

Decision document new bespoke Permit

We have decided to grant the permit for LD11x operated by Equinix (UK) Limited.

The permit number is EPR/CP3409BH/A001.

The application is for 12 emergency standby diesel generators providing electricity to the associated data centre in the event of a failure of supply from the National Grid. Each generator has a thermal input of 8MW.

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

The site is a new 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 combustion plant only operates during limited routine maintenance or in an emergency scenario. The emergency combustion activity comprises 12 diesel fuelled standby generators. Each generator is approximately 8 MWth and has a stack 16m in height.

Electrical power is provided to the data centre from the National Grid. However, in the event of a failure in the electrical supply, the operator will utilise the generators to maintain the electrical supply. The generators will be used solely for the purpose of generating power for the facility. No electricity will be exported from the installation. The standby generators are based upon a block redundant design and configured so that in the event of a total mains failure 11 generators will fire up with 1 as back-up running but with no load. The site has a dual electricity feed to the site. In the event that one of the feeds fails approximately half of the generators will fire up. These will be shut down with the load manually transferred to the remaining utility feed if it is deemed reliable by onsite operations staff.

The engines run on diesel fuel. All engines are housed in separate containers with each having an individual double skinned day tank. There are four bulk 82,800 litre capacity fuel tanks located underneath the diesel generators, which are fully bunded to 110% of tank volume and have a leak detection system.

The site is covered in hardstanding. There are no combined drains and as mentioned oil tanks are bunded to prevent oil entering surface water drains. Surface water passes through an oil interceptor before being discharge to a surface water sewer. No process waters are generated for the site and thus there is no discharge to foul sewer from the generators. Additionally, there is a surface water borehole on site. No pumping is required to extract the water as it is under positive pressure. It is protected by a retaining wall to prevent any contaminants from entering (Schedule 5 question 13e response).

The testing schedule is as follows:

1. Start-up test - Fortnightly. Each engine is operated for 5 minutes, one after the other at 0% load.
2. Black building test - 3 times a year, every 3 months. All generators at once for 1 hour at 60% load.
3. Full load test: Annual test. Each engine is operated one after the other for an hour at 100% load.

The site is located on Slough Business Estate in North West London. The National Grid Reference for the site is SU 94555 81325. The surrounding area is a mix of industrial, commercial and residential uses.

On the Slough Business Estate there is another Equinix (UK) Limited permitted installation (EPR/LP3303PR) referred to as the Slough Campus. The installation consists of 5 separate sites with diesel generators providing back up-power generation capacity to a series of data centres. We consider that there is no technical connection between LD11x and the Slough Campus on the basis that they are managed independently and that the infrastructure (fuel storage and grid connection) is not shared.

In reaching our decision we also took into consideration that:

- LD11x will not be excluded from regulation by being treated as a separate site, a bespoke permit is required due to the total MWth of the site. Therefore, from a regulatory perspective it makes no difference if this is treated as a new bespoke permit or as part of a variation to the Slough Campus permit.
- Full consideration of Environmental Impacts have/could be made as part of a new bespoke/variation to the Slough Campus permit. The air quality impact assessment in this new bespoke EPR/CP3409BH/A001 application includes the emissions from the Slough Campus as part of an in-combination assessment with LD11x in this bespoke application.
- LD11x is part of a joint venture with Equinix (UK) Limited being the operator. Treating LD11x as a bespoke permit makes the distinction between this site and the Slough Campus, where the sites are wholly owned by Equinix (UK) Limited.

Therefore, treating LD11x as a separate installation is appropriate from both a technical and practical perspective.

Air Quality

The primary pollutant of concern to air quality is nitrogen dioxide (NO₂) resulting from the combustion process on site. The Applicant submitted an air dispersion modelling report which assesses the potential impact of emissions of NO₂ and PM₁₀ from the generators on local air quality.

Sulphur Dioxide was not assessed as an ultra-low sulphur fuel is used resulting in negligible emissions of sulphur, this has been included as a restriction in the permit. Carbon monoxide emissions will also be negligible due to installation of modern highly efficient engines allowing for complete combustion.

The data centre is situated within 2km of 3 Air Quality Management Areas (AQMA). These are as follow: Slough AQMA No.1 - 1,470m to the South, Slough AQMA No.3 Extension – 1940m to the South East and South Bucks AQMA – 1660m to the South West. The local authority were consulted and no response was received. We have also included an improvement condition (IC1) requiring the operator to work with the Local Authority to consider the response during grid failure. This should be based upon actual emissions from the installation collected through the emissions monitoring requested as part of improvement condition 3.

We audited the air dispersion modelling and report submitted with the permit application. Both the maintenance testing and emergency scenarios within the modelling were assessed. We agreed with the operator that predicted levels for the three testing regimes and emergency operations were unlikely to cause an exceedance of the Environmental Standard for human receptors and ecological receptors for NO₂ and PM₁₀.

Equinix also operate a series of data centre sites on the Slough Trading Estate under another permit EPR/LP3303PR, where the site is referred to as the Slough Campus. The operator has undertaken an assessment alone for LD11x, and also for LD11x and the Slough Campus, plus a further assessment taking into account background levels. As described above, we have concluded that there is no technical link between LD11x and the Slough Campus. Therefore, LD11x should not be included in the permit for the Slough Campus.

Consideration of LD11x and the Slough Campus as part of an alone assessment is beyond the scope of what is required. It is only necessary to consider LD11x as part of an alone assessment. This is because emissions from the Slough Campus are taken into account when considering background levels. The approach taken by the operator (in taking into account the Slough Campus) will result in the double counting of emissions.

A screening exercise using our H1 tool was undertaken for PM₁₀ based upon a theoretical scenario of all engines operating for 8 consecutive hours in a day. There were no exceedances alone or in combination with the Slough Campus. Therefore, emissions of PM₁₀ are considered acceptable and have not been considered any further. Consideration below is for NO₂ impacts only.

Maintenance testing

Human Receptors:

Short Term impacts

1. Start-up test – There were no predicted exceedances of the Air Quality Standard (AQS) as a result of the start-up testing of the LD11x generators. All short term emissions are less than the 10% significance threshold.
2. Black building test – It is predicted that there will be three exceedances of the NO₂ hourly standard per year. Not all short term emissions are less than 10%. The probability of an impact was considered and is described below.
3. Full load test – There were no predicted exceedances of the Air Quality Standard (AQS) as a result of the start-up testing of the LD11x generators. All short term emissions are less than the 10% significance threshold.

Therefore, the testing regime considered together for LD11x has the potential to result in a maximum number of exceedances of 3 hours in a year, which is below the 19 permissible exceedance hours before the standard is breached.

The testing regime for LD11x was considered with the testing regime of the Slough Campus. The statistical likelihood of the combined testing regime to result in an impact was predicted to be 0.7-1.0%, therefore, it is highly unlikely that there will be a significant impact. No further assessment is necessary.

Our audit of the modelling was unable to replicate the probability of 0.7%-1.0% presented by the operator. However, we can confirm that the exceedance of the short term NO₂ Environmental Standard is unlikely (<5%), our statistical analysis indicated the testing regimes are unlikely to coincide with more than 18 exceedance hours.

Long Term impacts

The purpose of the generators is to provide electrical power over a short period of time in the event of grid failure, reflected through only 30 hours of fuel being stored on the installation. We have limited hours of operation for each diesel generator to a maximum of 500 hours a year for emergency use. Therefore, long term impacts will not be an issue, which is shown in the operators modelling results as described below.

Annual emissions from all 3 parts of the testing schedule for both LD11x considered alone and for when LD11x was considered along with the Slough Campus were insignificant (<1% of the AQS). The long term emissions screen out and no further assessment is necessary.

Our audit of the modelling confirms that Long Term process contributions are not likely to be significant at the receptors either alone or when considered with the Slough Campus.

Ecological Receptors:

Short term and long term impacts were considered from LD11x alone and LD11x plus the Slough Campus. The modelling considered air borne NO_x, Nitrogen deposition and Acidification.

The process contributions at all relevant conservation sites within the screening distance were insignificant for the testing scenario. No further assessment is necessary.

Our audit of the modelling confirms that NO_x nutrient nitrogen and acid deposition process contributions will be insignificant at all conservation sites.

Emergency scenario

The emergency scenario that has been modelled is based upon all engines operating simultaneously for 1 hour. There is 30 hours of fuel stored on the site which is based upon customer demands and Equinix design guidelines, to cater for long-term disruption to the electrical grid. It is deemed unlikely that it will ever be needed. Short term operation is more realistic.

Human Receptors:

During the emergency operating scenario for LD11x (with or without consideration of the Slough Campus), the air quality modelling does indicate a risk of exceedances for environment standards for short term NO₂. Whether the AQS would actually be breached would depend on meteorological conditions, and how many hours the engine operated for (noting that 18 exceedances are permissible in any one year). LD11x alone is not predicted to have the potential to breach the acute exposure level of 940 µg/m³. Long term emissions of NO₂ are insignificant.

The generators on the Slough Campus have only operated once in 2019 which was as a result of a national power outage. The only other record of power supply failure was during 2017 when one of the substation feeds failed but the generators did not need to start due to the second substation being unaffected. It is anticipated that the timescale of operation is likely to be short. They will only operate in this mode when the National Grid is off-line. The Operator has put in multiple measures in place to minimise the risk of National Grid supply failure including dual substation connection and management systems for preventing data centre failure.

This is a new site and all engines installed meet 2g TA-Luft emissions standard. The stack height is 16m which is the maximum permissible within the Slough Simplified Planning Zone (SPZ), which this site is located within. The diesel engines installed are in line with BAT, and dispersion has been maximised within the restrictions in place at this location.

The EA has specified that the operator shall have a written action Air Quality Management Plan (AQMP) to manage the issue for prolonged emergency running of the plant. This needs to be proportionate to the level of risk at the receptors. The operator is expected to work with the local authority to develop this plan to ensure local factors are fully considered. This requirement for an AQMP is included in the permit through improvement condition IC2.

Our audit of the modelling agrees with the applicant that an exceedance of the NO₂ short term hourly Environmental Standard could occur if these operations took place more than 18 times a year. However, in the last nine years there have only been two to three instances requiring emergency power generation due to a failure of the national grid supply.

Our audit indicated that there would be exceedances of the acute exposure levels for NO over 10 minutes, 30 minutes and 1 hour periods at public exposure locations. This indicates an air quality incident level event under emergency operations from LD11x in-combination with the Slough Campus. However, the consideration of LD11x with the Slough Campus does not alter our previously made conclusions and recommendations for the Slough Campus air quality impacts. These recommendations were considered when determining the Slough Campus permit application with relevant measures incorporated into the permit. Additional measures are not required.

Ecological Receptors:

Short term and long term impacts were considered from LD11x alone, and LD11x plus the Slough Campus. The modelling considered air borne NO_x, Nitrogen deposition and Acidification.

The process contributions at all relevant conservation sites within the screening distance were insignificant for the emergency scenario. No further assessment is necessary.

Our audit of the modelling work confirms that both short term and long term impacts from emergency operation are unlikely to be significant for ecological receptors with regards to NO_x nutrient nitrogen and acid deposition process contributions.

Permit conditions

The permit will include a maximum 500 hours per annum 'emergency/standby operational limit' for any or all the plant producing on-site power under the limits of the combustion activity. Therefore emission limit values (ELVs) to air and engine emissions monitoring are not required within the permit. Emergency hours' operation includes those unplanned hours required to come off grid to make emergency repair of electrical infrastructure.

Technically, 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)/Medium Combustion Plant Directive (MCPD). However, the Environment Agency expects the number of and duration of planned testing and generator operations to be minimised as much as possible. (subject to client requirements). The BAT expectation is that individual generator testing is below 50 hours/annum which is drawn from the MCPD specified generator guidance. In this instance the operator is maintaining and testing for a total of 39 hours a year for the installation as a whole, this is in line with BAT and considerably below the level at which ELVs would be needed.

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'.

Operational and management procedures should reflect the outcomes of the air quality modelling by minimising the duration of testing, phasing engines into subgroups, avoiding whole site tests and planning off-grid maintenance days and most importantly times/days to avoid adding to "at risk" high ambient pollutant background levels

The permit application has assessed and provided evidence of the actual 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 low.

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

Noise

The site will only run the engines regularly as part of the testing regime described earlier for 39 hours per year. This occurs during daytime hours at the weekend, and is not classed as part of normal operations.

Prolonged operation will only occur in an emergency situation where the National Grid supply is lost. As this is a new installation then it is not possible to consider historical outage. Instead the operator has provided information from the adjacent Slough Campus also operated by Equinix (UK) Limited. On this installation four generators did run in 2019 as a result of a nationwide power

outage, prior to that the last record of supply failure was in 2017. The risk of 'LD11x' to be operated for a prolonged period is low. Therefore, the potential for prolonged noise is also considered to be low.

Despite this, the operator has taken measures to minimise noise emissions. The generators are housed in acoustic enclosures and all flues are wrapped in acoustic insulation. The operator also commissioned a noise modelling assessment which recommended that a 17.5m noise screen was installed to the south of the site. This has been installed.

The limited hours of operation combined with the proposed noise mitigation measures are considered to be sufficient to control noise arising from the installation.

BAT

As outlined in the Environment Agency's 'Data Centre FAQ' document, we accept that oil fired diesel generators are presently a commonly used technology for standby generators. However we requested a BAT assessment detailing the choice of engine, the particular configuration and plant sizing to meet the standby arrangement (e.g. 2n).

The default generator specification as a minimum for new plant to minimise the impacts of emissions to air of NO_x is 2g TA-Luft (or equivalent standard) or an equivalent NO_x emission concentration of 2000mg/m³. All of the engines meet the 2g standard emissions.

The number and size of the engines matches the requirements of the data centre. Maximum demand calculations have been carried out to affirm the generators are sized (and not oversized) for the design load. The site operates to an n+1 standby arrangement, where n is the load requirement of the data centre.

The size constraints of the site prevents the consideration of a greater number of smaller generators. Larger generators are also generally more efficient than smaller ones. This configuration would also increase the number of hours of testing that would be required each year. A smaller number of larger generators would equally be difficult to fit within the size of the site. Of the variety of engines considered, the efficiency of the engines was similar regardless of capacity.

In order to minimise the need for emergency operation, each building has two separate substation feeds. To address short term fluctuations, brown-outs or black-outs, the site has uninterruptable power supplies. This can supply power for six minutes, until the generators kick in.

Protection of Groundwater

There are no fugitive emissions to land or groundwater from the data centre. The generators are located in containers over hard-standing or concrete flooring. Externally, the Site consists of new hard standing. Diesel, hazardous waste and hazardous materials storage is bunded and/or indoors, such that any source of potential contamination is prevented from discharge to land.

Bulk fuel tanks are fully-bunded to 110% of their volume. The day tanks are double skinned (self-bunded) with leak detection alarms. The majority are under cover and not subject to rainwater incursion.

Equinix has emergency response procedures in place in the event of a release of oil or diesel, processes for the planning for such eventualities and checklists to audit the response in case such an event occurs. Rainwater is kept separate from any areas in which there may be any potential contaminants and is allowed to run off to the surface water drainage serving the trading estate.

Drainage drawings are provided in the application. Details of the existing condition of the Site can be found in the Site Condition Report supplied with the application.

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 application was publicised on the GOV.UK website.

We consulted the following organisations:

- Health and Safety Executive (HSE)
- Local Authority – Planning – Slough Borough Council
- Local Authority - Environmental Health – Slough Borough Council
- National Grid
- Sewage Authority – Thames Water
- Director of Public Health
- Public Health England

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', Appendix 1 of RGN2 '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

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

These show the extent of the site of the facility.

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. A completed Habitats Risk Assessment Level 1 was sent to Natural England for Information Only.

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.

Climate change adaptation

We have assessed the climate change adaptation risk assessment.

We consider the climate change adaptation 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.

Use of conditions other than those from the template

Based on the information in the application, we consider that we need to include conditions other than those in our permit template.

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 include an improvement programme.

We have included an improvement programme (IC1 and IC3) to ensure that to investigate whether short term reductions in nitrogen dioxide or nitrogen oxides can be achieved during emergency operation as discussed in the air quality section of key issues.

A further improvement condition (IC2) has been included to ensure that appropriate containment is in place for all oil and diesel storage tanks on the installation.

Emission Limits

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

Reporting

We have specified reporting in the permit to ensure that the installation is being operated in line with that specified in the operating techniques and to ensure that

we are notified immediately in the instance that the site ever operates in emergency scenario mode.

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.

Previous performance

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

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, 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 main emissions of potential concern are PM_{2.5}, PM₁₀ and nitrogen dioxide. Based on the H1 screening and detailed modelling provided, testing shows Air Quality Standards (AQS) were unlikely to be breached. However, in emergency scenarios there is the potential for the one hour AQS to be breached for nitrogen oxides. This risk is considered to be acceptable based on the fact that this is based on an extreme worst case scenario and that there has only been 2 or 3 instances in the last nine years where the generators have been needed. Even if breaching the AQS for NO_x for a single hour does not constitute a breach then the consideration of the Acute Exposure Guidance Levels (AEGl) should be made. It is requested that a written action plan is produced for managing emissions during prolonged emergency operation. Based on information provide risk to human health is considered low.

Summary of actions taken:

We have assessed that emergency operation is extremely unlikely. Other generators on the Slough Trading Estate operated by Equinix (UK) Limited did run on site in 2019 as a result of a nationwide power outage (four generators). Prior to that the last record of supply failure was in 2017. The potential for prolonged noise is therefore considered to be low.

Impacts on human receptors screened out for NO₂ and PM₁₀ pollutants due to the unlikelihood of emergency power generation and low probability of short term exceedances for the pollutants. Our audit of the air quality modelling did not show any exceedance of the AEGls. An Improvement Conditions has been set to look to minimise the impact from short term emissions of nitrogen oxides during prolonged emergency operation.