Permitting Decisions - Bespoke Permit

We have decided to grant the permit for Hemel Hempstead Data Centre operated by Amazon Data Services UK Limited.

The permit number is EPR/BP3546QP.

The application is for the operation of a data centre which is regulated as a Schedule 1, 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 thermal input of 50 or more megawatts (MW). Only the combustion activities (including fuel storage and handling) are regulated by the environmental permit – not the wider operation of the data halls themselves.

The site is comprised of 33 containerised generators for emergency back-up energy purposes with a combined thermal input capacity of 222MWth. Thirty of the back-up generators are double-stacked with two included as secondary redundancy back-up. There is also a smaller “house” generator to cover non-critical operations in an emergency – such as office lights and the office fire system.

The emergency back-up generators can be operated on gas oil or HVO (hydrotreated vegetable oil).

There are also two fire pumps in the sprinkler pump house that will operate to suppress fires in the data halls only. These are rated at 104kW thermal output (approximately 300kW thermal input) and can only operate on gas oil, not HVO. Their presence on site was identified during an Environment Agency visit. Although they should be included within the permit, they have been excluded at this time due to the determination being complete at time of their discovery. They can be added to the permit at a subsequent variation.

There will also be fuel storage facilities regulated under this permit:

- Each generator will have a “belly tank” capable of holding 16m^3 capacity.

- A storage tank of 40m^3 capacity will be used to fill the “belly tanks”.

The storage tank is located within a bund capable of containing 110% of the capacity of the tank. Each “belly tank” is containerised and self-bunded to contain 110% of the tank.

The generators will be used solely for the purpose of generating power for the facility in the event of a failure of supply from the National Grid, or an internal component failure requiring disconnection from the grid. No electricity will be exported from the installation.

A testing regime is in place which requires the generators to be operated for a defined period of time at arranged intervals to minimise air quality impact and to ensure the generators are available to operate in the event of an emergency.

The data centre is located within the Prologis Industrial Park located within a light industrial and commercial area towards the east of Hemel Hempstead. There are a number of other data centres within the wider Prologis Industrial Park area.

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:

- summarises the decision making process in the decision considerations section to show how the main relevant factors have been taken into account
- highlights key issues in the determination
- 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.

Key issues of the decision

Air Quality Assessment.

Modelling Scenarios:

Should the site generators not be required to operate to supply emergency power due to National Grid failure, they will operate only for scheduled testing and maintenance purposes.

The applicant modelled four scenarios in total – three testing/maintenance scenarios and one emergency operation scenario.

Scenario	Operating Profile	Description
Scenario 1: Biweekly	0.5 hour runs fortnightly = 13 hours per year	Each of the 33 generators to be tested, one at a time (daytime only). Generators will be tested at 25% load (but conservatively modelled at 100%).
Scenario 2: Biannual	1.5 hour runs, twice per year = 3 hours per year	Each of the 33 generators to be tested, one at a time (daytime only). Generators will be tested at 100% load.
Scenario 3: Maintenance	3 hours of cumulative running over the course of the year	Each of the 33 generators to be tested, one at a time (daytime only). Generators will be tested at 100% load.
Scenario 4: Emergency	A single (worst case and rare) event of 68 hours of running.	A single event where 30 generators plus the house generator will operate at 100% load and the two redundancy generators idling at 5% load.

Human Health Receptors.

The operator initially modelled potential impact of gaseous emissions on eleven human health receptors. Following the consultation response from Dacorum Borough Council that planning permission had been granted for apartments directly opposite the proposed data centre, this modelling exercise was repeated using new receptors located at the façades of the proposed new dwellings. When constructed, these new dwellings would be the closest human health receptors to the data centre.

Scenarios 1-3 (Planned operations).

The operator noted that, for scenario 1, a conservative approach was taken with the generators running at 100% load and these results are also therefore applicable to scenarios 2 and 3.

(a) NO_2 annual mean.

The largest PC within the proposed new residential development would be 0.01µg/m^3 at receptor HR18_C (on the façade of new residential building D) which is less than 1% of the EAL.

The largest Predicted Environmental Concentration (PEC) would be 23.4µg/m^3 also at receptor, HR18_C, which is less than 60% of the EAL.

As there are no predicted exceedances of the EAL and the PC is less than 1% of the EAL, the operator assessed the impact as insignificant for scenarios 1-3.

(b) NO_2 hourly mean.

The modelling predicted that the largest PC of the 99.79th percentile hourly mean NO_2 would be 58.4µg/m^3 at receptor HR14_G on the façade of the new residential building B (west) which was 29% of the EAL. The largest PEC would be 105.2µg/m^3 also at receptor HR14_G which is 53% of the EAL.

Although the PC is not insignificant (>10%), the PEC (taking into account background) is less than the hourly mean NO_2 EAL.

The operator proposed that, as there are no predicted exceedances of the air quality standard at any of the assessed receptors and the testing of the standby back-up generators is not a continuously operating process, the impact from the generators on the NO_2 hourly mean EAL would be acceptable for scenarios 1-3.

(c) PM_{10} annual mean.

The modelling predicted that the largest PC of PM10 annual mean would be <0.01µg/m^3 at receptor HR17_G (on the façade of the new residential building C (south). This is less than 1% of the EAL. The largest PEC is 14.4µg/m^3 at HR17_G which is 36% of the EAL.

As there are no predicted exceedances of the EAL, and the PCs are <1% of the EAL, the operator assessed the impact of gaseous releases from the generators on the PM_{10} annual mean air quality standard as insignificant for scenarios 1-3.

(d) PM_{10} daily mean.

The modelling predicted that the largest PC for PM_{10} (90.41st percentile daily mean) is 1.3µg/m^3 at receptor HR18_G (on the façade of new residential building D), which is 2.6% of the EAL. The largest PEC is 30.1µg/m^3 at HR18_G, which is 60% of the EAL.

As no exceedances of the EAL are predicted and all short-term PCs are predicted to be less than 10% of the EAL, the operator assessed the impact of gaseous releases from the generators on the PM_{10} daily mean air quality standard as insignificant for scenarios 1-3.

(e) $PM_{2.5}$ annual mean.

The modelling predicted that the largest PC for $PM_{2.5}$ annual mean is <0.01 µg/m^3 at receptor HR17_G on the façade of new residential building C (south) which is <1% of the EAL. The largest PEC is 10.2µg/m^3 at a number of receptors – HR6 (22 Barley Croft), HR7 (22 Hales Park Close), HR9 (Holiday Inn, Hemel Hempstead) and HR11 (17 Barley Croft). These PEC values are all 51% of the EAL.

As no exceedances of the EAL are predicted and all short-term PCs are predicted to be less than 1% of the EAL, the operator assessed the impact of gaseous releases from the generators on the $PM_{2.5}$ daily mean air quality standard as insignificant for scenarios 1-3.

(f) SO_2 15-minute mean.

The modelling predicted that the largest PC would be 112.4µg/m^3 at receptor HR17_G (on the façade of the new residential building C, south) which would be 32% of the Environmental Assessment Level (EAL) of 350µg/m^3. The largest PEC is also predicted to be at HR17_G which is 120.2µg/m^3 which is 34% of the EAL.

Although the PC is not insignificant (>10%), the PEC (taking into account background) is less than the 15-minute mean SO_2 EAL.

The operator proposed that, as there are no predicted exceedances of the air quality standard at any of the assessed receptors and the testing of the standby back-up generators is not a continuously operating process, the impact from the generators on the SO_2 15-minute mean EAL would be acceptable for scenarios 1-3.

(g) SO_2 hourly mean.

The modelling predicted that the largest predicted PC of SO_2 99.73rd percentile hourly mean was 65.6µg/m^3 at receptor HR14_G (on the façade of the new residential building B, west) which is 19% of the EAL of 350µg/m^3. The largest PEC is 73.4µg/m^3 also at HR14_G, which is 21% of the EAL.

Although the PC is not insignificant (>10%), the PEC (taking into account background) is less than the hourly mean SO_2 EAL.

The operator proposed that, as there are no predicted exceedances of the air quality standard at any of the assessed receptors and the testing of the standby back-up generators is not a continuously operating process, the impact from the generators on the SO_2 hourly mean EAL would be acceptable for scenarios 1-3.

(h) SO_2 daily mean.

The modelling predicted that the largest predicted PC of SO_2 daily mean was 29.1µg/m^3 at receptor HR17_G (on the façade of the new residential building C, south) which is 23% of the EAL of 125µg/m^3. The largest PEC is 37.0µg/m^3 also at HR17_G, which is 30% of the EAL.

Although the PC is not insignificant (>10%), the PEC (taking into account background) is less than the hourly mean SO_2 EAL.

The operator proposed that, as there are no predicted exceedances of the air quality standard at any of the assessed receptors and the testing of the standby back-up generators is not a continuously operating process, the impact from the generators on the SO_2 hourly mean EAL would be acceptable for scenarios 1-3.

(i) CO hourly mean.

The modelling predicted that the largest PC of CO hourly mean was 222.8µg/m^3 at receptor HR14_G (on the façade of the new residential building B, west) which is less than 1% of the EAL of 30,000µg/m^3. The largest PEC is 600.4µg/m^3 also at HR14_G, which is 2% of the EAL.

The operator predicted that the impact from the generators on the CO hourly mean EAL would be insignificant for scenarios 1-3.

(j) CO 8-hour rolling mean.

The modelling predicted that the largest PC of CO hourly mean was 405.4µg/m^3 at receptor HR14_G (on the façade of the new residential building B, west) which is 4.1% of the EAL of 30,000µg/m^3. The largest PEC was 782.9µg/m^3 also at HR14_G, which is 7.8% of the EAL.

The operator predicted that the impact from the generators on the CO hourly mean EAL would be insignificant for scenarios 1-3.

Summary:

We have carried out our own checks on the operator's modelling and have used alternative meteorological data years, higher background NO_2 concentrations, terrain data and alternative building configurations.

Although we do not necessarily agree with the consultant's numerical values, we agree that the contributions from the facility during the testing scenarios are not likely to lead to an exceedance of the EALs at any location of exposure for human health.

We do note that the proximity of the new residential apartments, which will be as close as 60m from the data centre, will introduce additional uncertainty to the modelling due to the potentially more turbulent flow that will be experienced and the fact that some of the receptors will be in the cavity region of the data centre site building.

Because of this, we have included improvement condition, (IC2) requiring the operator to verify the predicted short-term concentrations of nitrogen oxides and sulphur dioxide. We have included nitrogen monoxide (NO) in this improvement concentration as the operator did not include it in their monitoring. We carried out check modelling of NO in our assessment which indicated that the PCs for long-term and short-term NO would be insignificant for the testing and maintenance scenarios 1-3. For emergency scenario 4, our checks indicated that the long-term NO PCs would not be insignificant, but the PECs were less than the EAL. Exceedance of the short-term NO EAL would be possible at the closest sensitive human health receptors under scenario 4.

Scenario 4 (Emergency operation).

(a) NO_2 hourly mean.

Should the back-up generators be required to operate simultaneously in the event of National Grid outage, the largest PC in the 99.79th percentile NO_2 hourly mean is predicted to be 1,564.3µg/m^3 at receptors HR14_A to HR14_G on the façade of the new residential building B (west). These levels would be significantly greater than the EAL.

The operator carried out statistical analysis using hypergeometric distribution to determine the potential likelihood of these exceedances occurring.

The original air quality assessment modelled 68 hours of emergency operation and recorded the highest probability of an exceedance of the EAL was 4.9% at receptor H7 (22 Hales Park Close) which indicated the risk of exceedance was 'unlikely' as it fell below the criterion of 5% for unlikely effects. When the modelling was repeated with the proposed new residential receptors in place, 68 hours of emergency operation was now predicted to 'likely' result in exceedances of the EAL at many of the new receptors – with a 53% probability of exceeding the EAL at receptor HR18_C on the façade of the new residential building D.

With these new receptors present, the period of emergency operation would be required to not exceed 51 hours in order to limit the probability of an EAL exceedance to less than 5% (exceedance considered 'unlikely'). Under that emergency operation scenario, the highest probability of an EAL exceedance was predicted to be at receptor HR17_G on the façade of the new residential building C (west).

An emergency operation scenario of more than 51 hours is considered very unlikely due to the electrical design and built-in resilience measures at the site and the known reliability of the National Grid. The operator noted that the National Grid's National Electricity Transmission System Performance Report 2021-21 reported the longest loss of supply lasted 454 minutes (7.5 hours in Tinsley Park, Sheffield over 190km north of the Amazon Hemel Hempstead site). This supports the operator's contention that a continuous complete electrical grid failure of more than 51 hours is highly unlikely.

The operator has therefore proposed that, with the inclusion of the new residential developments in the modelling, an exceedance of the NO_2 hourly mean would be 'likely' under their modelled 68 hours emergency operation. However, by reducing any emergency operation to a maximum of 51 hours, an exceedance would be 'unlikely'.

(b) USEPA AEGLs.

The operator also used the air dispersion modelling to assess impact of the emergency operation (scenario 4) against the United States Environmental Protection Agency (USEPA) Acute Exposure Guideline Levels for Hazardous Substances (AEGLs).

Exceedances of the lower AEGL1 limit were predicted at a number of the modelled receptors at the higher storeys of the proposed new residential buildings.

There were twelve exceedances predicted, all at the top two storeys of the new buildings, for the AEGL1 10-minute and 30-minute limits.

There were eleven exceedances predicted, again all at the top storeys of the buildings, against the 1-hour limit for AEGL1.

The AEGL guidance states that the effects of exposure to emissions at AEGL1 limits are "not disabling and are transient and reversible upon cessation of exposure".

The predicted concentrations at all receptors were below the AEGL2 and AEGL3 limits.

Because the limits AEGL2 and AEGL3 were not predicted to be exceeded and the unlikely scenario of an extended National Grid outage requiring prolonged operation of the back-up generators, the emergency scenario is deemed acceptable for compliance against AEGL limits.

(c) SO_2 15-minute mean.

The modelling predicted that the largest PC of SO_2 99.9th percentile 15-minute mean was 117.8µg/m^3 at receptor HR17_G (on the façade of the new residential building C, south) which is 34% of the EAL of 350µg/m^3. The largest PEC was 125.7µg/m^3 also at HR17_G, which is 36% of the EAL.

Our audit indicated that the EAL used of 350µg/m^3 was incorrect and the operator should have used an EAL of 266µg/m^3. Using the correct EAL, the PC at the predicted most impacted receptor would be 44% with PEC being 47% of the EAL.

The operator noted these results include the overly conservative assumption that the generators will operate for all hours of the year, in order to calculate the 99.9th percentile. Therefore, the operator predicted it was unlikely the SO_2 15-minute mean EAL would be exceeded. As this scenario was also unlikely to occur, the operator concluded the impact would be acceptable.

(d) SO_2 hourly mean.

The modelling predicted that the largest PC of SO_2 99.73rd percentile hourly mean was 95.8µg/m^3 at receptor HR14_G (on the façade of the new residential building B, west) which is 27% of the EAL of 350µg/m^3. The largest PEC was 103.6µg/m^3 also at HR14_G, which is 30% of the EAL.

The operator noted that these results include the overly conservative assumption that the generators will operate for all hours of the year, in order to calculate the 99.73rd percentile. Therefore, the operator predicted it was unlikely that the SO_2 hourly mean EAL would be exceeded. As this scenario was also unlikely to occur, the operator concluded the impact would be acceptable.

(e) CO hourly mean.

The modelling predicted the largest PC of CO hourly mean was 452.0g/m^3 at receptor HR14_G (on the façade of the new residential building B, west) which is less than 1.5% of the EAL of 30,000µg/m^3. The largest PEC was 829.6µg/m^3 also at HR14_G, which is 3% of the EAL. The impact from this predicted concentration would be insignificant.

The operator also noted that these results include the overly conservative assumption that the generators will operate for all hours of the year, in order to calculate the maximum concentration. Therefore, the operator predicted it was unlikely that the CO hourly mean EAL would be exceeded. As this scenario was also unlikely to occur, the operator concluded the impact would be insignificant.

(f) CO 8-hour rolling mean.

The modelling predicted the largest predicted PC of CO hourly mean was 405.4µg/m^3 at receptor HR14_G (on the façade of the new residential building B, west) which was less than 4% of the EAL of 30,000µg/m^3. The largest PEC was 782.9µg/m^3 also at HR14_G, which is 8% of the EAL. The impact from this predicted concentration would be insignificant.

The operator also noted that these results include the overly conservative assumption that the generators will operate for all hours of the year, in order to calculate the maximum concentration. Therefore, the operator predicted it was unlikely that the CO 8-hour rolling mean EAL would be exceeded. As this scenario was also unlikely to occur, the operator concluded the impact would be insignificant.

Ecological Receptors.

Scenarios 1 -3 (Planned operations).

The consultant has grouped scenarios 1-3 assuming a total of 19 hours of operation per generator each year. This still provides a conservative approach assuming generators operate at 100% load. The results also use the worst possible year for meteorological data which again is a conservative approach to assigning risk.

(a) NOx annual mean.

The largest predicted Process Contribution (PC) in NOx annual mean is <0.01µg/m^3 at all ecological receptors ER1 – ER12, which is less than 1% of the EAL of 30µg/m^3. The largest Predicted Environmental Concentration (PEC) from the modelling is 26.2µg/m^3 at ER7, which is less than 88% of the EAL.

There were no predicted exceedances of the EAL. Neither of the screening criteria for ecological sites were exceeded, as the PC for the Chiltern Beechwoods SAC (ER1) was less than 1%, and the PCs for all other local nature sites were less than 100%.

Therefore, the impact from the generators on the NOx annual mean EAL at the sensitive receptors was assessed as insignificant.

(b) NOx daily mean.

The largest predicted PC in NOx daily mean is 1.1µg/m^3 at receptor ER2 (Maylands Wood Ancient Woodland, Local Wildlife Site) which is 1% of the EAL of 75µg/m^3. The largest PEC predicted is 52.9µg/m^3 at ER7 (Westwick Row Wood, Local Wildlife Site), which is approximately 70% of the EAL.

There were no predicted exceedances of the EAL. Neither of the screening criteria for ecological sites were exceeded, as the PC for the Chiltern Beechwoods SAC (ER1) was less than 10% and the PCs for all the other local nature sites were less than 100%. No exceedances of the EAL were predicted.

Therefore, the impact from the generators on the NOx daily mean EAL at the sensitive receptors was assessed as insignificant.

(c) SO_2 annual mean.

The largest predicted PC in SO_2 annual mean is <0.01µg/m^3 at receptor ER2 (Maylands Wood Ancient Woodland, Local Wildlife Site), which is less than 1% of the EAL of 20µg/m^3. The largest PEC predicted is 7.7µg/m^3 at ER3, which is 38% of the EAL.

There were no predicted exceedances of the EAL. Neither of the screening criteria for ecological sites were exceeded, as the PC for the Chiltern Beechwoods SAC (ER1) was less than 1%, and the PCs for all other local nature sites were less than 100%.

Therefore, the impact from the generators on the SO_2 annual mean EAL at the sensitive receptors was assessed as insignificant.

(d) Nutrient nitrogen deposition.

With regard to nutrient nitrogen, the PCs at the ecological receptors were predicted to be < 1% and the PEC > 70% of the relevant critical loads. However, in all cases the background already exceeds the relevant critical load used in the assessment.

(e) Acid deposition.

For acid deposition, the PC for each ecological receptor was less than the critical load and no exceedances of the critical load function were recorded using the APIS critical load function tool. As such, the impacts of acid deposition were assessed as not significant.

For each ecological receptor, the operator included in the modelling report, a screenshot from the APIS website of the acid critical load function.

Scenario 4 (Emergency operation).

(a) NOx daily mean.

The modelling predicted that the largest PC would be 440.6µg/m^3 at receptor ER2 (Maylands Wood Ancient Woodland, Local Wildlife Site) which is 588% of the critical load of 75µg/m^3. The largest PEC predicted was 481.9µg/m^3 also at ER2 which is 642% of the critical load.

Exceedances of the critical loads are predicted at all but one receptor assessed - ER1 (Chilterns Beechwood Special Area of Conservation). This receptor, ER1, is the only European statutory site within the screening distance. It is located approximately 8km from the proposed Amazon data centre and, even should emergency operation of the generators last for the 68 hours modelled, critical loads at that site will not be exceeded.

However, exceedances of the critical loads would be predicted at all the non-statutory conservation sites closer to the data centre. However, as with the assessment of impacts on human health from emergency operating scenario, it is unlikely that any significant period of such operation will be required due to the built-in resilience on site for electrical supply and the reliability of the National Grid.

BAT Compliance.

We accept that currently gas oil generators are an accepted technology for back-up electrical power supply at sites such as data centres where loss of power could have very significant impact on the work they carry out.

Nevertheless, we required the operator to carry out a BAT assessment of their proposed generators against other technologies that could supply back up power in the event of National Grid failure.

They reviewed the following technologies:

- Combined cycle gas turbine.
- Open cycle gas turbine.
- Aero derivative gas turbine.
- Gas fuelled engines.
- Gas oil fuelled engines.
- Hydrogenated vegetable oil (HVO) fuelled engines.
- Hydrogen fuelled engines.
- Renewables

Against the following criteria:

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

Of the techniques considered, only engines fuelled by gas, gas oil or HVO were considered feasible sources of back-up electricity.

The gas storage and supply requirements for the gas engines made this option unfeasible as a final design solution for the site. Uncertainty around the supply, use and emissions data for HVO-fuel also removed this as the final design solution for the site.

The operator proposed that overall, the gas oil fuelled generators would offer their business the most reliable balance between supply, immediate output of power and safe storage at this time.

Whilst acknowledging potential environmental impacts from the use of gas oil fuel, they decided the standby nature of back-up generators and infrequent testing would not cause exceedances of air quality standards at sensitive receptors.

Since submission of the application, the operator has confirmed that both gas oil and HVO are suitable for fuelling the emergency back-up generators.

We expect that the minimum specification for new back-up generators to minimise impact on air quality is 2g TA-Luft or Tier II US EPA, or equivalent with a maximum NOx emission concentration of 2,000mg/m^3 at standard reference conditions and 5% oxygen. The generators to be installed at the Amazon Hemel Hempstead data centre have emissions that meet this requirement.

Noise.

As only the gas oil/HVO generators and bulk gas oil/HVO storage tanks are included within the installation boundary, the most significant noise sources will be the operation of those generators and tanker movements on site delivering fuel. Other noise sources such as the chillers and fans serving the main data centre halls are not included within the installation boundary.

The operator submitted a Noise Impact Assessment which they subsequently updated to consider impact on the new apartments which will be the closest inhabited dwellings once they are constructed. They used manufacturer's sound data for the new generators and considered a worst-case scenario where all generators are operating at the same time. As discussed previously, this would only occur in the unlikely case of full National Grid power outage.

The operator concluded that the existing residual sound level is higher than the predicted specific sound level at the nearest receptors and that, therefore, it was unlikely that the data centre specific sound level will be audible against the existing soundscape.

With this worst-case scenario and very conservative approach, the operator concluded that the sound emissions from the data centre will be equivalent to a low impact or below adverse impact at the residential receptors.

We have audited the operator's noise impact assessment and noise modelling and agree with their conclusions.

We have decided that no specific noise requirements are required in the permit other than the standard condition, 3.4.

Electrical Reliability.

The operator noted that power for the data centre will be supplied by the National Grid which operates its transmission system in accordance with the Security and Quality of Supply Standard which is a requirement of its Transmission Licence. In accordance with this standard, a level of redundancy is also built into the transmission system.

As noted previously, the operator has confirmed that the National Grid's National Electricity Transmission System Performance Report 2021-21 reported the longest loss of supply lasted 454 minutes (7.5 hours in Tinsley Park, Sheffield over 190km north of the Amazon Hemel Hempstead site).

The National Grid's National Electricity Transmission System Performance Report 2020-219 states that the overall reliability of supply during 2020–21 was: 99.999966%.

During 2020–21, the Report states that there were 455 events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users, with 10 resulting in loss of supplies to customers. None of the supply incidents reported in 2020-2021 were in the vicinity of the data centre site. The total estimated unsupplied energy for these 10 incidents during 2020–21 was 74.36 MWh.

The probability of a significant National Grid outage resulting in prolonged operation of the emergency back-up generators is therefore very low.

The operator has also incorporated additional resilience on site about electrical power supply.

Uninterrupted Power Supply (UPS) systems are in place on IT racks. There is a 100kVA UPS system installed within the house electrical room that serves all areas outside of the data hall. Two 40kVA UPS units are also installed within each of the data hall electrical rooms, serving the data hall controls to manage any short-term fluctuations of the mains power supply.

The power distribution system, on the data centre site, starting from the High Voltage (HV) (132kV) intake substation down to the Low Voltage distribution, is designed to be safe, reliable, robust, and efficient and have in-built redundancy.

Similarly, for the grid connection to the data centre to fail, it would require a number of failures to the upstream distribution network to occur simultaneously.

The Operator has designed and implemented systems with built-in redundancy, based on High Voltage power supply connections from an electricity grid, being the primary power source to the site. A dual redundant circuit provides security of supply in the event of a fault or loss of supply from one source with the other circuit capable of supplying full load to the site. To achieve this redundancy, the operator is implementing a system that will entail the full electrical supply being split 50%/50% (dual-feeds) from alternative supply sources, each capable of supplying the 100%, if required, of the data centre power.

Essentially, the data centre will be supplied from the National Grid by an adjacent 132/33kV substation with two separate circuits from two separate feeders from the Elstree National Grid (NG) 400/132kV upstream substation. In the event of a loss of supply from a single source, 50% of the development is still on the alternative source, while the remaining 50% is on back-up emergency generators temporarily until the site's own distribution system can be rearranged to resume supply from the available source.

This arrangement stays in place until the failed source has restored supply, at which point power returns to the two supply sources.

The operator further noted that the Elstree substation is an important National Grid substation with capacity of more than 2750MVA.

The Operator also undertakes a regular and robust infrastructure inspection, preventive maintenance and testing programme and has an integrated Building Management System (BMS) and an Electrical Power Monitoring System (EPMS) which are additional control tools used to monitor physical assets and equipment status and performance. These measures also minimise the potential for emergency operation of the generators, reducing the overall environmental impact from the installation, in the rare event that they are triggered.

Phasing.

The operator noted that full data centre operation will occur over a number of phases with data rooms (and accompanying generators) being deployed in groups.

The construction of the new High Voltage (HV) substation and new 132kV HV supply ducts and cables for the site was not scheduled to begin until August 2023. The substation and grid connection were due to be ready for energisation in May 2024, which is when the full design resilience will be in place.

The power distribution system shall for a short period of time (estimated 3 months) be at Medium Voltage (MV) (11kV) for the Phase 1 building, which will be on a single feed connection. In the unlikely event of a power failure in this single feed grid connection during this interim period, one main backup generator serving the data hall and one smaller house generator serving the office facilities would be utilised to provide sufficient emergency power for Phase 1.

In this brief period before the HV substation connection at the site is operational, the risk of potential environmental impacts through the use of the backup generators is therefore considered to be very small, due to the low Phase 1 load requirements.

Containment and Gas Oil/HVO Spill Management.

The data centre will utilise one bulk fuel storage tank of 40m^3 capacity which is contained within a bund with a capacity of more than 110% of the storage capacity of the tank (in reality, the bund volume is approximately 75m^3). The bund walls are not the same height all around – the walls closer to the tank are higher to prevent jetting over the top of the bund walls.

This storage volume has been set to meet the operator's requirement that there is sufficient fuel to the generators to provide uninterrupted power for three days without any external assistance. The tank has integral level alarms remotely monitored allowing

instantaneous accurate assessment of the filling level and a high-level alarm to prevent over-filling. During the filling operation, an audible alarm sounds when the fuel tank is 85% full. A further alarm is generated at 90% which closes the motorised fill valve. Finally, a mechanical overfill prevention valve is provided at 95% which shuts off the fill line to the tank. The filling operation is attended at all times.

A road tanker will fill up the bulk fuel storage tank using a fill point in a lockable cabinet. The tanker will be parked on an area of slab that slopes towards a central drain which is connected to a full retention oil separator that is alarmed.

The operator has based the capacity of the oil separator on the fact that fuel tankers are all separated into multiple fuel compartments due to potential differences in the grade of fuels being carried and also to protect against the unlikely event of catastrophic failure. The oil separator connected to the foul water drain in the tanker filling area has been designed to accommodate the rupture of a single compartment (1/3) of a delivery tanker, which is approximately $8m^3$ (8000 litres). Furthermore, this hardstanding delivery and slab-decline area has been sized appropriately to accommodate and contain the entire contents of a $26m^3$ (26,000 litres) fuel tanker.

The bulk storage tank will be used to fuel the individual ‘belly tanks’ for each generator which are $16m^3$ in capacity each. Each belly tank is containerised and self-bunded to contain 110% of the storage capacity of the tank (the outer tank can contain 110% of the total tank contents). The fuel for these ‘belly tanks’ will routinely be pumped directly from the bulk storage tank but they can be filled directly from within their contained area should that be required.

The ‘belly tanks’ are alarmed in the event of pressure loss/significant leakage into the bund, as well as having alarms which alert at high and low fuel levels, both during filling and routine operation. These alarms are remotely monitored via the generator control system. The operator will also carry out daily checks for any signs of smaller leakage not notified by the alarm system.

The operator has located some fuel pipework underground to prevent the risk of damage by collisions from vehicles. The below ground route is served by vacuum leak detection which is connected to the central management system monitored 24 hours a day. This system will identify any issues in either the inner or outer layers of the double contained underground pipework to give early detection of any issues in this route. Should any leaks or issues be encountered, the fuel pipeline and fuel distribution will be closed at both ends (top-up tank to generator yard) to minimise any potential impacts and before any necessary remedial action is taken.

All tanks, pipes and valves are designed to appropriate industry standards and flanged connections between pipes are kept to a minimum.

There is an automatically triggered safe plant emergency shutdown in the event of major faults in equipment being detected.

Spill kits are provided at key locations on site should any fuel spillage occur.

There are two aqueous discharges from site – one to surface water and one to foul sewer. Both of these have an oil interceptor prior to discharge. It is the policy of the operator that the area around the bulk fuel storage tank should drain to the foul sewer as it is deemed the most vulnerable to leaks or spillages die to the volume of the tank and the routine filling operations. The area around the back-up generators discharges to surface water.

Improvement Conditions.

The following improvement conditions (ICs) have been included in the permit:

IC1 which requires the operator to produce an Air Quality Management Plan (AQMP) in conjunction with the Local Authority outlining measures to be taken in the event of a National Grid failure. This improvement condition is included in all data centre permits.

IC2 which requires the operator to submit for approval a report verifying the predicted short-term concentrations of nitrogen oxides (including nitrogen monoxide) and sulphur dioxide at the boundary of the site. The output of the verification exercise should be used to inform or revise the air quality management plan if necessary.

We have included this improvement condition because of the proximity of the proposed new apartments, which will be the closest human health receptors, introduces additional uncertainties in the modelling due to the potential impact of more turbulent flow. It is important, because of their location, that the operator verifies the predicted emissions from their air dispersion modelling to ensure that the data which were used determine potential impact on these receptors are correct.

IC3 which requires the operator to submit for approval a review of options to reduce predicted short term emissions of nitrogen oxides and sulphur dioxide during the maintenance, testing and emergency operation of the stand-by generators. Again, due to the proximity of the new receptors and the predicted concentrations of nitrogen oxides released during these scenarios, we must require the operator to investigate the potential for reduction of these emissions.

IC4 which requires the operator to submit for approval a monitoring plan that will outline their proposal for implementation of the flue gas monitoring requirements outlined in Table S3.1. This is a standard improvement condition for all data centre permits which include a medium combustion plant and, for which, a monitoring proposal that meets the requirements of Table S3.1 has not been submitted.

Pre-operational conditions.

PO1: which requires the operator to submit a commissioning plan with timescales to the Environment Agency for assessment and approval.

Decision considerations

Confidential information

A claim for commercial or industrial confidentiality has not been made.

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.

The decision was taken in accordance with our guidance on confidentiality.

Consultation

The consultation requirements were identified in accordance with the Environmental Permitting (England and Wales) Regulations (2016) and our public participation statement.

The comments and our responses are summarised in the consultation responses section.

The application was publicised on the GOV.UK website.

We consulted the following organisations:

- Dacorum Borough Council Environmental Health Department.
- Dacorum Borough Council Planning Department.
- Health and Safety Executive.
- Thames Water.
- Director of Public Health and UKHSA.
- Hertfordshire Fire and Rescue Service.

The comments and our responses are summarised in the consultation responses section.

Operator

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 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 RGN2 ‘Defining the scope of the installation’ and Appendix 1 of RGN 2 ‘Interpretation of Schedule 1’.

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

The operator has provided a plan which we consider to be satisfactory.

These show the extent of the site of the facility including the discharge points.

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.

Nature conservation, landscape, heritage and protected species and habitat designations

We have checked the location of the application to assess if it is within the screening distances we consider relevant for impacts on nature conservation, landscape, heritage and protected species and habitat designations. The application is within our screening distances for these designations.

We have assessed the application and its potential to affect sites of nature conservation, landscape, heritage and protected species and habitat designations identified in the nature conservation screening report as part of the permitting process.

We consider that the application will not affect any site of nature conservation, landscape and heritage, and/or protected species or habitats identified.

We have not consulted Natural England.

The decision was taken in accordance with our guidance.

Environmental risk

We have reviewed the operator's assessment of the environmental risk from the facility.

The operator’s risk assessment is satisfactory.

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 NOx cannot be screened out as insignificant with regard to impact on human health receptors for the emergency scenario of generator operation in relation to exceedances of Environmental Assessment Levels (EALs) and United States Acute Exposure Guideline Levels for Hazardous Substances (AEGLs).

Emissions of NOx, SO_2, nutrient nitrogen deposition and acid deposition cannot be screened out as insignificant for the emergency scenario of generator operation with regard to their impact on ecological sites (ancient woodland and local wildlife sites).

We have assessed whether the proposed techniques are Best Available Techniques (BAT).

We regard the emergency generator operation scenario to be very unlikely to occur. The site has built in resilience for National Grid failure as it is not dependent on one single source of power from the National Grid.

See the Key Issues section for further details.

Operating techniques for emissions that screen out as insignificant

Emissions of NOx, SO_2, PM_{10} and $PM_{2.5}$ have been screened out as insignificant with regard to impact on human health receptors for the maintenance and testing scenarios, and so we agree that the applicant's proposed techniques are Best Available Techniques (BAT) for the installation.

Emissions of NOx, SO_2, nutrient nitrogen deposition and acid deposition have been screened out as insignificant with regard to impact on all ecological receptors for the maintenance and testing scenarios and screened out as insignificant with regard to the Chiltern Beechwoods Special Conservation Area (SAC) for the emergency generator operation scenario also, and so we agree that the applicant's proposed techniques are Best Available Techniques (BAT) for the installation.

We consider that the emission limits included in the installation permit reflect the BAT for the sector.

National Air Pollution Control Programme

We have considered the National Air Pollution Control Programme as required by the National Emissions Ceilings Regulations 2018. By setting emission limit values in line with technical guidance we are minimising emissions to air. This will aid the delivery of national air quality targets. We do not consider that we need to include any additional conditions in this permit.

Raw materials

We have specified limits and controls on the use of raw materials and fuels.

The sulphur content of gas oil (or equivalent fuel agreed with the Environment Agency) has been limited to 0.001% (w/w) max.

Pre-operational conditions

Based on the information in the application, we consider that we need to include pre-operational conditions.

Please see Key Issues Section.

Improvement programme

Based on the information on the application, we consider that we need to include an improvement programme.

See Key Issues Section for further details.

Emission Limits

We have decided that emission limits are not required in the permit.

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.

We have specified monitoring of emissions of carbon monoxide and oxides of nitrogen from emission points, A1 to A33 (new medium combustion plant), with a minimum frequency of once every 1500 hours of operation or every five years (whichever comes first). This monitoring has been included in the permit in order to comply with the requirements of Medium Combustion Plant Directive.

Taking into account the limited hours of operation of the engines operating at the installation, and the fact that we are not setting emission limits for NOx and carbon monoxide, we consider this monitoring can be carried out in line with web guide ‘Monitoring stack emissions: low risk MCPs and specified generators’ Published 16 February 2021 (formerly known as TGN M5).

We have set a requirement for the first monitoring to happen within 4 months of the issue date of the permit or the date when each new medium combustion plant is first put into operation, whichever is later.

Reporting

We have specified reporting in the permit to ensure the site is operated to the standards specified in the Operating Techniques including the reporting of emissions to air agreed after completion of Improvement Condition, IC4.

We have specified reporting to ensure the operator notifies us of any operation of the stand-by generators in emergency mode in response to national grid power outage.

We made these decisions in accordance with Data Centre FAQ Headline Approach.

Management System

We are not aware of any 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.

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

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 Responses

The following summarises the responses to consultation with other organisations, and 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: **Thames Water**

Brief summary of issues raised: From the information provided, there were no discharges from the installation to land/groundwater or surface water that caused any concern to the consultee at this time.

Summary of actions taken: No further action required.

Response received from: **United Kingdom Health Security Agency (UKHSA)**

Brief summary of issues raised: Based on the information contained in the application supplied to the consultee, UKHSA had no significant concerns regarding the risk to the health of the local population from the installation. That response assumed that the permit holder would take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best practice.

Summary of actions taken: No further action required.

Response received from: **Dacorum Borough Council (response 1)**

Brief summary of issues raised: In relation to land contamination considerations, the consultee confirmed there was no relevant information they were aware of that the Environment Agency had not be made aware of via the application. The consultee noted groundwater sampling and analysis had not been required as part of the submissions to discharge the land contamination conditions placed on the permission 4/01922/19/MFA, which is the permission referenced within the application and the Site Condition Report.

Summary of actions taken: No further action required. The Site Condition Report was assessed during the permit determination process.

Response received from: **Dacorum Borough Council (response 2)**

Brief summary of issues raised: The consultee noted that the Council had granted planning permission for the use of the site as a data centre and had no objections in principle to the granting of an Environmental Permit.

The consultee highlighted that planning permission had also recently been approved for the construction of residential units on the opposite side of Maylands Avenue to the data centre site. They requested that further consideration is given to the impact on these units.

Summary of actions taken: The applicant was informed of this planning permission, about which they were unaware. The applicant was required to submit updated air quality modelling and noise assessments as these new units, for which planning permission had been approved, would be the closest sensitive receptors to the data centre.

APPENDIX 1.

Ecological Receptors.

Reference ID	Receptor	National Grid X	National Grid Y
ER1	Chilterns Beechwood SAC	500448	209977
ER2	Maylands Wood AW, LWS	507520	207861
ER3	Widmore Wood AW, LWS	507418	208561
ER4	Yewtree Wood AW	507043	208773
ER5	Rant Meadow Wood/Bennets End Pit LWS	507326	206493
ER6	Holy Trinity Church, Leverstock Green LWS	508502	206554
ER7	Westwick Row Wood LWS	509338	206429
ER8	Disused Railway Line, Hemel Hempstead LWS	506940	208808
ER9	Disused Railway Line, Hemel Hempstead LWS	507260	208943
ER10	Disused Railway Line, Hemel Hempstead LWS	507915	209515
ER11	Paradise Fields Central LWS	506073	206910
ER12	Blackwater Wood AW, LWS	509422	205831

SAC = Special Area of Conservation; AW = Ancient Woodland;

LWS = Local Wildlife Site.

APPENDIX 2

Human Health Receptors.

REF. ID	Receptor	National Grid X	National Grid Y
Originally assessed human health receptors			
HR1	Maddox Road	507893	207306
HR2	27 The Flags	507866	207369
HR3	26 The Flags	507853	207400
HR4	17 The Flags	507806	207472
HR5	9 Arundell Close	507779	207525
HR6	22 Barley Croft	508159	207282
HR7	22 Hales Park Close	508154	207768
HR8	33 Highland Drive	507996	207208
HR9	Holiday Inn Hemel Hempstead	508520	207432
HR10	7 Maddox Road	507918	207225
HR11	17 Barley Croft	508113	207244
Additional human health receptors assessed after planning decision			
HR12_A	Façade of building A (north)	507897	207409
HR12_B	Façade of building A (north)	507897	207409
HR12_C	Façade of building A (north)	507897	207409
HR12_D	Façade of building A (north)	507897	207409
HR13_A	Façade of building B (south)	507970	207379
HR13_B	Façade of building B (south)	507970	207379
HR13_C	Façade of building B (south)	507970	207379
HR13_D	Façade of building B (south)	507970	207379
HR13_E	Façade of building B (south)	507970	207379
HR13_F	Façade of building B (south)	507970	207379
HR13_G	Façade of building B (south)	507970	207379
HR14_A	Façade of building B (east)	507967	207412
HR14_B	Façade of building B (east)	507967	207412
HR14_C	Façade of building B (east)	507967	207412
HR14_D	Façade of building B (east)	507967	207412
HR14_E	Façade of building B (east)	507967	207412
HR14_F	Façade of building B (east)	507967	207412
HR14_G	Façade of building B (east)	507967	207412
HR15_A	Façade of building B (north)	507937	207423
HR15_B	Façade of building B (north)	507937	207423
HR15_C	Façade of building B (north)	507937	207423
HR15_D	Façade of building B (north)	507937	207423
HR15_E	Façade of building B (north)	507937	207423
HR15_F	Façade of building B (north)	507937	207423
HR15_G	Façade of building B (north)	507937	207423
HR16_A	Façade of building C (north)	507977	207363
HR16_B	Façade of building C (north)	507977	207363

HR16_C	Façade of building C (north)	507977	207363
HR16_D	Façade of building C (north)	507977	207363
HR16_E	Façade of building C (north)	507977	207363
HR16_F	Façade of building C (north)	507977	207363
HR16_G	Façade of building C (north)	507977	207363
HR17_A	Façade of building C (south)	507990	207337
HR17_B	Façade of building C (south)	507990	207337
HR17_C	Façade of building C (south)	507990	207337
HR17_D	Façade of building C (south)	507990	207337
HR17_E	Façade of building C (south)	507990	207337
HR17_F	Façade of building C (south)	507990	207337
HR17_G	Façade of building C (south)	507990	207337
HR18_A	Façade of building D	507989	207309
HR18_B	Façade of building D	507989	207309
HR18_C	Façade of building D	507989	207309
HR18_D	Façade of building D	507989	207309
HR18_E	Façade of building D	507989	207309
HR18_F	Façade of building D	507989	207309
HR18_G	Façade of building D	507989	207309
HR19_A	Façade of building A (south)	507918	207362
HR19_B	Façade of building A (south)	507918	207362
HR19_C	Façade of building A (south)	507918	207362
HR19_D	Façade of building A (south)	507918	207362

HRXX_A assessed at 8.75m height; HRXX_B assessed at 12.25m height;

HRXX_C assessed at 15.75m height; HRXX_D assessed at 19.25m height;

HRXX_E assessed at 22.75m height; HRXX_E assessed at 22.75m height;

HRXX_E assessed at 22.75m height.