surfaced fuel delivery areas will be directed to channel drains around the site perimeter of the delivery area, which will discharge runoff to a below ground forecourt separator.

2.4 Point Source Emissions to Land

There are no proposed point source emissions to land from the installation activities.

2.5 Noise Emissions

An acoustic report, reference 24027-TEM-ZZZ-ZZ-RP-Y-0001 was completed for the proposed installation. The report covers the assessment of external plant noise emission from the data centre generators and chillers at the nearest noise sensitive receptors. This report will be submitted in support of the application.

3 Management Systems

3.1 General

All of Virtus' data centre operations are managed in line with their Operations Manual, which incorporates the requirements of the IMS (Chapter 6 Occupational Health and Safety and Environmental (OHSE) Management System. The Operations Manual submitted in support of this permit application.

The Environmental Management System (EMS) includes an integrated policy (Compliance Policy) which is reviewed and updated annually by Virtus' Compliance manager. The EMS also includes:

- An Occupational Health and Safety (OH&S) Policy;
- Organisational Structure;
- Roles, Responsibilities and Accountabilities;
- Standards / procedures;
- Process controls; and
- OH&S and Environmental Communications and awareness.

The EMS includes process controls and resources which are in place to manage environmental protection across all aspects of Virtus' businesses including the installation.

3.2 Environmental Policy

Virtus' EMS is ISO 14001 certified, and it is underpinned by an Environmental Policy which is included as part of an overall Compliance Policy. Virtus have a commitment to continual improvement and to develop objectives and targets which are aimed at preventing pollution and improving their environmental performance.

The EMS is reviewed annually by Virtus HoldCo Ltd.'s Senior Management team. Virtus promotes awareness of the EMS and its contents to all employees via toolbox talks and notice boards, and they ensure that the Policy and its contents are made available to company stakeholders, including contractors who undertake much of the onsite work around the generators subcontractor activities such as deliveries and maintenance activities.

3.3 Environmental Aspects and Risk Management

The applicant ensures that internal and external issues relevant to the provision of services, energy and environmental aspects, information security, strategic direction, and in maintaining compliance are captured, evaluated and mitigated through a Risk Management System compliant with the requirements of BS ISO31000:2009 Risk Management.

Virtus maintain a Risk Evaluation Register, which is controlled under the Risk Management Process (Chapter 4 of their Operations Manual). The register contains the details of environmental risks which have been deemed "environmental aspects" relevant to Virtus and its operation. Environmental risks are evaluated for opportunities to improve energy / environmental improvement i.e. environmental programmes. The Risk Evaluation Register includes a significance rating for each environmental aspect, and risks are evaluated in order to identify opportunities for continual improvement.

"Significant" aspects are managed by establishing operational controls, process, procedures, training and the monitoring of activities via an audit programme which covers both site-level and organisational level activities.

The energy review is used to drive power usage effectiveness figures, which is the ratio of total amount of energy used by a data centre facility to the energy delivered to computing equipment.

Environmental incidences follow the same procedures identified in the Incident Management Process (Chapter 2 of the Operations Manual). These are:

- Incident Identification;
- Impact Assessment; and
- Escalation and Action.

All environmental incidences are reported to the Compliance Manager in the form of a Post Incident Report (PIR) allowing for effective assessment and updating procedures and / or escalating to a business continuity plan, where necessary.

3.4 Training

Virtus' environmental training relates to both general environmental training, as well as job-specific training for clearly defined roles and responsibilities. Individuals' knowledge and skills are assessed and matched against the needs of the role.

Skill and knowledge gaps are assessed, identified prioritised and planned to ensure employees have the skills and knowledge to conduct their roles effectively. Virtus will

maintain records of knowledge and skills that are required for each role, as well as training and relevant qualifications undertaken by staff to meet role competence requirements.

The applicant ensures that all employers and contractors are aware of their legal responsibilities and duties and implements training to ensure that these requirements are communicated. Training can take the form of toolbox talks, or refreshers, site sign in screens, dynamic risk assessments (present in each plant room), adequate safety signage and instruction, mandatory safety delivered training, internal compliance audits, and the use of the Occupational Health and Safety and Environmental (OH&S&E) Forum.

The OH&S&E forum enables the cross-company communication of all OHSE matters, and the forum's monthly meetings are chaired by Virtus's health and safety manager and managed on a campus-by-campus basis.

Contractors and sub-contractors are given appropriate training prior to the commencement of any works, services or activities.

Personnel involved in the operation of the engines is undertaken by the suppliers, and the training is both classroom and onsite practical training, and each trainee is issued with a training manual.

Training methods include staff inductions, safety moments, senior leadership walk arounds, annual awareness training, toolbox talks and refreshers, site sign in screens, dynamic risk assessments in plant rooms and internal compliance audits.

3.5 Review and Audit

An annual management review examines the EMS to ensure that it remains appropriate and effective at controlling environmental performance and to identify any areas where opportunities exist for improvement. The EMS and site activities are internally audited on an annual basis as a minimum. Internal audits are conducted by suitably trained and experience site staff.

Where corrective action is required, through audit (or otherwise), which for example involves modifications to plant and equipment, the implementation of such changes will be managed via the EMS change management process.

3.6 Critical Asset Management

The applicant identifies and manages critical assets comprising of physical, non-computing systems such as power, cooling and life safety systems under a critical asset management process. It identifies areas of criticality and ensures appropriate levels of

planned preventative maintenance, Standard Operating Procedures, and Emergency Operating Procedures as well as an Operation and Maintenance Manual.

3.7 Contractor Management

Large areas of operation and maintenance of Virtus' data centres are contracted to a Facilities Management (FM) team, Optimum Group Services, who are specialists in data centre maintenance.

The FM teams, manage and authorise all sub-contractors permitted to work on Virtus sites. All sub-contractors are subjected to site inductions, which ensures that all hazards, emergency evacuation procedures, emergency contacts and environmental procedures are effectively communicated. The FM teams maintain records of all site inductions. Virtus' approach to contractor management is detailed further in Chapter 13 of their operations manual.

3.8 Engine and Set Up Choice

The diesel-powered stand-by electrical generator sets that will be installed at the Saunderton data centre are typical fit-for purpose vendor-supplied units, which have the following (or similar/equivalent) characteristics:

- Prime mover: V16 four-stroke liquid cooled low emission set up;
- Set arrangement: Containerised with close coupled radiator; and
- Standby rating: 2.4MWe or 2.8MWe.

The Uptime Institute[5], an advisory organisation focused on improving the performance, efficiency and reliability of business-critical infrastructure (such as those associated with data centres) through innovation, collaboration, and independent performance certification.

The institute regards electricity from utility service providers as an unreliable source of power. Therefore, Tier III data centres specifications require that the data centre must have alternative power generation as a backup for the utility power supply that is in the control of the data centre owner. Standby diesel generators are still considered to be the tried and tested, reliable available technology with the following logic:

[5] Uptimeinstitute.com. (n.d.). *Data Centre Authority | Tier Certification & Training*. [online] Available at: https://uptimeinstitute.com/.

- They can accept significant load steps after a power outage, so they can be quickly brought online to take over from an Uninterrupted Power Supply (UPS) system;
- Shorter start up time compared to gas fired generator and gas turbine systems;
- Fuel is stored on site, ensuring local control is retained (48-hour supply to all generators);
- The site retains full local control of power outage protection (exempt from utility supply failures);
- The storage of diesel is considerably safer than the storage of alternative fuels;
- The storage of enough alternative fuels to satisfy the Tier 3 24-hour power outage protection requirements requires significant space and considerable Health and Safety controls;
- The storage of the fuel is required to match the redundancy levels that the system is designed for (therefore a single storage will not be sufficient);
- The availability of diesel and diesel suppliers readily extends emergency operations to support tenant equipment;
- The technology is mature; and
- The technology is the most cost-effective technique considering commissioning, availability of spare parts, fuel, servicing and end of life decommissioning.

3.9 Fuel Storage

Each generator set will have an above ground, Grade S355 steel "belly-tank" with sufficient fuel for 48 hours fuel capacity when the generator is running at 100% output power rating. Tanks will be double skinned / internally bunded with a capacity to contain at least 110% of the total fuel volume in the event of a leak of the primary tank.

The belly tanks of the 2.4 MW generators have a usable capacity of 34,500 litres (40,000 litres brimful) and the 2.8 MW generator belly tanks have a usable capacity of 40,000 litres (48,000 litres brimful).

The belly tanks will be supplied complete with fuel level monitoring system, a fuel polishing system, filling station, set-mounted refuelling cabinet, supply pipework, vents, fire safety, isolating and control valves, drip trays and facilities to link to the fire alarm interface.

Fuel polishing is undertaken to properly maintain fuel during long periods of storage and non-use. This is to ensure that the fuel supply is not wasted and managed sustainably. The fuel polishing unit is fixed to the tank and will contain a filter separator element which is used to remove particulate contaminant and water from the diesel fuels.

Fuel deliveries are governed by the processes set out within the Virtus Operations Manual and are included within the management system.

4 Conclusions

Virtus has extensive experience building, managing and operating data centres within the UK and further afield. The Saunderton data centre will be operated in accordance with Virtus' ISO 14001 certified IMS, which includes integrated compliance policy, responsibilities, standards, procedures, management principles, processes and controls to ensure compliance obligations are met.

Virtus' technology choice, management systems, fuel storage, deliveries and waste disposal all comply with best practice and can be considered BAT as outlined in the Technical Supporting Documentation Report (reference 24027-TEM-ZZZ-ZZ-RP-Y-004).

The diesel-powered generator sets will only be operational during testing, maintenance and the unlikely event of a failure of the normal electricity supply to the data centre. The air quality assessment, which included modelling of the concentration of contaminants of concern at local receptors, found no significant risk to human health or environmental receptors due to the activities at the data centre.

The acoustic assessment included attended and unattended noise surveys to determine baseline noise levels. The assessment indicated that the predicted rating noise level of the mechanical plant will meet local authority plant noise requirements during standard daytime and night-time operation as well as during monthly generator maintenance and testing based on the current design.

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