Landmark House
20 Broomgrove Road
Sheffield
S10 2LR

Tel. 0114 263 1824
ehsprojects.co.uk
Registered no. 04845638

Spring Park, ARK Datacentres: Permit Variation EPR/PP3003PW

EHS reference:	201920109
Prepared for:	Ark Datacentres
Prepared by:	Steve Power
Reviewed by:	Rosie Wood
Date of issue:	21 March 2021

Contents

Non-Technical Summary

The Spring Park Data Centre Campus, owned by Ark Data Centres Ltd (Ark) operates in accordance with Environmental Permit EPR/PP3003PW first issued 7/7/20. Electricity for operation of the data centres is provided by five connections to the National Grid. Due to the need to ensure availability of uninterrupted power supply at all times, the site incorporates diesel-fired standby generators. To account for this and the future expansion of the facility Ark is proposing to install an additional 21 standby generators that will be phased in over time, providing a total of 54. These will serve the existing buildings, as well as a proposed new P5 unit once operational.

Ark Data Centres Ltd is an experienced data centre operator and has established specification and management arrangements for the safe and efficient operation of data centres within the UK that are certified to ISO14001:2015 & ISO 50001:2018.. Ark has a rigorous design process to ensure that its data centres remain innovative, progressive, environmentally focussed, secure and energy efficient. The company recognises the importance of the design and development function in ensuring its activities are as energy efficient as possible. This includes the utilisation of free cooling and the specification of energy efficient plant and equipment.

The company employs specialist contractors for the supply of equipment, management and maintenance of the facility to ensure compliance with Best Available Techniques (BAT). The installation is therefore specified and will operate in a manner that is consistent with EU guidance for Large Combustion Plants BREF note. In addition the operator has been instrumental in consulting with the Environment Agency in advance of permitting regulations being extended to data centre operations and complies with the requirements highlighted within the EA published FAQ Headline Approach V9 agreed with operators and TechUK.

Each of the existing and new emergency standby generators associated with the data centre is new and is specified to operate within strict emission control standards. The generators are tested periodically to ensure they are ready for use in the event of a mains failure and the impact of their operation during normal, test and emergency operation condition has been assessed from a noise and air quality perspective. Fuel specification, handling and containment arrangements are in place and the facility is served by high integrity hard standing with petrochemical interceptors on surface water drains. All personnel on site are inducted and trained in operational control procedures including responding to environmental incidents.

Both the noise and air quality assessments conclude that the impact of routine maintenance operations on air emissions is “insignificant” and the risk of air quality exceedance arising from emergency operations is low.

1. What operations are you applying to vary?

Table 1 Types of Activities

Schedule 1 listed activities						
Installation Name	**Schedule 1 References**	**Description of the activity**	**Activity daily capacity**	**Annex IIA or IIB (disposal and recovery) codes**	**Hazardous waste treatment capacity**	**Non-hazardous waste treatment capacity**
Spring Park Data Centre	S1.1 A1(a): Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts	Operation of up to 54 emergency standby generators with a total thermal input of approximately 234 MW(th). The generators will burn diesel solely for the purpose of providing electricity to the installation in the event of mains outage.	234 MW(th)	-	-	-

Directly associated activities		
Name of DAA	**Description of the DAA (please identify the schedule 1 activity it serves)**	
Storage of fuel materials	From receipt of fuel to use within the facility.	
For installations that take waste	**Total storage capacity**	N/A
	Annual throughput (tonnes each year)	N/A

1.1 Proposed Changes

Spring Park Data Centre operates in accordance with Environmental Permit EPR/PP3003PW first issued 7/7/20 and consists of 5 units known as SQ17, P1, P2, P3 and P4. Electricity for operation of the data centres is provided by five connections to the National Grid. Due to the need to ensure availability of uninterrupted power supply at all times, the site incorporates diesel-fired standby generators.

In order to meet customer expectations and to provide security of services the operator is required to have resilient, concurrently maintainable standby generator systems on site. Each building is therefore required to be supported by "N+1" generator, which means there is one generator more than would be required to provide the total power for that unit in the event of an external power failure.

To account for this and the future expansion of the facility Ark is proposing to install an additional 21 standby generators in a phased deployment, providing a total of 54 at some time in the future. These will serve the existing buildings, as well as a proposed new P5 unit that is expected to become operational in 2022.

1.2 Standby Generator Capacity

The Spring Park Site Plan (Drawing 19072-PL-1002_00 - Proposed Masterplan) shows:

- The land ownership boundary of the campus (blue line). This is also the existing installation boundary of the permit.
- The location of each of the emergency standby generators associated with the data centres are indicated by the exhaust stack locations using the references within Table 4. The Generator Data Sheets are presented in Appendix C with details of air emissions from the supplier's datasheet used within the Air Quality Assessment Report (Appendix D) and noise performance data used within the noise assessment (Appendix E).

The provision on site for an ultimate deployment of a total of 54 emergency standby generators has been assessed in the attached technical assessments for noise and air quality.

All generating units to be installed within the existing installation boundary will be configured in four banks as follows:

- HV Gen Farm (Buildings P3, P4 &P5): 24 standby generators;
- Building P2: 12 standby generators;
- Building P1: 10 standby generators; and,
- Building SQ17: 8 standby generators.

Site layout plan is shown in Drawing 1 (Reference 19072-PL-1002_00 - Proposed Masterplan lts1) shows the location of each of these units.

The total generating capacity and thermal input at the site will increase from the current 33 permitted standby generators with approximately 120MWth in total to 54 units comprising approximately 234 MWth input in total as summarised in the table below.

Table 2 – Summary of overall standby generating capacity

Number	MW(e)	Total	MW(th) (input)	Total
10	1	10	2.717	27.17
12	1.464	17.57	3.656	43.872
6	1.52	9.12	3.301	19.806
2	1.6	3.2	3.956	7.912
24	2.04	48.96	5.650	135.6
54		**88.85**		**234.36**

No individual plant is larger than 15 MWth, the activity falls under Chapter II of the IED. The plant are classed as medium combustion plant as part of a Chapter II installation. Medium Combustion Plant Directive (MCPD) requirements are fulfilled through compliance with Chapter II of Directive 2010/75/EU. The engines are classed at emergency/standby plant.

1.3 Combustion Technology Selection & BAT

At Spring Park, the emergency back-up generators are installed to provide power to the data centres in the unlikely event of a power outage of mains electricity supplies. To meet the requirements of a Tier III concurrently maintainable data centre, emergency back-up generators must:

- Start and take full electrical load in less than 2 minutes to minimise the quantity of batteries deployed in the Uninterruptable Power Supply (UPS) whilst the generators start, synchronise and accept the load.
- Have sufficient fuel stored on site to enable generator running at full load for 72 hours of continuous running.
- Be deployed in a resilient configuration such that if a generator is out of service (under maintenance or unavailable) the remaining generators can support the full facility electric load (i.e. N+1).

- Must be tested regularly to ensure that they will operate in the unlikely event of a mains power outage.
- Must be able to operate at low loads, during early deployments as the IT demand grows and when external ambient conditions dictate very small cooling demand in the facility.
- Must be modular to allow for expansion as the data centre load grows.

As the emergency back-up generators are an intermittent source of power and the data centres use ambient conditions for "free cooling" there is no opportunity for using heat recovery systems on the generators to improve overall operating efficiencies.

In addition, the electric loads in the facility can change very quickly in response to changes in IT processing demands and/or external ambient conditions. The emergency back-up generators must therefore be able to respond quickly to changes in load condition.

The available engine technologies to provide this level of duty are, diesel engines, gas spark ignition engines, gas turbines and fast start aero engine derivatives. A high-level comparison of the attributes associated with these four technologies, bearing in mind the specific data centre requirements, is presented in Table 3:

Table 3 – High Level Comparison of Alternative Engine/Fuel Technologies

Attributes	Engine/Fuel Technologies (no heat recovery)			
	Diesel Engine	Gas Engine	Gas Turbine	Aero-Derivative
Start Time to Full Load	<2mins	7-10mins	10-15mins	2-5mins
Reaction to Load Changes	Immediate	Slow	Slow	Slow
Fuel Volatility and Storage Safety Risk	Low	High	High	High
Fuel Supply	Diesel	Gas, requires a grid connection	Gas, requires a grid connection	Gas, requires a grid connection
Fuel Storage	Simple tanks and gravity connections	Complex, gas compression, pumps and storage	Complex, gas compression, pumps and storage	Complex, gas compression, pumps and storage
Engine Maintenance	Low Frequency, Standard diesel engine technology	High frequency, Standard Gas engine technology	High frequency, Specialist engineering support	High frequency, Specialist engineering support
Cost per MW installed	Lowest cost	10-20% more costly than diesel engines	20-30% more costly than diesel engines	30-40% more costly than diesel engines

The high-level comparison between the technologies demonstrates that the benefits of fast start, reaction to load changes, simpler and safer fuel supply, storage and handling systems associated with a diesel combustion engine outweigh the benefits of the of the other technologies, particularly given the low anticipated run hours each year for the emergency back-up generators deployed at Spring Park.

The above points along with Ark's experience in developing data centres, goes towards demonstrating that plant sizing, number, configuration along with routine maintenance and testing of emergency back-up generation have all been carefully considered and are aligned with the principles of the BAT process, reducing raw material inputs, reducing fuel consumption and therefore reducing more than just emissions to air per MW of IT processing capacity.

The supplier technical datasheets for each of the different generating units installed and planned to be installed as part of this variation are included at Appendix C.

2. Emissions to Air, Water and Land

The following table provides an updated inventory of all generator units, their location, reference and capacity. This table should be used in conjunction with site layout drawing (Drawing 19072-PL-1002_00 - Proposed Masterplan). The table below lists all generator exhausts for combustion gases. In addition, each generator unit fuel tank has an associated air breather vent to atmosphere.

Table 4 Emission Points to Atmosphere

Emission Point Reference & Location	Manufacturer & Model	Rated source (kw(e)	Rated source (kw(th)	Parameter	Concentration
GS1 SQ17	SDMO X2000C	1,600	3,956	Oxides of Nitrogen (NO and NO2 expressed as NO2) Carbon monoxide Sulphur Dioxide	No limits set/No Monitoring Required
GS2 SQ17	SDMO X2000C	1,600	3,956		
GS3 SQ17	SDMO T1900	1,520	3,301		
GS4 SQ17	SDMO T1900	1,520	3,301		
GS5 SQ17	SDMO T1900	1,520	3,301		
GS6 SQ17	SDMO T1900	1,520	3,301		
GS7 SQ17	SDMO T1900	1,520	3,301		
GS8 SQ17	SDMO T1900	1,520	3,301		
G1 P1	SDMO X1250C	1,000	2,717		
G2 P1	SDMO X1250C	1,000	2,717		
G3 P1	SDMO X1250C	1,000	2,717		
G5 P1	SDMO X1250C	1,000	2,717		
G6 P1	SDMO X1250C	1,000	2,717		
G7 P1	SDMO X1250C	1,000	2,717		
G9 P1	SDMO X1250C	1,000	2,717		
G10 P1	SDMO X1250C	1,000	2,717		
G11 P1	SDMO X1250C	1,000	2,717		
G12 P1	SDMO X1250C	1,000	2,717		
1 P2	SDMO X1850C	1,464	3,656		
2 P2	SDMO X1850C	1,464	3,656		
4 P2	SDMO X1850C	1,464	3,656		
5 P2	SDMO X1850C	1,464	3,656		
7 P2	SDMO X1850C	1,464	3,656		
8 P2	SDMO X1850C	1,464	3,656		
10 P2	SDMO X1850C	1,464	3,656		
11 P2	SDMO X1850C	1,464	3,656		
13 P2	SDMO X1850C	1,464	3,656		
14 P2	SDMO X1850C	1,464	3,656		
16 P2	SDMO X1850C	1,464	3,656		
17 P2	SDMO X1850C	1,464	3,656		
HV 1 HVG	MTU DS2500	2,040	5,650		
HV 2 HVG	MTU DS2500	2,040	5,650		
HV 3 HVG	MTU DS2500	2,040	5,650		
HV 4 HVG	MTU DS2500	2,040	5,650		
HV 5 HVG	MTU DS2500	2,040	5,650		
HV 6 HVG	MTU DS2500	2,040	5,650		
HV 7 HVG	MTU DS2500	2,040	5,650		
HV 8 HVG	MTU DS2500	2,040	5,650		
HV 9 HVG	MTU DS2500	2,040	5,650		
HV 10 HVG	MTU DS2500	2,040	5,650		
HV 11 HVG	MTU DS2500	2,040	5,650		
HV 12 HVG	MTU DS2500	2,040	5,650		
HV 13 HVG	MTU DS2500	2,040	5,650		
HV 14 HVG	MTU DS2500	2,040	5,650		
HV 15 HVG	MTU DS2500	2,040	5,650		
HV 16 HVG	MTU DS2500	2,040	5,650		

HV 17 HVG	MTU DS2500	2,040	5,650		
HV 18 HVG	MTU DS2500	2,040	5,650		
HV 19 HVG	MTU DS2500	2,040	5,650		
HV 20 HVG	MTU DS2500	2,040	5,650		
HV 21 HVG	MTU DS2500	2,040	5,650		
HV 22 HVG	MTU DS2500	2,040	5,650		
HV 23 HVG	MTU DS2500	2,040	5,650		
HV 24 HVG	MTU DS2500	2,040	5,650		

There are no changes proposed for the arrangement of discharge of surface water and foul water from the installation.

3. Operating Techniques

3a Technical Standards

Table 5 Technical Standards

Description of the Schedule 1 Activity or DAA	Relevant Technical Guidance Note	Document Reference
S1.1 A1(a): Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts	Best Available Techniques (BAT) Reference Document for Large Combustion Plants	Section 3a Main Application Document Large Combustion Plant BAT Conclusions Appendix B(i)
As above	Data Centre FAQ Headline Approach V9	Section 3a Main Application Document Data Centre FAQ Appendix B(ii)

3.1 Operational Philosophy

The operational control philosophy of the listed activity has not changed as a result of this variation. The emergency backup diesel generator array associated with the facility only operates to produce electricity for the data centre should mains electricity supply be interrupted. There are five independent mains feeds to the site so their operation for this purpose is very infrequent. However, the generators are tested monthly to ensure they are ready for use in the event of a mains failure and annually during their main service period.

All emergency standby generators are powered by diesel. The combustion of diesel in the event of a mains electricity supply outage, or for generator testing, are the only activities operated by Ark Data Centres Limited at Spring Park that give rise to the production of air emissions and additional noise as a result of emergency conditions and planned testing.

3.2 Generator Testing

The emergency generators are tested to a monthly/quarterly/annual regime on a rotating basis at days and times as agreed by customer contracts:

- Off-load Generator tests are carried out monthly as a group. The group of generators is started and run for 10 minutes with no electrical load applied.
- On-load generator tests are carried out quarterly (instead of the off-load test) by group. Each group of generators is started and run for 15 minutes supporting the data centre demand at that time. Given

the N+1 nature of the generator deployment and the loads in the data centre, during testing this load is rarely greater than 75% of the standby generator capacity, when the facility is operating under normal conditions.

- Service testing when each generator is connected to a load bank (individually) and run at full load for up to 2 hours. Service testing is carried out annually instead of one of the quarterly on-load tests.

As a consequence of this testing regime, each generator typically runs for less than 5 hours a year.

3.3 Grid Reliability

The Spring Park site is currently supplied via five 33kV supplies from SSEN the local Distribution Network Operator, configured as two independent resilient supply systems. One system comprises 2Nr 40MVA supplies providing 40MVA at N+N; the other has 3Nr 24MVA supplies providing 48MVA at N+1. It is therefore anticipated this level of mains electrical system redundancy means that the mains generators are unlikely to operate for extended periods of operation.

3b General Requirements

Table 6 General Requirements

Are fugitive emissions an important issue?	No
Is odour an important issue?	No
Is noise and vibration an important issue?	Yes, under emergency conditions only – See Appendix E

3.7 Emissions to Sewer, Surface Water and Groundwater

3.7.1 Surface and Foul Water Drainage

There are no changes to the site drainage proposed as a result of this variation however, in parallel to this variation the operator is undertaking a review of the site's tertiary containment system which serves the location of the diesel generators across the buildings P1 -4 including the HV Gen Farm and SQ17. The review is being undertaken to close out IC2 in the current permit against CIRIA guidance C736 – Containment Systems for the Prevention of Pollution or an equivalent industry standard and the protection of site surface water soakaways. This review will be completed in April and will be submitted to the local EA officer and central permitting to be considered alongside this permit variation. Without prejudicing the outcome of this review the local EA regulatory officer has confirmed that with the measures the operator is already using (secondary containment with spill alarm, tank gauging, regular site inspections) that the risk of an uncontrolled release from the P1 generators is low and therefore effectively managed. However, additional measures such as installing a penstock valve at an appropriate point in the drainage system, which could be closed on detection of a spill or before higher risk activities such as bulk receipt of fuel are being considered as part of this review and will be reported to the EA ahead of IC3 deadline of July 2021.

3.7.2 Fuel Storage and Delivery

To meet customer requirements the operator has to maintain sufficient fuel on site to operate the standby generators for 72 hours. To achieve this obligation each generator set (new and existing) has a double skinned belly tank manufactured to BS 799: Part 5 Type J (2010) and meets all requirements as set out in Oil Storage Regulations (2001). Each standby generator therefore can hold upto 72 hours of fuel when running at full load.

Each of the belly tanks described above is double skinned. The inner tank is sized to meet the operating requirement of the standby generator. The outer tank is sized to hold the volume of the inner tank (brimful) plus 20%. The outer tank also contains a leak detection float switch, which is linked to the Hytek Tank Alarm located within the Fill Point Cabinet. The alarm in the fill point cabinet is fed back to the generator controller and then into the facility Energy Monitoring System.

Ark operates strict management processes for all work on the live data centres. These processes include Standard Operating Procedures (SOP), Risk Assessments and Method Statements (RAMS), permits to work and change control process. A specialist facilities management contractor oversees the delivery of fuel and maintenance of the associated infrastructure by competent third parties. In addition to SOPs and RAMS for fuel deliveries Ark also has Emergency Operating Procedures (EOP) for diesel spills and leaks. To support the EOP for diesel spills and leaks "Spill Kits" are distributed at every set of generators, with a minimum 1 wheelie bin kit for every two generators. The contents of a "Spill Kit" are listed on the spill kit inspection sheet. Spill kits are inspected monthly as part of the monthly Planned Preventative Maintenance (PPM) schedule.

3.7.3 Waste

There will be no change to the types of waste generated, how they are stored and arrangements for collection and recovery.

3.7.4 Fugitive Emissions to Air

There is no change in the potential for fugitive releases to atmosphere as a result of this variation. The only source of fugitive release is from the vents associated with each of the diesel storage tanks that will occur only during refuelling operations. There is no risk of dust release from the installation through the handling of raw materials or waste. There is no potential for fugitive emissions to air from chillers as cooling requirements are met using an Direct Air Evaporative Cooling plant.

3.7.5 Odour

There are no sources of odour at the site.

3.7.6 Noise

There is very little potential for offsite noise nuisance from the site under 'Normal Operations' when the main sources of noise will be plant which will normally be running, such us the internal plant rooms with associated ventilation inlet and outlet louvers at the buildings' facades and the external roof plant associated with P5 ancillary block and SQ17 extension.

In 'emergency backup' situations the ground level backup electricity generators associated with main power failure will be the main sources of noise together with operation of roof mounted air cooled condensing units associated with emergency cooling system that could lead to off-site impact. The acoustic acceptability of the installation has been assessed following a baseline sound survey out at the closest noise-sensitive receptors and through a comprehensive noise modelling exercise (See Appendix E).

3c Types and Amounts of Raw Materials

The type of raw materials handled and stored at the installation will not change as a result of this variation. Table 7 summarises these together with the increase in the maximum potential amount stored and annual throughput as a result of the increased number of generators covered by this variation.

Table 7 Raw Materials Inventory

Schedule 1 Activity	*Description of raw materials and Composition*	*Max Amount (litres)*	*Annual Throughput (ltrs each year)*	*Description of Use*
S1.1 A1(a)	*Diesel*	*2,284,200*	*<81,000*	*Fuel*
*S1.1 A1(a) **	*Oil*	*16,200, ,*	*** <525*	*Lubricant*
*S1.1 A1(a) ****	*Ethylene Glycol*	*2,700*	*****<50*	*Coolant*

The levels of all raw materials are quoted as maximum and would vary over time as a result of operational activities and maintenance.

* Calculations are based on maximum values and based on full site capacity (54 generators x 300 litres per generator (16,200 litres). No additional substances are stored on site as spares in relation to the maintenance of the Standby Generators as all servicing and maintenance is done by a supplier who brings all materials onto site. ** As this is a new site values for annual throughput are based on maintenance conducted at other sites and will be reviewed as part of the annual reporting regime.

*** Calculations are based on maximum values and based on maximum capacity ((54 generators x 50 litres per generator (2,700 litres). No additional substances are stored on site as spares in relation to the maintenance of the Standby Generators as all servicing and maintenance is done by a supplier who brings all materials onto site.

**** As this is a new site values for annual throughput are based on maintenance conducted at other sites and will be reviewed as part of the annual reporting regime.

3d Management Systems

There will be no change in Ark's management system as a result of this variation.

3d Accident Management

There is no change to the accident management plan for the installation as a result of this variation. The existing control measures previously described in the original application are sufficient.

4. Monitoring

4a Describe the measures you use for monitoring emissions

In line with Data Centre FAQ Headline Approach V9 (agreement point 6) as the individual or groups of generators will not run more than 500 hours in either emergency or standby operational mode (including repair and testing) the emission limit values ELVs to air (and thus engine emissions monitoring) are not required within the permit under the IED/MCPD**.**

There is no requirement for emissions monitoring from the process. The operator does not propose any monitoring.

4b Point source emissions to air only

As above.

5. Environmental Impact Assessment

5a Have your proposals been the subject of an EIA under Council Directive 85/337/EEC?

No

6. Resource Efficiency and Climate Change

6a Describe the basic measures for improving how energy efficient your activities are?

Ark has a rigorous design process to ensure that its data centres remain innovative, progressive, environmentally friendly, secure and energy efficient. The company recognises the importance of the Design and Development function in ensuring the organisations activities are as energy efficient as possible. T

Energy planning activities undertaken by Ark on an ongoing basis and are included in regular energy reviews. The aim of these activities is to create a method through which energy usage is continually reviewed to create achievable, yet challenging energy objectives which will lead to more effective energy use and consumption. In carrying out these activities, Ark will live by the values stated in their Energy Policy and fulfil the pre-determined requirements stated in their Climate Change Agreement and EU-ETS permit when these apply.

In addition, we actively engage with our clients to ensure that their activities also support the energy efficiency of the data centres.

6b Provide a breakdown of any changes to the energy your activities use and create

The estimated energy use for a typical 12-month period when the data centre will be at full capacity.

Table 8 Energy Use

Period	*Electricity (MWh/yr)*	*Natural Gas (MWh)/yr*	*Diesel (litres)/yr*	*Total Emissions (tCO2e)/yr*	*Carbon Intensity (gCO2e)/kWh*
Full Capacity	*~135,000*	*0*	*<22,500*	*<65*	*<0.5*

6c Have you entered into, or will you enter into, a climate change levy agreement?

The operator will remain within its current climate change levy agreement.

6d Tell us about, and justify your reasons for, the raw and other materials, other substances and water you will use

There are no changes to the raw and other materials inventory as result of this variation.

6e Describe how you avoid producing waste in line with Council Directive 2008/98/EC on waste

The existing measures to avoid waste and documented waste management plan are unchanged as a result of this variation.

7. Installations that include a combustion plant (excluding waste incinerators)

Is the aggregated net thermal input of your combustion plant more than 20MW(th)?

Yes

8. Environmental Risk Assessment

The following section addresses the potential impact of the proposed changes on the surrounding area.

Sensitive Receptors

The following sensitive receptors have been identified as being potentially affected by operations at the site. A desk-top study was undertaken to identify any sensitive human receptor (such as residential properties, schools, care homes, health facilities, leisure facilities etc.) in the vicinity of the Site that required specific consideration due to the potential impact at these locations from emissions from the standby generators. These are summarised in Table 9 and shown in Figure 1.

Table 9a Sensitive Receptors - Human

ID	Location	Coordinates		Emission which may impact on the receptor and their relevant pathways
		X	Y	
R1	68 Westwells	385239.6	168903.8	Noise, Air Emissions
R2	26 The Links	384544.3	169404.9	"
R3	The Retreat, Bradford Road	384256.3	169104.3	"
R4	Glenhaven, Bradford Road	384249.1	168680.2	"
R5	31 Moor Park	385443.6	168781.5	"
R6	Jaggards House	385435.2	168536.8	"
R7	Westwells Road	384781.7	169169.0	"
R8	Roundwood Cottage	384785.0	168498.2	"

Emissions from the facility also have the potential to impact on receptors of ecological sensitivity within the vicinity of the Site. A desktop study was undertaken to identify the following sites of ecological or nature conservation importance:

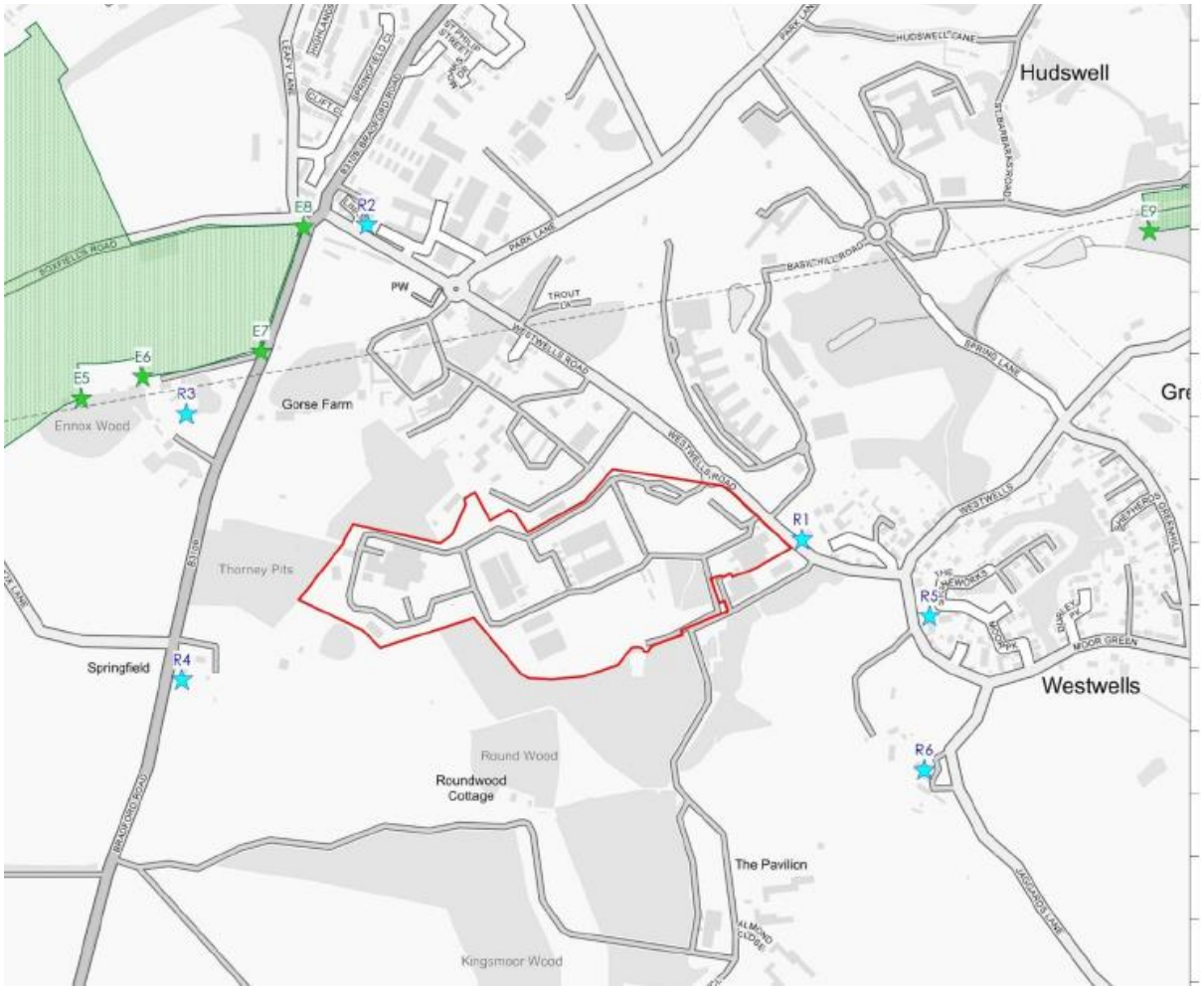
- Special Areas of Conservation (SACs), Special Protected Areas (SPAs) or Ramsar sites within 5km of the standby generators;
- Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs), Local Nature Reserves (LNRs), local wildlife sites and ancient woodlands within 2km of the standby generators.

A pre-application request was submitted to the EA in order to identify relevant sites of ecological or nature conservation importance for inclusion in the assessment. The response indicated the following designations within the relevant distances referenced within the table and the closest point from the installation to each designation given.

Table 9a Sensitive Receptors - Ecological

ID	Location	Coordinates		Emission which may impact on the receptor and their relevant pathways
		X	Y	
E1	Bath & Bradford on Avon Bats SAC and Box Mine SSSI	383540.9	383540.9	Air Emissions
E2	Bath & Bradford on Avon Bats SAC and Box Mine SSSI	383693.2	168564.8	"
E3	Bath & Bradford on Avon Bats SAC and Box Mine SSSI	383593.2	168780.9	"
E4	Bath & Bradford on Avon Bats SAC and Box Mine SSSI	383877.4	168990.1	"
E5	Bath & Bradford on Avon Bats SAC and Box Mine SSSI	384088.9	169128.8	"
E6	Bath & Bradford on Avon Bats SAC and Box Mine SSSI	384186.7	169162.9	"
E7	Bath & Bradford on Avon Bats SAC and Box Mine SSSI	384375.5	169203.9	"
E8	Bath & Bradford on Avon Bats SAC and Box Mine SSSI	384443.7	169401.7	"
E9	Corsham Railway Cutting SSSI	385794.5	169394.9	"

Figure 1 Sensitive Receptors – Human and Ecological in the immediate area of the installation.



Impact of Emissions to Air

The principal emissions to atmosphere from the installation are identified in Table 4. This section presents the approach to the assessment of the impact of the emissions on the local receiving environment.

An air quality assessment has been undertaken based on data for the standby generators provided by the equipment suppliers. The pollutants associated with the generators, as provided by the generator manufacturers are nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter (PM10) and sulphur dioxide (SO_2); therefore the assessment focuses on these pollutants.

In accordance with Data Centre FAQ Headline Approach V9 the assessment considers the potential impact from the operation of the standby diesel generators under the following operating scenarios:

- Event 1 (a) - Standby generator test (no load). Each bank of standby generators is tested monthly when Event 1 (b) and Event 2 are not being undertaken. This involves simultaneous operation of the bank at 0% of full load for 15-minutes;
- Event 1 (b) - Standby generator test (80% load). Each bank of standby generators is tested three times per annum. This involves simultaneous operation of the bank at 80% of full load for 15-minutes;
- Event 2 – Service Test. Annually a full-Service Test is undertaken where one stand-by diesel generator is connected to the load bank, started and run at full load for two hours. This test is carried out on one generator at a time; and
- Event 3 – Grid Outage Event. In the event of a power outage all standby generators would operate at 100% of full load until supply is resumed. As agreed with the EA it is assumed that operation would occur for a maximum of 72 hours. This is based on the resilience of the grid connection Standby duty will only occur in the event of a power failure. A Grid Outage Event of up to five days loss of grid power at a frequency of once per five years has been assumed, as a worst-case event.

A detailed air quality assessment is presented at Appendix D that assessed releases of nitrogen dioxide, particulate matter, sulphur dioxide and formaldehyde. Based on the modelling results and the existing baseline conditions, the results show that in Events 1 and 2 the emissions to air from the standby generators are insignificant. Under Event 3 conditions (emergency operation) there is a potential for exceedance at one human receptor however the risk from this is so low as to not be considered significant. No impact at any of the ecological receptors are predicted.

IC1 of the current permit requires that an Air Quality Management Plan has been produced in consultation with the Local Authority outlining response measures to be taken in the event of a National Grid failure and the operation of the generators. This includes considerations of the predicted potential impact indicated by the air dispersion modelling at individual receptors, timescales for response measures, considerations of local conditions relevant during a grid failure, contingency measures and how this plan will be reviewed. The plan has been produced taking account of the full design capacity of the site introduced by this variation. The plan has been submitted to the local inspector and is included alongside this variation application (Appendix F).

Point Source Emissions to Sewer, Surface Water and Groundwater

Sections 3b Fugitive Emissions and 3d Accident Management outline that there is no change in the risk to sewer, surface water and groundwater as a result of this variation. Pending the outcome of the review required by IC2 and 3 within the current permit the sites existing approach to managing the risk posed by storage of potential pollutants on the site is considered appropriate. This is summarised in the risk assessment below in Table 10.

Odour

The installation has no discernible odour sources and does not present an odour nuisance risk.

Noise

A noise assessment has been undertaken to assess the impact of noise associated with full Data Centre site operations at Spring Park including the addition of P5 and the extension of SQ17 in support of this Permit variation application.

The acoustic acceptability of the full Data Centre operation has been demonstrated utilising a baseline sound survey carried out at the nearest noise-sensitive receptors and a comprehensive noise modelling exercise. The assumptions of the noise model are based on source noise measurements carried out at existing and operating Data Centre P1, P2, Module P3, SQ17 and technical performance datasheet information from suppliers for new equipment together with sound reduction measures employed.

Detailed assessment of operating scenarios have been assessed including 'Normal Operation' scenario assesses acoustic impact of plant which will normally be running, such us the internal plant rooms with associated ventilation inlet and outlet louvers at the buildings' facades and the external roof plant associated with P5 ancillary block and SQ17 extension. Further scenarios included different 'Emergency Backup' scenarios to assess the acoustic impact of the different situations, including the extremely unlikely event of roof-mounted air-cooled condensing units associated with emergency cooling system operation and backup electricity generators operation associated with main power failure occurring simultaneously.

The assessment shows that 'Normal Operations' are expected to have No Impact or a Low Adverse Noise Impact at the nearest and most exposed noise-sensitive receptors, when assessed in accordance with BS4142:2014. The 'Emergency Generators Backup Operations' and 'Emergency Cooling Backup Operations' have both shown to have a Low to Significant Adverse noise impact when assessed in accordance with BS4142:2014. However, considering the emergency, short duration and very occasional occurrence of this scenario, it is considered appropriate to extend the Assessment to comply with BS8233:2014/WHO Guidelines. The assessment has found that in the worst-case scenario of all emergency power generators from all buildings operating at the same time, the BS8233:2014/WHO Guidelines at external amenity areas and the Indoor Ambient Noise Levels targets are achieved at all nearby properties. This scenario operation will not produce a significant adverse noise effect at the nearest noise sensitive receptors.

The emphasis in the management of noise from the site is on prevention during 'normal' day to day data centre operations, and as such preventative maintenance, management, monitoring and inspection of all routine potential sources of noise. No additional measures are considered necessary at this time.

Table 10 Environmental Risk Assessment

Hazard	Receptor	Pathway	Risk Management Technique	Probability of Exposure	Consequence (Severity)	Overall Residual Risk
Emissions to air – generator emission from Standby and Service generator testing	See Tables 9a and 9b	Air dispersion	Selection, operation and maintenance of combustion units in line with BAT for the sector. Rotational time limited testing (each generator <5hrs and cumulative <100 hrs per year).	Low	Low	Low - See Air Quality Dispersion Assessment and Management Plan
Emissions to air – generator emission points Grid outage	See Tables 9a and 9b	Air dispersion	High level of mains electrical system redundancy, selection, operation and maintenance of combustion units in line with BAT for the sector	Low	Medium	Low - See Air Quality Dispersion Assessment and Management Plan
Noise – Normal Data Centre operations	See Tables 9a	Airborne	Specification and selection of equipment. PPM, monitoring and inspection of all routine potential sources of noise	High	Low	Low – See Noise Assessment.
Noise – Grid Outage operations	See Tables 9a	Airborne	Selection, operation and maintenance of combustion units in line with BAT for the sector High level of mains electrical system redundancy,	Low	Low	Low – See Noise Assessment.
Fugitive Emissions to Air – dust, litter etc.	See Tables 9a and 9b	Air dispersion	Housekeeping Standards	Low – no dusty materials	Low	Negligible
Fugitive emissions to air – process	See Tables 9a and 9b	Air dispersion	Contracted maintenance programme.	Low - Potential for emissions during maintenance or in the event of a breakdown	Low – No impact	Negligible

Hazard	Receptor	Pathway	Risk Management Technique	Probability of Exposure	Consequence (Severity)	Overall Residual Risk
Emissions to sewer from discharge point	Water Waste Water Treatment Works	Sewerage drainage system	Specification and selection of equipment. PPM, monitoring and inspection of all routine potential sources of noise Compliance with trade effluent discharge consent	Low (low volumes)	Low – No consent required compliant with consent	Low – site operates within existing consent levels.
Fugitive Emissions to surface water, sewer and groundwater – accidental minor leaks and spills – bulk fuel delivery and storage	Controlled Waters; Water Waste Water Treatment Works	Drainage system; overground.	Tank integrity checks; Containment alarms; Delivery procedures; Spill procedures and training;	Low	Medium – minor impacts with no pollution occurring	Low – minor leaks and spills routinely cleared up with no impact.

Appendices

Appendix A – Site Plans

i) Drawing 1 Site Plan & Air Emission Points (Drawing Emission Points)

Appendix B – BAT Assessment

i) Large Combustion Plant BAT Conclusions

ii) Data Centre FAQ Headline Approach V9 Operator Response

Appendix C – Generator Specification Sheets

Appendix D – Air Quality Assessment

Appendix E – Noise Assessment

Appendix F – Air Quality Management Plan