ARUP

Virtus Holdco Ltd

London 14 Data Centre, Prologis Park Heathrow, Hayes

Non-Technical Summary - Environmental Permit Application

Reference: 294760-EP-NTS

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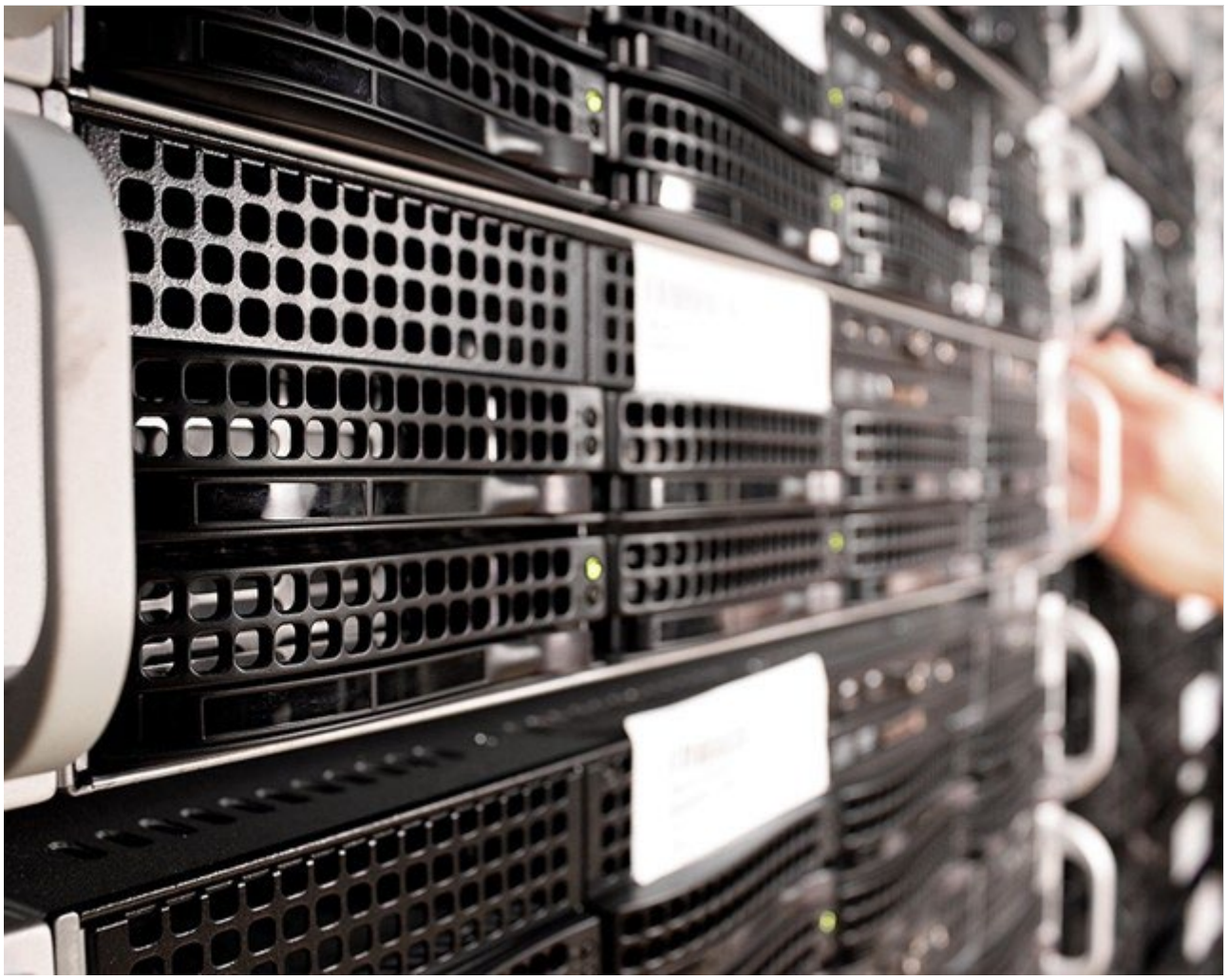

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1. Introduction

Ove Arup & Partners Ltd (Arup) has been commissioned by VIRTUS (henceforth referred to as 'the Operator') to prepare a bespoke application for an Environmental Permit (EP) for the London 14, or LON14 data centre.

The EP is for the standby back-up generators at the LON14 data centre and directly associated activities only, not for the whole of the data centre.

The application is made by VIRTUS Holdco Limited which is the legal entity that will be responsible for operating the generating installation.

The site is located at DC6, Unit D, Plot C, Prologis Park Heathrow, Stockley Road, Hayes in the London Borough of Hillingdon. This is shown in the Site Location Plan[1], which can be found in the application provided as Drawing 294760-EP-DR001.

2. Environmental Permit Application

2.1 Environmental Permit Type

2.1.1 Scheduled Activity

The site comprises 16 containerised stand-by backup generators (SBG) for emergency purposes with a combined thermal input capacity of 110 MWth. The SBGs will be diesel-fuelled.

The data centre will be served by a direct power connection to the National Grid. In case of a break in power supply, back-up power will be supplied by operating the SBGs.

Each SBG has an individual flue terminating at 14.45m above ground, the locations of which are provided in the Site Layout and Emissions Point Plan[2]. The 16 SBG flues are located close to each other but are separate flues.

Combustion activities are regulated under The Environmental Permitting (England and Wales) Regulations 2016 (EPR). The regulations enact both the Industrial Emission Directive (IED) and the Medium Combustion Plant Directive (MCPD) in England. Operators undertaking any of the activities identified under these regulations require an environmental permit to carry out these activities.

The "activities" that are proposed are defined in the EPR:

Section 1.1 Part A(1)(a) burning any fuel in an appliance with a rated thermal input of 50 or more megawatts.

In accordance with the EPR:

"...where two or more appliances with an aggregate rated thermal input of 50 or more megawatts are operated on the same site by the same operator, those appliances must be treated as a single appliance with a rated thermal input of 50 or more megawatts."

The total aggregated capacity of the generators is above 50 MWth and will therefore be permitted under the IED. However, because the individual combustion is below 15 MWth the installation will be permitted as an IED Chapter II installation but not a Chapter III (Large Combustion Plant) installation. This means the installation will not be required to meet the Best Available Technique (BAT) Conclusions for the Large Combustion plant. The permit will therefore follow the guidelines set out under the MCPD.

[1] Site Location Plan (Document reference 294760-EP-DR001).

[2] Site Layout and Emissions Point Plan (Document ref 294760-EP-DR002).

The SBGs will not be used to provide a balancing service or for demand side response operations such as triad avoidance or fast frequency response. No electricity generated from the site will be exported off-site or fed back into the National Grid.

2.1.2 Directly Associated Activity

Schedule 1, Part 1 Regulation 2(1) of the Regulations provides that a Directly Associated Activity (DAA) is an operation that, in relation to any other activity:

- Has a technical connection with the activity;
- Is carried out on the same site as the activity; and
- Could have an effect on pollution.

Diesel fuel will be stored in individual 'belly tanks' of the SBGs, each of 30,868.8 litres in volume which equates to 48 hours use in volume. As the purpose of this fuel storage is to serve the SBG and the 'combustion' Scheduled Activity, this storage of fuel therefore constitutes a DAA to be covered in this Permit Application.

All tanks will be above ground and integrally bunded. No additional fuel storage (top-up tanks) is proposed.

Each belly tank is containerised and self-bunded to contain 110% of the storage capacity of the tank. All tanks will comply with the Oil Storage Regulations (SI 2001/2954. The Control of Pollution (Oil Storage) (England) Regulations 2001).

The surface water drainage system for the permitted activity is also considered to be a DAA up to the point the drainage system discharges to ground and has therefore been included in the application. The wider drainage system serving the wider site does not meet the above criteria and therefore is not considered to be a permitted activity or DAA.

2.2 Application Contents

The application comprises the following elements:

- Environmental Permit Application forms (Part A, B2, B3 and F1);
- Non-technical Summary[3];
- Summary Technical Report with supporting Appendices[4];
- Site Condition Report with supporting Appendices[5];
- Environmental Risk Assessment with supporting Appendices[6];
- Air Quality Assessment[7];
- Drawing 1 Site Location**Error! Bookmark not defined.**;
- Drawing 2 Site Layout and Emission Points[2];

[3] Non-technical Summary – Environmental Permit Application (2023) (Document ref 294760-EP-NTS).

[4] Summary Technical Report – Environmental Permit Application (2023) (Document ref 294760-EP-STR).

[5] Site Condition Report – Environmental Permit Application (2023) (Document ref 294760-EP-SCR).

[6] Environmental Risk Assessment – Environmental Permit Application (2023) (Document ref 294760-EP-ERA).

[7] Air Quality Assessment – Environmental Permit Application (2023) (Document ref 294760-EP-AQ).

- Drawing 3 Environmental Site Setting[8]; and
- Drawing 4 Cultural and Natural Heritage[9].

3. Site Condition Report

A Site Condition Report[5] (SCR) has been prepared in accordance with the Environment Agency's H5 Guidance Note on SCR.

The SCR describes and presents detailed information on the condition of the land and groundwater at the site at the time of permit application. It also serves as a baseline so that it can be demonstrated to the EA that the land and groundwater have been protected during the lifetime of the site and that the land is in a satisfactory state on permit surrender.

Sections 1 to 3 of the EA's SCR template have been completed in preparation of this document, which comprises the following:

- Site details;
- Condition of the land at permit issue:
  - Geology;
  - Hydrogeology;
  - Hydrology;
- Pollution history;
- Evidence of historic contamination; and
- Permitted activities.

Appendices are also provided to evidence the previous ground investigation and remediation at the site.

Section 4 to 7 of the SCR template will be maintained during the life of the permit and Sections 8 to 10 will be completed and submitted in support of the application to surrender the permit.

[8] Environmental Site Settings Drawing (Document ref 294760-EP-DR003).

[9] Cultural and Natural Heritage (Document ref 294760-EP-DR004).

4. Environmental Risk Assessment

An Environmental Risk Assessment[6] (ERA) has been undertaken in accordance with the EA Risk assessments for your environmental permit[10] and is included in the EP application.

The ERA is a simple effective tool for identifying potentially hazardous or polluting consequences of activities and providing mitigation systems that reduce the risk of those activities causing pollution.

The primary risks to the environment as a result of the Installation are considered to be from emissions to air as a result of the SBG use, together with the potential for leaks from the associated fuel tanks and delivery systems affecting water and land.

Other potential environmental risks also covered including Noise and Vibration, Odour, Accidental and Fugitive Emissions and Global Warming Impact.

Overall, with the design and operational measures in place to manage potential risks, no significant environmental risks have been identified at the site.

[10] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit [Accessed July 2023]

5. Air Quality Assessment

As the primary risk to the environment as a result of the Installation is considered to be from emissions to air as a result of the SBG use, a detailed stand-alone Air Quality Assessment[7] has been undertaken as part of the EP application.

The assessment has been undertaken to consider the potential impact of the use of SBGs during the routine testing and maintenance (5 hours per year per generator) and in the unlikely event of an emergency power outage for 72 hours.

Each of the SBGs are fitted with Selective Catalytic Reduction (SCR) abatement technology to reduce the potential emissions of oxides of nitrogen (NOx) by up to 95% once activated.

The modelling considered and assessed emissions of NO_x, nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ammonia (NH_3) and carbon monoxide (CO).

The summary of this is that no significant impacts are predicted from any of the modelled routine or unplanned events at sensitive human or ecological receptors.

6. Key Design & Operational Information

A review of the key design and operational information is provided as part of the Summary Technical Report[4] (STR) is included in the EP application. The STR has been undertaken in accordance with the following regulations and guidance pertinent to the 'combustion' Scheduled Activity and DAA for the on-site diesel fuel storage and surface water drainage:

1. The Environmental Permitting (England and Wales) Regulations 2016, SI2016/1154.
2. EU, 2010 Directive 2010/75/EU of the European Parliament and the Council on industrial emissions.
3. EU, 2015 Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plant.
4. The Control of Pollution (Oil Storage) (England) Regulations 2001.
5. Best available techniques (BAT): environmental permits[11].
6. Risk assessment for specific activities: environmental permits[10].
7. Environment Agency Data Centre FAQ Headline Approach[12].
8. Reference Document – Best Available Techniques on Emissions from Storage 2016[13].
9. CIRIA, 2014. Containment systems for the prevention of pollution (C726F)[14]

6.1 Generator Type

The EA's Data Centre FAQ[12] acknowledges that diesel generators are presently the default technology for standby generators in data centres. The STR[4] details the justification for the choice of SBG with a review of potential alternatives and sets out the need for the installed configuration and sizing of engines.

The proposed back-up power solution is considered to be BAT for this data centre on the basis of:

- Diesel engines (and on-site 'belly tank' diesel storage) give VIRTUS local control to ensure power continuation at the site that is independent of any third-party interruption;
- Diesel fuelled engines have been chosen due to the ability to store the required volumes of diesel on site and therefore maximise energy security in the system;
- The size of the engines has been selected in order to ensure fast start up and shut down can be achieved as this is a fundamental requirement of the emergency back-up nature of the generators;
- Instantaneous supply of electricity is required in the event of power loss to the site, which diesel engines provide (approximately 15 seconds).
- The technology is well established, replacement parts are readily available and the maintenance costs are low.

[11] https://www.gov.uk/guidance/best-available-techniques-environmental-permits [Accessed July 2023]

[12] EA, 2018. Data Centre FAQ Headline Approach – Release to Industry version 10.0 01/06/18. Available at https://consult.environment-agency.gov.uk/psc/cr0-4td-digital-realty-uk-limited/supporting_documents/Data%20Centre%20FAQ.pdf [Accessed July 2023]

[13] EC, 2016. Reference Document – Best Available Techniques on Emissions from Storage. Available at https://eippcb.jrc.ec.europa.eu/sites/default/files/2022-03/efs_bref_0706_0.pdf [Accessed July 2023]

[14] CIRIA, 2014. Containment systems for the prevention of pollution. Secondary, tertiary and other measures for industrial and commercial premises. Available at https://www.ciria.org/ItemDetail?iProductCode=C736F&Category=FREEPUBS [Accessed July 2023]

- Emissions abatement for NOx is included with the use of SCR to minimise the potential environmental impacts during routine testing and for emergency use, in the unlikely event of network power outages.

6.2 Emissions to air

As the SBGs are exempt from MCPD Emission Limit Values (ELV) because they operate for less than 500 hours per year.

The planned testing and maintenance regime is for a total of 5 hours 5 mins per year per generator. This is significantly less than the 50 hours per year BAT expectation set out in the EA Data Centre FAQ[12] to minimise the potential for adverse air quality impacts and minimised diesel usage.

Whilst the back-up generators have no ELVs, the EA guidance specifies the BAT as "*2g TA-Luft or US EPA Tier II (or equivalent standard) with NO_x emission levels in the range of 2000mg/m^3 at 5% oxygen and reference conditions".*

The generators to be installed state NOx emission concentrations of 1746 mg/Nm^3 at 5% O_2 and reference conditions (100% load standby mode – nominal) which comply with this EA guideline, prior to any additional abatement.

SCR will also be fitted with a minimum NOx emission reduction of 95% (<86mg/Nm^3 at 5% O_2). Detailed specifications for the engines and SCR technology are provided as an Appendix to the application.

The design of the generator and flue enclosure results in a significant dilution of generator emission concentrations.

Ultra-low sulphur diesel will be used on site and is considered to be BAT.

No significant impacts are predicted during either routine or unplanned scenarios.

Monitoring ports which comply the EA's MCERTS (monitoring certification scheme) will be included on the flue stacks to allow the sampling of NO_x and CO.

Overall, the design of the Installation in relation to emissions to air is considered to be BAT.

6.3 Emissions to water/land

There are no point source emissions to and from the generators or associated fuel storage.

Surface water drainage plans have however been provided in the EP application and in the Site Layout and Emissions Point Plan[2]. A Flood Risk Assessment (FRA) Report for the site has also been provided for further information within Appendix 05-02 of the EP application.

No process waters will be generated by operation of the installation, hence there will be no associated process water discharge to ground or groundwater.

6.4 Noise

A Noise Assessment[15] has been completed and provided as part of the EP application within Appendix 03-06. The generators are located within noise attenuating container units and individual exhaust flues.

Modelling carried out predicts that during both routine and unplanned scenarios, adverse effects at the nearest sensitive receptors are considered to be unlikely. During a full emergency scenario, the day-time limits at nearby sensitive receptors are predicted to be exceeded, however the likelihood of this occurring is considered to be low based on the network reliability and in-built design resilience.

[15] LCP, 2023. Acoustic Consultancy Report, 07194/3/3/2, External Plant Assessment, Virtus DC6 6th October 2023

6.5 Fugitive emissions/leaks

The SBG diesel fuel storage, fuel delivery and engine lubrication oil systems have been designed to consider the potential impact of leaks / spillages on the site.

VIRTUS takes the protection of the environment, particularly relating to the management of diesel fuel on all sites, very seriously. It is the goal of VIRTUS data centres to effectively control these sources and to prevent the pollution of underground aquifers, canals, or waterways.

Management systems will be in place at the facility to ensure that the risk from fugitive emissions to air is minimised, for example through regular inspection and maintenance of plant. Protection systems will include automatically triggered safe plant emergency shutdown in the event of major faults in equipment. Scheduled maintenance of diesel tanks will be incorporated into the EMS, to minimise the risk of fugitive emissions of fumes to air.

The principal guidance for the design of the oil storage and associated infrastructure is the Control of Pollution (Oil Storage) (England) Regulations 2001. Additionally, the requirement for the safe environmental storage of fuel on-site (including transport of fuel) is covered within the EPR. BAT Reference (BREF) document 'Emissions from storage' for sites regulated under the IED has also been considered as part of the design.

A road tanker will fill up the diesel belly tanks individually. The tanker will be parked on impermeable slab that slopes towards the channel drains which is connected to an oil separator. The oil interceptors have been sized to accommodate on compartment of a fuel tanker (see Document reference Appendix 03-03).

The belly tanks will also monitor pressure loss and fill (high/low) levels. The operator will also carry out daily checks for signs of smaller leakage not notified by the alarm system. There are multiple alarm systems including: high, low, block and leak alarms.

All tanks, pipes and valves are designed to appropriate industry standards and flanged connections between pipes are kept to a minimum by the proximity of the tanker fill point.

Fuel integrity is maintained with each generator housing a fuel polishing unit to constantly circulate and filter the fuel.

Fuel tank filing will be carried out by trained fuel tanker drivers. This reduces any significant risk of spillages and leaks. Spill kits will also be available to deal with any leaks. Relevant spill response equipment will be situated at various locations around the site, designed for the particular hazard characteristics of the materials (fuel) present. All spillages will be logged, investigated and corrective action will be taken.

It is anticipated that fugitive emissions of odour will not be significant for the facility. Diesel will be contained within vented tanks and therefore would only be a potential source of odour if a spill were to occur. Procedures will be incorporated within the EMS to ensure the potential for spills is minimised and they are dealt with swiftly should they occur.

No powders or other dry materials will be used or stored at the installation and therefore fugitive emissions of dust are unlikely to occur.

6.6 Energy Efficiency

The data centre is exempt from the EED requirements as the total installed planned maintenance and testing schedule falls below the 1,500 hour threshold (16 generators x 5 hours 5 mins each = 81 hours 20 mins).

Operation of the back-up generators will be for emergency back-up only. The efficiencies of the main emergency generators and the smaller ‘house’ generators at the data centre are 35% each, with a total installed thermal input of 110 MW and a rated electrical output rating of 38.4 MWe.

Energy recovery is not reasonably practicable for engines of this emergency nature with such small anticipated operational hours and the provision of combined heat and power is not considered to be feasible. However, improving energy efficiency will form part of the Operator’s Environmental Management System, with an objective to monitor energy use and evaluate opportunities to influence energy efficiency, and achieve as low a Power Usage Effectiveness (PUE) ratio as possible.

6.7 Network Reliability

National Grid National Electrical Transmission System Performance Report 2021/22 states that the overall reliability of supply during 2021-22 was: 99.999612%[16].

The total estimated unsupplied energy for these 11 incidents during 2021–22 was 143.40 MWh. The longest loss of supply incident lasted 300 mins (7.5 hours) in Elstree, Watford, with a total of 25.7 MWh not supplied. It is also reported that a portion of demand was restored within 3 minutes.

Virtus is certified as an Uptime Institute Tier III standard operator[17], which means that during routine maintenance of power and cooling systems there is no interruption to the operation of the systems located in the centre. Virtus has designed an incoming power system to the site to ensure that only the most major power interruption events would trigger the need for the generators to be used outside of maintenance activities.

The LONDON14 site is set up in a N+1 redundancy system[18]. Multiple Uninterrupted Power Supplies (UPS) (battery storage) are also proposed onsite, which can supply immediate power for 10 minutes. After 30 seconds however, the relevant SBGs will come on at 100% load to charge the UPS, after which point they will reduce to 88% load.

These generators are designed to automatically activate and provide the required power to the plant pending restoration of mains power, at which time they shall automatically ramp down and switch back to utility supply. Therefore, the specific number of back-up generators in use (and the relevant loads required) will always be reflective of, and proportionate to, the power demands at the time, to maintain operations until the supply is restored.

Since operating the existing Virtus LONDON data centres in wider Stockley Park and Slough Campuses, Virtus has a maintained a 100% uptime record.

6.8 Environmental Management Systems

VIRTUS currently has an ISO 14001:2015 certification (Document reference Appendix 03-07) for 'the design, build and ongoing operation of mission critical Tier III data centre facilities' and will look to develop an Environmental Management Systems (EMS) for LONDON14 in line with the requirements of the international standard.

As part of this EMS, VIRTUS will include LONDON14 within their existing Compliance Policy which set out the commitment to operating their facilities in *'adherence to all applicable regulatory requirements, to meet or exceed customer requirements and continually improve the effectiveness of our management systems'*.

VIRTUS' Compliance Policy defines their commitment to continual improvement and to developing objectives and targets aimed at preventing pollution and improving environmental performance. The Policy is reviewed annually by the Senior Management Team. Arrangements are in place to ensure that all employees are aware of the Policy and its contents and that the Policy is made available to company stakeholders, including contractors who undertake onsite work around the generators (maintenance, deliveries, etc).

VIRTUS also ensures that internal and external issues relevant to the provision of services, energy & 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.

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[16] National Grid ESO, 2022. National Electricity Transmission System Performance Report 2021-22. Available at https://www2.nationalgrideso.com/document/267701/download. Accessed 20th September 2023

[17] https://uptimeinstitute.com/tiers

[18] N+1 redundancy is a form of resilience that ensures system availability in the event of component failure. Components (N) have at least one independent backup component (+1). The level of resilience is referred to as active/passive or standby as backup components do not actively participate within the system during normal operation

7. Conclusion

The overall conclusion from the studies undertaken as part of the EP application is that there is unlikely to be a significant environmental impact as a result of the operation of LONDON 14 data centre.

The data centre operator VIRTUS is fully committed to ensuring the highest standards are met and will undertake its activities in a manner consistent with best industry practices.