Permitting decisions

Bespoke permit

We have decided to grant the permit for Ajax Avenue Datacentre operated by Cyxtera Technology UK Limited.

The permit number is EPR/YP3935QM.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Purpose of this document

This decision document provides a record of the decision making process. It:

- highlights key issues in the determination
- summarises the decision making process in the decision checklist to show how all relevant factors have been taken into account
- shows how we have considered the consultation responses.

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit. The introductory note summarises what the permit covers.

Key issues of the decision

Installation:

The site is an existing data centre which consists of a Section 1.1 Part A (1) (a) activity under The Environmental Permitting (England and Wales) Regulations 2016 for the burning of any fuel in an appliance with a rated thermal input of 50 or more megawatts (MW).

The electrical power to the data centre halls is provided by the National Grid. The facility will operate standby diesel fired generators which it will use to supply power to the data centre halls in the event of National Grid outage. No electricity generated will be exported from the installation.

The generators will only operate in the event of power outage or during defined periods for testing and maintenance duties.

The combustion plant, when fully developed, will consist of up to 18 generators with an aggregated thermal capacity of 91.8MWth. There were 14 generators on site as of January 2019 with aggregated thermal input of 71.4MWth.

Air Quality:

The pollutants of concern for emissions to air are the products from the combustion of diesel in the standby generators. The operator submitted an Air Emissions Risk Assessment which screened these emissions to determine whether they could be screened out as insignificant and subsequently carried out detailed air dispersion modelling which assessed the short term (ST) and long term (LT) impacts at human and ecological receptors of nitrogen oxides (NOx), carbon monoxide (CO), sulphur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$) and unburnt hydrocarbons (as benzene [C_6H_6]).

Modelling of sulphur dioxide used concentrations based on a fuel use rate mass balance with full conversions of sulphur to sulphur dioxide and Class A2 diesel (10ppm sulphur). This specification for sulphur in diesel is included in Table 2.1 of the permit, “Raw materials and fuels”.

We have audited the operator’s Risk Assessment and are satisfied that their conclusions could be used for permit determination.

The operator modelled the scenarios of:

(1) Maintenance operations:

Monthly test – every month during weekends, each generator is operated one at a time for 30 minutes with no load.

The air dispersion modelling has assumed that these generators operate for 60 minutes at 50% load with emission rates assumed to be half of the standard full load emission rate as a worst case assumption.

Half yearly maintenance – every six months, maintenance is undertaken on each individual generator set by operating it for 30 minutes with no load.

The air dispersion modelling has assumed that these operate for 60 minutes with standard full load emission rates as a worst case scenario.

Half yearly load tests – every six months, each generator is operated one at a time for 4 hours at 80% load.

The air dispersion modelling has assumed this operation to be at standard full load emission rates as a worst case scenario.

Annual full load tests – once per year, between 12:00pm and 15:00pm on 9th June, all the generators are started, synchronised and tested at site load.

The air dispersion modelling has assumed this operation to be carried out at standard full load emission rates as a worst case scenario.

(2) Emergency Operation (National Grid failure):

In addition to the testing regimes, the operator has modelled an emergency scenario which involves the operation of 16 generators at full load for a total of 500 hours. The operator has stated that only 16 generators are required to take the full site electrical load in the event of National Grid power outage with two generators remaining as backup.

This scenario was modelled using two potential emission rates:

- Case 1: Emission rates based on the standard full load as provided by manufacturer's specifications;
- Case 2: Emission rates based on measured emissions at full load provided by the manufacturer.

The modelling assessed potential impact on ten human health receptors to which we added, during our audit, an additional dwelling 395m from the site.

The modelling considered five habitat sites using distance criteria of 10km and 2km:

- Burnham Beeches (Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI));
- Windsor Forest and Great Park (SAC);
- South West London Waterbodies (Special Protection Area (SPA) and Ramsar site);
- Haymill Valley (Local Nature Reserve (LNR));
- Ward Chalvey (Local Wildlife Site (LWS)).

We included additional sites in our audit of the air dispersion provided extending the distance criteria to 15km:

- Chilterns Beechwoods (SAC);
- Thursley, Ash, Pirbright and Chobam (SAC);
- Thames Basin Heaths (SPA);
- Railway Triangle (LWS);
- Jubilee River and Dorney Wetlands (LWS);
- Stoke Park (LWS).

The modelling used weather data from 2010 – 2015 at London Heathrow located approximately 11km south-southeast of the Cyxtera site which was considered likely to be representative of regional meteorology.

Screening and modelling results

(1) Maintenance Operations:

Screening

Potential annual (long-term) impacts of SO_2 and C_6H_6 were insignificant with the Process Contribution (PC) <1% of the Environmental Assessment Level (EAL).

Potential annual (long-term) impacts of PM_{10} and $PM_{2.5}$ were not significant as Predicted Environmental Concentrations (PEC) were <70% of the EAL.

NO_2 (long-term impact) could not be screened out at this stage so further detailed modelling was required.

No short-term impacts of potential pollutants were screened out without detailed modelling.

Modelling

Modelling indicated that short-term maximum predicted ground level concentrations of SO_2, PM_{10}, CO and benzene could be screened out as their PC values were <1% of their respective EALs.

In the case of NO_2/NOx, modelling demonstrated that:

- For human receptors, both long term and short term predicted NO_2 levels would be unlikely to cause any exceedances of human health standards;
- For ecological receptors, the predictions of daily NOx, annual NOx, nutrient nitrogen deposition and acid deposition would be unlikely to cause any exceedances of respective critical levels and critical loads.

(2) Emergency Operation:

Potential annual (long-term) impacts of SO_2 and C_6H_6 were not significant as Predicted Environmental Concentrations (PEC) were <70% of the EAL.

Detailed modelling was required to assess the potential annual impacts of NO_2, PM_{10} and $PM_{2.5}$. Modelling was also required to assess the short-term impact of all the potential pollutants considered.

The annual impact of PM_{10} was screened out as insignificant as, at all sensitive receptors, the PC for PM_{10} was <1% of the EAL. The annual impact of $PM_{2.5}$ was screened out as not significant as, at all sensitive receptors, its PEC was <70% of the EAL.

The modelling assessments for short-term impacts were based upon the 2014 meteorological data as that resulted in the maximum predicted ground level impact (worst case scenario).

For short-term SO_2, modelling indicated that, for the maximum predicted ground level concentration, the PC would be 1% of the EAL and the PEC would screen out at 8% of the EAL (in the case of 24-hour 99.18%ile).

For short-term benzene, modelling indicated that, for the maximum predicted ground level concentration, the PC would be 2% of the EAL and the PEC would screen out at 6% of the EAL.

For short-term CO (both 1-hour and 8-hour), modelling indicated that, for the maximum predicted ground level concentration, the PC would screen out at <1% of the EAL.

For short-term (24 hour) PM_{10}, modelling indicated that, for the maximum predicted ground level concentration, the PEC would be a maximum of 70.6% so would not beach the EAL.

In the case of NO_2, the modelling indicated that the probability of exceedance of the short-term environmental standard for NO_2 was high (90%) in the event of a requirement for 500 hours operation of the standby generators due to an electrical grid outage. However, further statistical analysis on the short-term exceedances and further sensitivity checks have indicated that exceedances are unlikely if the emergency operation lasts less than 95 hours.

It is a very unlikely scenario that any emergency power outage situation would last more than 95 hours. The site has extensive protection against power outages and, in the nine years of site operation, there has never been an occasion when loss of power from the National Grid caused the operation of even a single standby generator.

Managing emissions:

To address the predicted elevated levels in short term NO_2 limits at sensitive receptors the operator will be required to minimise the potential impact of emissions through a staged programme of improvement conditions.

Improvement Condition, IC1, requires the operator to produce an Air Quality Management Plan in conjunction with the Local Authority that outlines response measures to be taken in the event of National Grid failure.

Improvement Condition, IC2, requires the operator to propose a method of ambient air monitoring to verify the nitrogen dioxide emission concentrations from the standby generators that have been predicted by the air quality modelling report. It is expected that any difficulty in achieving a feasible and valid method will be due to the requirement to differentiate between nitrogen dioxide produced by the operator and nitrogen dioxide from other sources in the atmosphere. The loading rates and durations considered for the air quality monitoring will be worst case scenarios based around monthly testing, half-yearly maintenance, half-yearly load tests and annual full load tests. The output of the verification will be used to revise the Air Quality Management Plan if required.

Improvement Condition, IC3, then requires the operator to review options for reducing predicted short term NO_2 emissions for the grid failure emergency scenario. Completion of this Improvement Condition will necessitate the review of the testing regime (duration, number of engines, loading), the generators (compliance with best practice TA-Luft standards) and the infrastructure of the stack emission points (stack height, orientation). The operator is also required to provide a cost benefit analysis related to the improvements necessary to reduce the NO_2 emissions from the generators (particularly those generators causing most concern, those with highest emission rates, those demonstrating reduced dispersion of emissions and those closest to sensitive receptors). The operator is also required to carry out monitoring of the emissions from one Cummins C2500 D5A engine and one MTU 16V4000 G63 engine and use these to validate the impact assessment and air quality modelling submitted with the application.

Protection against Power Outage and Minimisation of Generator Operation:

The operator has put in place multiple measures to minimise the risk of power failure including dual connections from the National Grid linking from two different sub-stations. These exist on a ring topology which in turn has multiple connections to the 132kV High Voltage Super Grid. One of the key factors in selecting the data centre location was the availability of power and reliability of supply. The site has been constructed along highly reliable and resilient industry standards.

The site is accredited to ISO27001, the information security management system standard, to help ensure that Cyxtera maintains its assets in a manner to reduce the risk of unplanned downtime, and subsequent standby generator operation, due to issues such as security breaches. The site has perimeter fencing at 3m and 10m heights, more than 500 CCTV cameras and a 24-hour on-site security presence.

Cyxtera has achieved M&O (Management and Operations) Certification for its data centres from The Uptime Institute. This certification process assesses staff, organisational practices, maintenance, operation, management and planning to minimise downtime and any potential need for standby generator operation.

The site has an in-house bespoke environmental management system (EMS) that largely mirrors the requirements of ISO14001 and regular maintenance, testing and inspection regimes are in place to ensure reliable operation of the site including its infrastructure necessary for maintaining National Grid power supply.

The data centre design allows for the movement of computer equipment load from one uninterrupted power supply (UPS) to another, should maintenance be required on that UPS, without the need to operate any of the standby generators.

Since the data centre commenced operation almost ten years ago, there have been zero occasions of grid power loss that required operation of any standby generators.

Reliability of Power Delivery in Event of National Grid Outage:

There is a built-in redundancy to the number of standby generators present on site to ensure they can always support the site in the event of any power failure. In the case of Cyxtera Ajax Avenue, the built in redundancy is “N + 1” meaning that there is one more standby generator on site than would be required to deliver the full power load to site should grid connection fail.

Permit Conditions:

The permit will include a maximum 500 hours per annum ‘emergency/standby operational limit’ for the installation. Emission limit values (ELVs) to air and engine emissions monitoring are therefore not required within the permit. 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.

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 or associated monitoring under the Industrial Emissions Directive (IED) and Medium Combustion Plant Directive (MCPD). The Environment Agency expects planned testing and generator operations to be organised to minimise occasions and durations (subject to client requirements).

The permit has a limit on the activity to exclude voluntary ‘elective power operation’ such as demand side response (i.e. on-site use) or grid short term 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’ that voluntarily operate within the balancing market and importantly provide a clear way to demonstrate minimisation of emissions to air as ‘emergency plant’.

The permit application has assessed and provided evidence of the reliability of the local electricity grid distribution allowing the Environment Agency to judge that the realistic likelihood of the plant needing to operate for prolonged periods in an emergency mode is very low.

Reporting of standby engine maintenance run hours is required annually and any electrical outages (planned or grid failures regardless of duration) require both immediate notification to the Environment Agency and annual reporting.

BAT Assessment:

The operator carried out a BAT assessment of the viable technologies capable of providing emergency power at the data centre.

They considered the following technologies:

- Diesel-fired generators
- Natural gas-fired generators (spark ignition)
- Fuel oil-fired generators (typically kerosene fuelled)
- Hydrogen fuel cell generators.

Against the following considerations:

- Start-up time
- Reliability
- Independence of off-system services
- Minimising environmental impact.

The assessment of each technology indicated that only diesel-fired generators gave the quick start-up response necessary for the data centre in the event of power outage (typically other technologies could take up to 30 seconds to provide 100% load). In addition, only diesel-fired generators delivered the raw material resilience requirements for the site as diesel could be stored in on-site tanks and was readily available from a number of external suppliers. There was insufficient space on site for storage of natural gas and hydrogen, both of which also exhibited greatly increased safety and health risks relating to storage and use.

The conclusion of the assessment was that diesel generators were considered BAT.

We have accepted that diesel fired generators are presently a commonly used technology for standby generators in data centres. Retrofitting abatement techniques onto existing power generation technologies would not normally be expected for standby plant to mitigate the emission of standby/emergency operation.

The operator's BAT assessment did demonstrate that diesel-fired generators would produce more potentially polluting emissions to air (most notably NOx) than other technologies. Therefore Improvement Condition, IC3, requires the operator to submit a report detailing the results of a review into options for reducing predicted short term NOx concentrations. This will include a feasibility study (including cost benefit analysis) for potential upgrades to infrastructure such as generators or stacks or changes to operational regimes such as duration and frequency of testing regimes with a view to reducing gaseous emissions of products of combustion or increasing the dispersion of these emissions.

The default generator specification as a minimum for new plant to minimise the impacts of emissions to air (particularly NOx) is 2g TA-Luft (or equivalent standard) or an equivalent NOx emission concentration of 2,000mg/m^3. The standby generators operating on the site are a mix of Cummins C2500 D5A engines (4g TA-Luft) and MTU 16V4000 G63 engines (2g TA-Luft) and therefore a number of these generators have emissions higher than this default standard. This is due to the fact the site has already been operating for approximately ten years prior to falling under the requirements of the Environmental Permitting Regulations. We accept that it would not be practicable to require the operator at this stage to upgrade all plant to BAT standards. However upgrade of plant and installation of new engines that meet default generator specification will be considered as part of the expansion programme for the site in line with the permit preoperational condition and the permit requires the operator to investigate reduction in short term nitrogen dioxide emissions as an integral part of a comprehensive response to Improvement Condition, IC3.

In order to ensure BAT standards are maintained for installation of any further standby generators as part of the site expansion plan outlined in the permit application, a pre-operational condition (POM1) for future development requires the operator to submit a detailed design report to the Environment Agency for approval prior to installation of any additional standby generators at the site. The report must demonstrate how the specification of the generator, height and orientation of discharge flue, location of generator and operational programme are designed to minimise NOx emissions and optimise atmospheric dispersion with a view to reducing any impact of short-term NOx emissions on sensitive local receptors. At the time of permit

issue (April 2019), the installation works for the proposed additional four generators required to complete the site expansion programme (generators 15-18) had not yet commenced.

The operator has justified its use of a large number of smaller generators rather than the use of fewer but larger generators. This allows for flexibility in achieving the required electrical output in the event of an emergency scenario. Only those generators necessary to supply the power required in any given National Grid failure scenario will be required to operate hence reducing consumption of diesel and reducing the potential for emissions to air. In addition, the data centre has been developed in phases and each standby generator is dedicated to a specific power room within the data centre. This approach allowed the generator selected to be matched to the customer demand or required electrical load for each power room ensuring they would be operated at optimal design capacity.

The operator has justified not limiting the number of stacks or not grouping stacks into common windshields because the approach adopted has designed individual stacks to individual generators to optimise dispersion of gaseous emissions during testing/maintenance periods. If a common stack is used for all standby generators and only a few generators tested at any one time, the velocity through that common stack would be low and atmospheric dispersion reduced.

Noise:

The site will operate the generators for testing, maintenance and load tests purposes for set periods each year as outlined in the Section on Air Quality. Based on an expected final complement of 18 standby generators on site after completion of expansion plans, the total operating period for these generators due to testing, maintenance and load testing would be 318 hours.

Prolonged operation outside of these periods will only occur in an emergency situation where the National Grid supply is lost. This is deemed a low risk as the reliability of the National Grid power supply is very good and the operator has taken measures to reduce the potential for, and the potential impact of, grid failure. Since operation of the site commenced almost ten years ago, there have been no cases of operation of standby generators due to National Grid power failure. The potential for prolonged noise is therefore considered to be low.

The site has submitted a noise assessment undertaken in accordance with British Standard 4142:2014, “Methods for rating and assessing industrial and commercial sound” based on the results of spot noise measurements undertaken on site and a background sound survey carried out at nearby noise-sensitive receptors.

The nearest noise-sensitive receptors to site are:

- Thirkleby Close – residential properties approximately 130m to the south east of the site;
- Oakfield Avenue – residential properties approximately 350m to the south west of the site;
- Lake Avenue – residential properties approximately 500m to the east of the site.

The standby generators are each housed in individual steel containers which themselves demonstrate significant levels of attenuation resulting in low levels of breakout noise. Measurements were undertaken around the perimeter of the containers at distance of 1m. Levels ranged between 57-74dB. These measurements were considered near field but as a worst case assessment were corrected assuming standard point source attenuation resulting in a highest level of 85dB. Given the distances to the nearby noise-sensitive receptors, the operator considered that the source be considered a point source and therefore the dimensions of the containers were not accounted for.

It is stated in BS4142:2014 that:

“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, dependant on context.”

The noise assessment indicated that the predicted rating levels during the daytime period at the three sensitive receptor locations during operation of the 18 standby generators were significantly below the background sound levels recorded at these locations. There may also be a noise attenuation effect from a large commercial building close to the south east of the Cyxtera facility which could reduce noise levels recorded at the sensitive receptors on Thirkleby Close and Lake Avenue.

It is concluded therefore that daytime emergency use, testing and maintenance would not have an adverse impact on the assessed nearby noise-sensitive receptors.

The night-time assessments indicated that, in the case of Thirkleby Close, the noise rating level during operation of the 18 standby generators would exceed the background level by 3dB. As the exceedance of background level is <5dB, the potential for adverse impact on this receptor is low.

All non-emergency operation of the generators will occur only during daytime periods, any exceedance at the Thirkleby Close receptor would only be an adverse risk in emergency operation during night-time hours. As there have been no occurrences of emergency operation of generators on site during ten years of operation and any emergency operation, should it occur, could happen day or night, it is concluded that the site operation will not have an adverse impact at nearby noise-sensitive receptors.

There is no history of noise complaints directed at the Cyxtera facility. Although no formal noise management plan has been requested from the site, permit condition 3.4 enables the Environment Agency to request one if considered necessary in the future.

Summary of Measured Noise Levels

Location	Period	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{AMAX}
1. Thirkleby Close	Daytime	57.0	48.8	58.5	74.5
	NightTime	49.0	39.3	44.5	67.1
2. Lake Avenue	Daytime	54.7	44.9	57.5	74.8
	NightTime	47.0	38.5	46.1	66.7
3. Oakfield Avenue	Daytime	59.0	48.7	60.3	76.7
	NightTime	57.1	38.9	51.9	74.3

Predicted Specific Sound Levels

Location	Daytime	Night-Time
1. Thirkleby Close	41.2	40.1
2. Lake Avenue	9.5	9.8
3. Oakfield Avenue	18.3	18.3

BS4142:2014 Assessment

Receptor	Time	Predicted Specific Sound Level ($L_{Aeq,T}$)	Predicted Rating Level ($L_{Ar,T}$)	Derived Background Sound Level (L_{A90})	Difference
1. Thirkleby Close	Daytime	41	43	49	-6
	NightTime	40	42	39	+3
2. Lake Avenue	Daytime	10	12	45	-33
	NightTime	10	12	39	-27
3. Oakfield Avenue	Daytime	18	20	49	-29
	NightTime	18	20	39	-19

Containment and Prevention of Pollution to Ground and Groundwater:

Tanks/Bunds/Pipework and Containment:

Cyxtera currently has the capacity for the storage of up to 258,300 litres of diesel on the site with an additional 6,800 litres required for the four proposed standby generators as part of the site expansion plan.

There are three integrally bunded, horizontal, above ground bulk storage tanks:

- 1 x 96,000 litres;
- 1 x 84,000 litres;
- 1 x 56,000 litres.

Each standby generator also has its own day tank:

- 5 x 1,100 litres
- 4 x 1,700 litres
- 5 x 2,000 litres
- 4 x 1,700 litres (for proposed additional generators).

The bulk storage tanks are designed to provide adequate secondary containment – 110% of the internal volume of the tank. They have high and low level alarms and are fitted with leak detection alarms.

Remote fill points are used for the filling of the bulk tanks on the LO5 data centre site. These are above ground double-skinned pipes (pipe in pipe arrangement) fitted with leak detection alarms. The remote fill points are also fitted with drip trays to capture any minor spills during delivery. With respect to the LO1 data centre, the diesel fill points are located directly on the bulk diesel storage tank within a tank cabinet and the fill point in each cabinet is also provided with a drip tray.

The fuel pipework from the bulk diesel tanks to the standby generator day tanks are also double skinned (pipe in pipe arrangement) and have leak detection alarms.

Each standby generator is located, along with its own diesel day tank, in a steel container. Nine of these day tanks are single skinned whilst five are double skinned. The tanks that would serve the proposed four new standby generators are proposed to be double-skinned. Leakage from these tanks would be contained within the raised floor (200cm raised) of the container unit.

The containment provided by the containers is sufficient to retain the entire contents of the day tanks within those containers:

- The 1,100 litres day tanks are housed in containers with containment capacity of 6,030 litres;
- The 1,700 litres and 2,000 litres day tanks are housed in containers with containment capacity of 5,820 litres.

All the day tanks have fuel level gauges and low/critical low and high/critical high alarms which automatically report to the site Building Management System.

Should there be a risk of leakage exiting the container unit, each container is fitted with a bund alarm. All containers containing diesel tanks alarm both locally and on the Building Management System.

A comprehensive site inspection and maintenance programme is in place to prevent or detect leaks from equipment containing diesel. Bulk diesel storage tanks and associated pipework are subject to annual inspections, including tank integrity testing, by a specialist third-party contractor. In addition to tanks and pipework, this inspection considers the bunding, fill pipes, pumps/dispensers and spill kits.

Cyxtera personnel also undertake monthly visual inspections of the bulk diesel tanks and daily inspections of the individual standby generators and their associated day tanks.

All deliveries of diesel to site are supervised by trained Cyxtera personnel from the point at which the delivery vehicle arrives at the Cyxtera site. During diesel offloading operations, surface water drainage grids in proximity to the offloading operation are temporarily covered with a heavy duty rubber mat or spill absorbent socks are placed around them.

Cyxtera has a number of formal procedures and a site emergency action plan outlining actions to be taken in the event of a leak or spillage of diesel. Cyxtera personnel are trained in the requirements of these procedures and have also received emergency spill training from an approved external contractor.

To avoid the risk of collision damage and potential loss of diesel, the bulk storage tanks are constructed on raised concrete plinths and located away from areas of routine traffic activity. For those tanks that could experience traffic movements in their vicinity, crash barriers are provided around them.

Small amounts of other potentially polluting raw materials are used in operation/maintenance of the standby generators:

- Lubricating oil;
- Transformer oil (not containing polychlorinated biphenyls).

However neither of these will be permanently stored on site. Instead they will be brought to site for specific scheduled or unplanned maintenance activities.

Surface Infrastructure, Drainage and Soakaways:

The site sits on a concrete base and is covered in good quality hardstanding that reduces the potential for any leak of diesel or other materials to reach underlying soils or groundwater. Further protection from pollution is provided by the Slough Industrial Estate drainage infrastructure.

Regular documented inspections of diesel storage tanks, standby generator containers and distribution pipework are in place to ensure that there are no leaks of diesel from any of this infrastructure.

There are five release points for surface water from site to be discharged to municipal foul sewer, S1 – S5. Discharge points S1 and S4 serve surface water runoff from non-operational areas of site or solely roof water runoff. Discharges offsite through S1 and S4 do not pass through an oil interceptor. Discharge points S2 and S3, located close to car parking areas, and S5, have oil interceptors in place. The points discharge of surface water runoff from the rear yard of data centre LO1 to municipal foul sewer. We have required the operator to carry out weekly visual assessment of discharge through S5 as this is the only release point within the operational site area where diesel may be present.

The operator stated that the geology of the site is drift clay over the clay of the Lambeth Group. However we believe that the geology of the site is Langley Silt (unproductive stratum) over Taplow Gravel Formation (Principal Aquifer) over Lambeth Group (Secondary A Aquifer). The operator therefore may have not fully included and considered the Taplow Gravel Principal Aquifer within the conceptual site model. Any drainage through this site is likely to be into this aquifer. It is therefore very important that there are no diesel leaks on site that can drain into the gravel aquifer.

The most vulnerable areas on site for potential drainage into the aquifer would be the site soakaways. These were developed in partnership with Thames Water as a means of managing surface water run-off. When the building known as data centre, LO1, was constructed, Thames Water allowed only a limited volume of surface water runoff to be discharged into their municipal drainage systems. To manage this restriction on discharge, the site was developed such that the surface water runoff from the rear yard and car parking areas of LO1 was directed to the Thames Water drainage system and the surface water runoff from the roof was directed to site soakaways, W3 and W4.

When the site was expanded to construct building LO5, the Thames Water drainage systems were nearing capacity and again Thames Water would permit only limited site surface water to be discharged into their drainage systems. Two further soakaways were constructed to manage the LO5 surface water runoff from the roof and rear yard with all other surface water runoff (from car parking area and a small non-operational area to the north-west of LO5) being discharged to the Thames Water drainage systems.

Although the soakaways may appear a vulnerable area where diesel spillages could drain off-site possibly to an aquifer, the site has robust diesel storage, handling and distribution systems with internal and external inspection and maintenances systems to ensure the risk of diesel leaks and spills are low.

In addition, the surface water discharges to soakaway are predominately those where the risk of contamination are lower such as discharges of roof water.

To further ensure contaminated drainage does have an adverse impact, we have included improvement conditions within the permit requiring the operator to:

- review their tertiary containment on site (including protection of soakaways) (IC4);
- submit a programme of soil and groundwater investigation and reporting to ensure it can sufficiently demonstrate that no contamination of ground and groundwater is occurring (IC5) and
- review their use, location and protection, of soakaways on site (IC6).

Installation Boundary:

The installation boundary encompasses the entire Cyxtera Technology UK Limited site including standby generators, diesel storage tanks, diesel offloading and distribution pipework, data halls and roadways.

Directly Associated Activities:

The operator proposed in the permit application that there should be only one Directly Associated Activity (DAA) – the bulk storage of diesel in storage tanks.

We agreed that this was a DAA but we also believed that surface water drainage should also be a DAA.

The operator proposed that surface water drainage did not meet the three limb tests that must all be satisfied for a DAA as stated in Regulatory Guidance Note RGN2, Understanding the Meaning of Regulated Facility:

- It was not directly associated with the stationary technical unit (combustion activity);
- It did not have a technical connection with the stationary technical unit;
- It was not capable of having an effect on emissions.

Although we believe that the surface water drainage does satisfy the first and third of these criteria, we accept that it does not fully satisfy the second criterion and so we have not included surface water drainage as a DAA. We have nevertheless regulated the aqueous emission points, S1-S5 in Table S3.2, for discharge of surface water from site and required weekly visual assessment of the discharge through S5 for oil and grease.

Aqueous Discharges from Facility:

The Site discharges uncontaminated surface water to municipal (Thames Water) sewer via discharge points, S1 – S5 and to site soakaways, W1 – W4. Should the surface water originate from, or pass through, areas where diesel is stored/transported or car parking areas, the discharge is passed through an oil interceptor. The site does not possess a trade effluent consent for discharge to foul sewer.

The Ajax Avenue site is leased to Cyxtera and the existing site drainage system was connected to the Thames Water municipal drainage systems prior to leasing of the site by Cyxtera. The operator has not modified the connections to the municipal drainage systems since occupying the site.

To ensure municipal sewage works are not overwhelmed during periods of heavy rainfall, it is best practice to not discharge uncontaminated surface water to municipal foul only sewer. The most appropriate discharge off-site for uncontaminated surface water is to surface water sewer and, failing that, combined sewer (taking both trade effluent and uncontaminated surface water). Discharge of uncontaminated surface water to surface water sewer or combined sewer would not require a trade effluent consent.

The Thames Water website states that “We rarely allow surface water to be connected to a foul water sewer, as heavy rainfall can then cause sewer flooding. We only permit this if you can’t discharge your surface water by another method.”

The permit application appeared to indicate that the uncontaminated surface water from site was discharged to municipal foul sewer which is contrary to the advice given by Thames Water. Further information on the matter, including a drainage plan supplied by Thames Water, demonstrated that there is a municipal surface water sewer present on the road outside the Cyxtera site. The landlord for the site confirmed that the surface water drainage from the site ultimately discharges into the Thames Water municipal surface water drainage system rather than the Thames Water municipal foul water drainage system.

The discharge to this surface water drainage system is included as an Operating Technique within Table S1.2 of the permit.

Improvement Conditions:

IC1: To ensure that the operator has defined response measures to be taken in the event of National Grid power failure, the operator shall, in conjunction with the local authority, produce an Air Quality Management Plan outlining actions to be taken in the event of electrical grid failure.

IC2: To compare nitrogen dioxide concentrations produced during operation with those predicted from the air quality modelling, the operator shall propose to the Environment Agency a method for testing ambient air for nitrogen dioxide. Should such a method be feasible and produce valid results and conclusions, it will be used to confirm the short-term nitrogen dioxide concentrations in proximity to the generators, at site boundary and at local sensitive receptors by monitoring or testing of actual ambient levels.

IC3: In order to determine if improvements are required to the site infrastructure or operation to reduce the impact of short-term nitrogen dioxide emissions, the operator shall carry out a feasibility study (including cost benefit analysis) of options for minimising this impact through either reducing emissions or increasing dispersion. This shall include the testing of emissions from one Cummins C2500 D5A engine and one MTU 16V4000 G63 engine which are the only types of engine operating on site. This should encompass all the permitted facility, including generators and infrastructure to be commissioned as part of site expansion programmes and consider upgrades of generators, changes to stack heights and review of generator testing and maintenance regimes.

IC4: To ensure sufficient sealed drainage and containment is in place on site in accordance with CIRIA guidance, the operator shall carry out a review of the tertiary containment system on site that serves diesel storage tanks proposing, with timescales, any improvements necessary.

IC5: To ensure that there is a recorded system that is suitable and sufficient to give warning of potential contamination of ground and groundwater, the operator shall propose for approval and carry out a programme of soil and groundwater investigation and reporting.

IC6: In order to ensure there is no risk of surface water contaminated with diesel potentially discharging to site soakaways and possibly draining to local aquifers, the operator shall review the operation, location and protection of site soakaways.

Decision checklist

Aspect considered	Decision
Receipt of application	
Confidential information	A claim for commercial or industrial confidentiality has been made. This related to: • Contact details for site personnel; • Floor plans, drawings, photographs of sensitive areas included within the Fire Risk Assessment and Emergency Action Plan. We have accepted the claim for confidentiality in relation to the contact details of site personnel. We have excluded names, e-mail addresses and telephone numbers. We have accepted the claim for confidentiality with regard to the floor plans, drawings and photographs of sensitive locations included within the Fire Risk Assessment and Emergency Action Plan. Redacted copies of these documents have been submitted and accepted. The operator has also removed generic information from the Fire Risk Assessment and included that in an expanded section of the Site Risk Assessment relating to management of fire risk. Our guidance document, "Data Centre FAQ Headline Approach" (01/06/18) states that: *"We are unlikely to need the following information in an application:* *1. Site drawings of detailed Data Centre infrastructure like halls, electrical circuits, transformers, security,* *2. Contact details of site staff* *3. Data Centre Site specific operating procedures which don't relate to the permitted combustion process."* The decision was taken in accordance with our guidance on confidentiality.
Identifying confidential information	We have not identified information provided as part of the application that we consider to be confidential.
Consultation	
Consultation	The consultation requirements were identified in accordance with the Environmental Permitting Regulations and our public participation statement. The application was publicised on the GOV.UK website. We consulted the following organisations: - Food Standards Agency; - Health & Safety Executive; - Public Health England; - Director of Public Health (Slough Borough Council) - Director of Public Health (Bracknell Forest Council);

Aspect considered	Decision
	- Slough Borough Council Planning Authority; - Slough Borough Council Environmental Planning Authority. The comments and our responses are summarised in the consultation section.
Operator	
Control of the facility	We are satisfied that the applicant (now the operator) is the person who will have control over the operation of the facility after the grant of the permit. The decision was taken in accordance with our guidance on legal operator for environmental permits.
The facility	
The regulated facility	We considered the extent and nature of the facility at the site in accordance with RGN2 'Understanding the meaning of regulated facility', Appendix 2 of RGN 2 'Defining the scope of the installation', Appendix 1 of RGN 2 'Interpretation of Schedule 1', guidance on waste recovery plans and permits. The extent of the facility is defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit.
The site	
Extent of the site of the facility	The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the. The plan is included in the permit.
Site condition report	The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive. We have included an Improvement Condition, IC5, requiring the operator to propose and implement a programme of soil and groundwater investigation and reporting particularly in regard to the risk of leaks or spillages from site polluting a primary aquifer.
Biodiversity, heritage, landscape and nature conservation	The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat: - Burnham Beeches (Special Area of Conservation); - Windsor Forest & Great Park (Special Area of Conservation); - South West London Waterbodies (Special Protection area & Ramsar site). We have assessed the application and its potential to affect all known sites of nature conservation, landscape and heritage and/or protected species or habitats identified in the nature conservation screening report as part of the permitting process. We consider that the application will not affect any sites of nature conservation, landscape and heritage, and/or protected species or habitats identified.

Aspect considered	Decision
	We have not consulted Natural England on the application. The decision was taken in accordance with our guidance. We have completed a Habitats Regulations Assessment and sent it to Natural England for information.
Environmental risk assessment	
Environmental risk	We have reviewed the operator's assessment of the environmental risk from the facility.
Operating techniques	
General operating techniques	We have reviewed the techniques used by the operator and compared these with the relevant guidance notes and we consider them to represent appropriate techniques for the facility. The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.
Operating techniques for emissions that do not screen out as insignificant	Emissions of nitrogen dioxide (NO_2) cannot be screened out as insignificant. We have assessed whether the proposed techniques are BAT. We agree with the applicant that the use of diesel generators to supply power to site in the event of National Grid outage is BAT when compared with alternative power generation techniques such as natural gas-fired generators (spark ignition), fuel oil-fired generators and hydrogen fuel cell (refer to key issues section) We have imposed an improvement condition requiring the operator to assess improvements in existing systems (generators and emission locations) and for future generators to be installed.
Permit conditions	
Raw materials	We have specified limits and controls on the use of raw materials and fuels.
Improvement programme	Based on the information on the application, we consider that we need to impose an improvement programme. Further information is included in the key issues section of this document.
Emission limits	We have decided that emission limits are not required in the permit. See key issues section of this document.
Monitoring	We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified. These monitoring requirements have been imposed in order to ensure no loss of diesel off-site in surface water discharges.
Reporting	We have specified reporting in the permit to ensure the site is operated to the standards specified in the operating techniques (including prevention of oil and grease in surface water discharged from site) and to ensure the operator informs us of any operation of the facility in emergency mode.

Aspect considered	Decision
Operator competence	
Management system	There is no known reason to consider that the operator will not have the management system to enable it to comply with the permit conditions. The decision was taken in accordance with the guidance on operator competence and how to develop a management system for environmental permits.
Relevant convictions	The Case Management System has been checked to ensure that all relevant convictions have been declared. No relevant convictions were found. The operator satisfies the criteria in our guidance on operator competence.
Financial competence	There is no known reason to consider that the operator will not be financially able to comply with the permit conditions.
Growth Duty	
Section 108 Deregulation Act 2015 – Growth duty	We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit. Paragraph 1.3 of the guidance says: "The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation." We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections. We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Consultation

The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public and the way in which we have considered these in the determination process.

Responses from organisations listed in the consultation section

Response received from
Public Health England (PHE)
Brief summary of issues raised
The consultee noted the applicant's site is located in a predominately industrial area approximately 3km north east of Slough with closet receptors being a number of properties located approximately 160m south east of the site boundary. The consultee recommended that any environmental permit issued for the site should contain conditions to ensure products of diesel combustion (nitrogen dioxide, particulate matter, carbon monoxide and sulphur dioxide) from back-up generator operation do not impact on public health. PHE noted that the air dispersion modelling provided by the applicant indicated there could be an exceedance of the short-term nitrogen dioxide air quality standard in a worst case scenario. The consultee noted that the Environment Agency may wish to assess whether measures to limit nitrogen dioxide emissions from the generators have been fully considered. They suggested modelling could be repeated once generators were commissioned. PHE noted that limited fire prevention and accident management scenarios were provided and recommended further consideration be given to the implementation of fire prevention measures to minimise impact on public health in the event of a fire on site.
Summary of actions taken or show how this has been covered
Improvement Conditions (IC) have been included in the permit: - IC1 requiring the operator to produce an Air Quality Management Plan in conjunction with the Local Authority to outline response measures following any loss of National Grid power supply; - IC2 requiring the operator to propose a method of analysing ambient air to verify the predicted short-term nitrogen dioxide concentrations at sensitive receptors (human and ecological) and use this to update the Air Quality Management Plan if required; - IC3 requiring the operator to review options for reducing the predicted impact of short-term nitrogen dioxide emissions due to standby generator operation after National Grid failure. The site has demonstrated they implement a detailed third-party fire risk assessment and action any areas of non-conformance identified. The site has fire alarms, aspiration, detection and sprinkler systems. The site has a 24/7 security team on site, a minimum of three persons on site at any time, over 500 CCTV cameras, a site access control system and fencing at heights from 3 m to 10 m on the perimeter of the site. The standby generators shutdown automatically in the event of fire. Inspections are carried out on bulk storage tanks and containers holding standby generators to identify and remedy any leaks, spills or abnormal operation that could increase fire risk.

No representations received from:
• Health & Safety Executive • Food Standards Agency • Slough Borough Council (Director of Public Health) • Bracknell Forest Council (Director of Public Health) • Slough Borough Council Planning Authority • Slough Borough Council Environmental Planning Authority.