Equinix (UK) Ltd

Environmental Permit Variation Application – Powergate (LD9) Data Centre: Supporting Document

18 December 2020

Project No.: 0425532

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18 December 2020

Equinix (UK) Ltd

Environmental Permit Variation Application – Powergate (LD9) Data Centre: Supporting Document

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Acronyms and Abbreviations

Name	Description
BAT	Best Available Technique
BREF	Best Available Techniques Reference document
Breached, breaching, breach	Used here when the predicted ambient concentration of a pollutant at a receptor will not comply with the air quality standard. For example, if the 1-hour mean NO_2 standard is predicted to be exceeded 20 times at a receptor, a breach of the NO_2 1-hour mean is therefore predicted as there would be more than the 18 allowed exceedances of this standard.
CO	Carbon monoxide
EA	Environment Agency
EMS	Environmental Management System
EP	Environmental Permit
EPR	Environmental Permitting Regulations
Exceeded, exceedance, exceed	Used here when a predicted concentration is above an air quality standard threshold. For example, a 1-hour mean NO_2 predicted environmental contribution of 220 µg/m^3 exceeds the 200 µg/m^3 air quality standard.
kWe	Electrical power in kilowatts
IED	Industrial Emissions Directive
ISO	International Standards Organisation
km	Kilometre
L	Litre
m	Meter
MCP	Medium Combustion plant
MCPD	Medium Combustion Plant Directive
MW_e	megawatt electrical
MW_{th}	megawatt thermal
NO_x	Oxides of nitrogen
PM_{10}	Particulate Matter of diameter below or equal to 10 µm
PUE	Power Usage Effectiveness
SO_2	Sulphur dioxide
t	Metric tonne
TGN	Technical Guidance Note
UPS	Uninterruptable Power Supply
WWTP	Waste Water Treatment Plant

APPLICATION CHECKLIST

Requirement	Topic	Location in Report
Form A Question 5c	Details of directors	***Section 1.4***
Form C2 Question 2b and table 1	Changes to existing activities	***Section 1***
Form C2 Question 3d	Management System	***Section 6.1***
Form C2 Question 5a	Provide a plan for the Site	***Figure 3.1***
Form C2 Question 5c	Non-technical Summary	***Page 2***
Form C2 Question 6	Environmental Risk Assessment	***Section 14***
Form C3 Question 1 and Table 1a	Activities to vary	***Section 1***
Form C3 Question 2	Emissions to air	***Section 4.2***
Form C3 Question 2	Emissions to water	***Section 4.3***
Form C3 Question 2	Emissions to Sewer	***Section 4.4***
Form C3 Question 2	Emissions to land and groundwater	***Section 4.5***
Form C3 Question 3a	Operating Techniques	***Section 5***
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From C3 Question 3c and Table 5	Raw Materials	***Section 8***
Form C3 Question 4	Monitoring	***Section 13***
Form C3 Question 4b	Point Source Emissions	***Section 4***
Form C3 Question 6a	Energy Efficiency	***Section 9.2***
Form C3 Question 6b	Energy Usage	***Section 9.1***
Form C3 Question 6c	Climate change levy	***Section 9.4***
Form C3 Question 6d	The raw and other materials, other substances and water use	***Section 8***
Form C3 Question 6e	Avoid producing waste	***Section 7***

NON-TECHNICAL SUMMARY

Equinix (UK) Limited (Equinix) operates the LD9 data centre (the Powergate site) on the Powergate Business Park in North West London under the Environmental Permit (EP) EPR/TP3500PB, issued on 8th September 2020. The data centre comprises two warehouse-style buildings (PG1 and PG2) containing data storage equipment and ancillary equipment designed to provide power in the event of the external power supply failing. The back-up power supply is multiple diesel-fuelled generators for each data storage building.

The main commercial activity of the data centres is data storage, however according to the Environmental Permitting (England and Wales) Regulations 2016 (as amended) the activity that requires a Permit is combustion of diesel in an appliance(s) with an aggregated thermal input of more than 50 megawatts (MWth). The individual generators are generally around 5-7 MW_{th}.

In the time between submission of the original EP application (February 2019) and the final determination of the EP (September 2020), seven new generators were installed on the PG2 section of the Powergate site which were not accounted for in the original EP application. The existing EP related to the operation of 22 standby emergency generators, whereas 29 emergency generators are currently installed. A variation to the existing EP is therefore required, as agreed with the site's local area officer (Compliance Assessment Report TP3500PB/0376936, **Appendix J**).

Environmental Resources Management Limited (ERM) has prepared this variation application on behalf of Equinix.

As part of the variation application, the existing EP and original EP application have been reviewed and the changes resulting from the seven new generators identified. The application includes an updated air quality impact assessment and noise impact assessment, which considers the impact of the seven new generators in combination with the 22 from the existing EP.

As per the existing EP (EP EPR/TP3500PB) diesel generators are considered to be the best available technique for the purpose of emergency generation for the data centre. A review of operating techniques and the potential effects on the environment is included in this application.

Air dispersion modelling was undertaken to assess the potential impact of the emissions to the air from the testing and emergency operation of the new and existing generators at the data centre. The testing regime of the generators at the Equinix Powergate Site is not predicted to result in a significant adverse impact on air quality at sensitive human receptors. Whilst the assessment predicts that there is a marginal increase in the potential in principle for the total number of hours exceeding the hourly NO_2 standard to be greater than the 18 allowed, a statistical assessment suggests that the chance of this happening in practice is highly unlikely ($3.0x10^{-34}$ %); far below the 1% probability threshold.

The testing regime of the generators is predicted to have the potential to create exceedances of the 24-hour NO_x standard for the protected conservation areas on 2100 m^2 of a local wildlife site. However, it is noted that this is only expected occur should there be coincidence of engine testing with unfavourable dispersion conditions.

Also, it was predicted that:

- The testing regime of the Site will not have any significant effects on the annual mean NO_2 standard; and
- The testing regime of the Site will not have any significant effects on the annual mean NO_x, nitrogen deposition and acid deposition standards for the surrounding protected conservation areas.

An emergency power generation scenario with all the Site's generators running at the same time for an hour was also assessed. In this case, an exceedance of the hourly NO_2 standard and of the 24-hour NO_x standard for protected conservation areas is predicted to occur. The engines have never in practice been used to provide emergency power since the datacentre was built, 2008 for PG1 and

2012 for PG2. Also, not all the engines would actually be used for emergency power generation as the Site is designed with a 2n arrangement (where the n is the number of generators is required to meet the data centre load). This modelled scenario and breach of the hourly and 24-hour mean air quality standards is therefore quite unlikely to happen. Emergency power generation would not be expected to impact adversely the annual mean NO_2 standard or the annual mean NO_x, nutrient nitrogen deposition or acid deposition for the protected conservation areas in the vicinity of the Site.

It was also predicted that the PM_{10} emissions from the engines do not have the potential to breach the air quality standard for PM_{10}. Sulphur dioxide emissions were not assessed as the Site uses ultra-low-sulphur diesel.

An assessment of the potential for impact on sensitive receptors from the seven new generators in terms of noise has been undertaken as part of the variation application. The nearest noise sensitive receptors are the Bashley Road Travellers' Site (over 100m from the new PG2 generators) and residential properties on North Acton Road (some 250m away from the new PG2 generators). The assessment found that the predicted Rating Level is likely to be below background noise at both the Travellers' Site and North Acton Road residences and is not expected to result in significant noise disturbance.

In the period since PG1 opened in 2008 and PG2 in 2012, there have been no events where the backup generators have started in a power supply capacity. All starts have been for maintenance and testing purposes, which is an integral part of Equinix's service commitment to their clients.

This variation application will not cause the operation to have any changed emissions to watercourses, groundwater, sewers or land. Four of the new seven generators are situated in cases on poured concrete flooring inside PG2 a warehouse style building, the other three generators are located in acoustic containers just north of PG2 and are hard standing. Six new bulk tanks have been installed in PG2. These have the same bunding arrangements as the existing permitted bulk storage tanks.

Equinix is an experienced operator of data centres, including back up engines, operating centres across the UK. Equinix will continue to operate its own IS014001 accredited Environmental Management System which covers the Powergate data centre.

1. ENVIRONMENTAL PERMIT TO BE VARIED

1.1 Reason for Application

Equinix (UK) Limited (Equinix) operates a data centre on the Powergate Business Park, Volt Ave, London, NW10 6PW (the Site) under the Environmental Permit (EP) EPR/TP3500PB, issued on 8th September 2020 (the 'existing EP'). The Powergate data centre comprises two warehouse-style buildings (PG1 and PG2) containing data storage equipment and ancillary equipment designed to provide power in the event of the external power supply failing. The back-up power supply is multiple diesel-fuelled generators for each data storage building.

In the time between submission of the original EP application (February 2019) and the final determination of the EP (September 2020), seven new generators were installed on the PG2 section of the Powergate site which were not accounted for in the original EP application (EPR/TP3500PB). The existing EP relates to the operation of 22 standby emergency generators, whereas 29 emergency generators are currently installed.

A variation to the existing EP is therefore required and was discussed with the Regulatory Officer for the existing EP (EPR/TP3500PB) in a teleconference with Equinix and ERM on 4th November 2020. The Compliance Assessment Report (CAR) from this meeting is referenced TP3500PB/0376936 (**0**).

The variation application has been prepared by Environmental Resources Management Limited (ERM) on behalf of Equinix. The application includes this Supporting Document and associated appendices and sets out the requested changes to the existing EP. This Supporting Document provides detail on the changes resulting from the seven new emergency generators and the information required as part of the application. It does not repeat all the information included within the original EP application (submitted February 2019), however where appropriate it cross-references to that original EP application and identifies where details have changed.

The variation application is based on the description of the data centre and its equipment and operations provided by Equinix; publically available environmental data; and results of air dispersion modelling and noise assessments undertaken by ERM.

1.2 Listed Activities

In the existing EP, the permitted activity under the Environmental Permitting (England and Wales) Regulations 2016 (as amended) is the combustion of diesel in an appliance(s) with an aggregated thermal input of more than 50 megawatts (MW_{th}). Additionally, the individual generators are Medium Combustion Plants (MCP) under the meaning of the Medium Combustion Plant Directive, Directive 2015/2193/EU (MCPD), being in the 1-50 MW_{th} size range and in fact generally around 5-7 MW_{th}.

Under this EP variation, the activity that requires an EP remains the combustion of diesel in an appliance(s) with an aggregated thermal input of more than 50 MW_{th}. The seven new generators are also MCP, each having a thermal input of 5.71 MW_{th}.

The nature of the listed activity (AR1) in the Permit Table S1.1 remains unchanged. However, the overall thermal input capacity has increased due to the additional generators. Details are given in ***Table 1.1***.

Table 1.1: Listed Activities

Reference and Listed activity	Description	Limits
AR1 Section 1.1 Part A(1)(a) "Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts"	Operation of emergency standby generators burning diesel solely in order to provide electricity to the installation in the event of a failure of National Grid electricity supply. Existing EP: Total thermal input c. 131 MW_{th} EP variation application: Total thermal input after variation c. 172 MW_{th}	As per the existing EP, from receipt of raw material (diesel) to combustion in emergency standby generators for electricity production to exhaust of products of combustion to atmosphere to generation, storage and dispatch of wastes.

1.3 Directly Associated Activities

Under this EP variation, the nature of the directly associated activities (AR2 and AR3) in the EP Table S1.1 remain unchanged. However, the amount of raw materials (diesel) stored has increased due to the additional generators. Details are given in ***Table 1.2***.

Table 1.2: Directly Associated Activities

Reference	Directly associated activity Description	Limits
AR2	Storage of raw materials including diesel.	From receipt of raw materials to use within the facility.
AR3	Surface water drainage.	Input to site drainage system until discharge to surface water drain via interceptors.

1.4 Details of Company Directors

As required by Application Form A, the directors for Equinix (UK) Ltd listed at Companies House at the time of this variation application are named below.

[redacted]

2. SITE DESCRIPTION

2.1 Site Location

As per the original EP application, the location of the Site remains on the Powergate Business Park in north-west London, close to Harlesden (NGR 521070,1827380). The Site boundary, identified in green in *Figure 2.1* of the existing EP (EPR/TP3500PB) has not changed.

2.2 Site Context

The context of the Site has not changed as a result of this EP variation and no new potential receptors have been identified in the surrounding area. Detailed information on the Site context can be found in the original EP application Supporting Document (February 2019).

3. SITE ACTIVITY

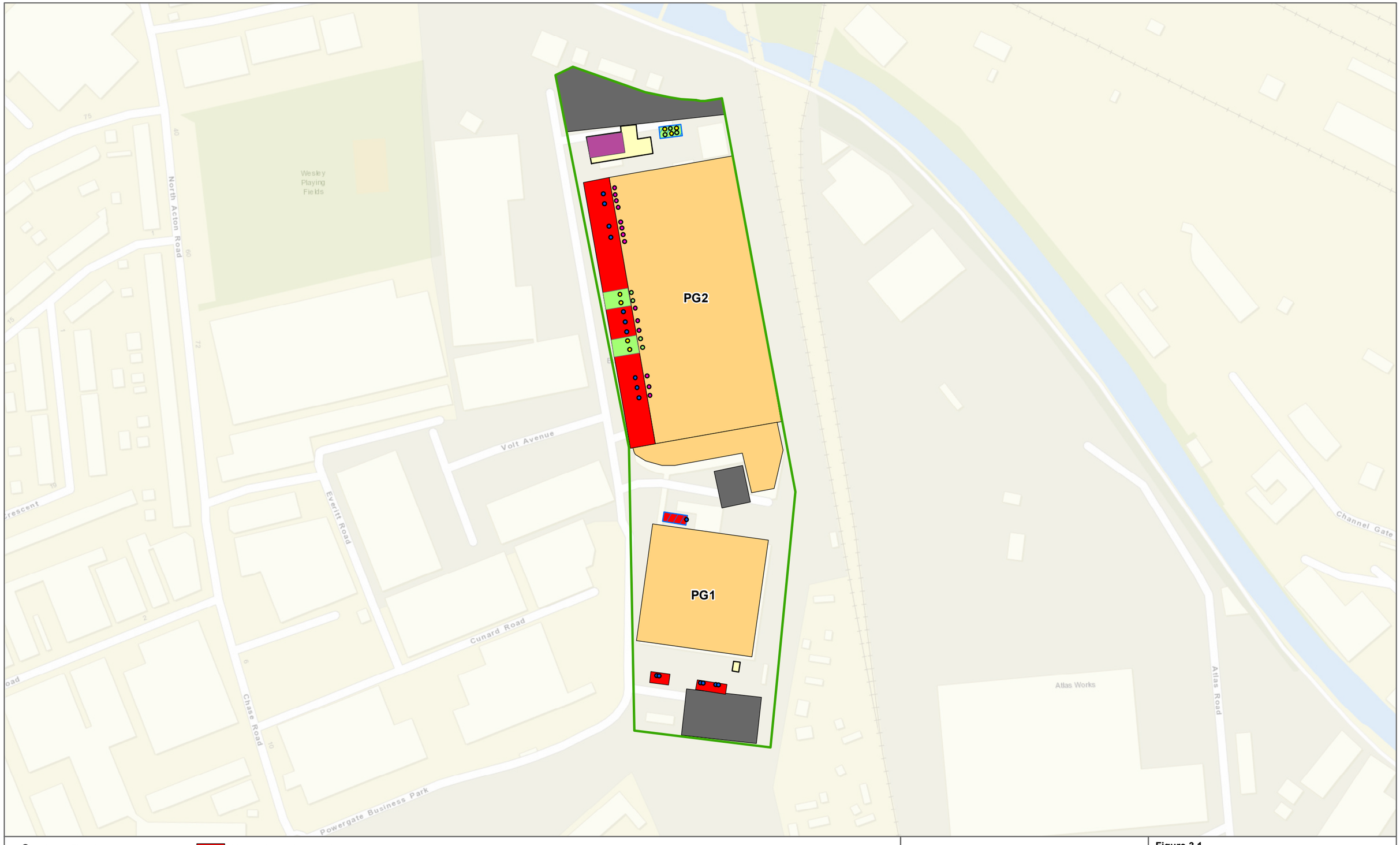
3.1 Overall Site Activity

As per the existing EP, the overall commercial activity for the Site is data storage. The data centre comprises two warehouse-style buildings (PG1 and PG2) containing customer data storage equipment and ancillary equipment designed to provide power in the event of the external power supply failing.

This EP variation application focuses on combustion activities associated with the seven new diesel emergency backup generators. All seven of the new generators are located on the PG2 part of the Site. The variation brings the total number of generators on the site to 29 (whereas the existing EP relates to the operation of 22 generators). The activities related to the operation of the data centre itself (electronic equipment, cooling, etc.) are not included.

As before, the data centre has the means of back-up power supply consisting of battery Uninterruptable Power Supplies (UPS) capable of maintaining data centre operations for several minutes before using the on-site generators for electrical power supply.

An updated site layout drawing for the Site, including the locations of the seven new generators is provided as ***Figure 3.1***.



PROJECTION: British National Grid

Figure 3.1
Site Layout
2, Powergate Business Park, Volt Ave
London NW10 6PW

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: OB
PROJECT: 0425532	CHECKED: WB
DATE: 02/12/2020	APPROVED: HB

ERM

EQUINIX

Path: Q:\Oxford\Projects\0425532 Equinix Park Royal Permit.GB\2nd App - Jan19\AQ\GIS\MAPS\Figure4.1_SiteLayout_A02.mxd

3.2 Backup Generators

The seven new generators will be for backup generation purposes only, i.e. for electrical generation in the event of a failure of the national grid electrical supply.

The data centre has two dual substation feeds in order that power supply has a good level of redundancy. The data centre is protected from short term brown-outs or black-outs by uninterruptable power supplies (UPS). These buffer small fluctuations in electrical supply. If the UPS detects power failure or extended reduced power, some, or all of the generators within the data centre will start automatically to begin generating sufficient electricity to match the load required by the data centre. The UPS can supply power for approximately six minutes but ordinarily the generators would kick in well before this time elapses.

Since PG1 opened in 2008 and PG2 in 2012, there have been no reported events where the backup generators have started in a power supply capacity. All starts have been for maintenance and testing purposes, which is an integral part of Equinix's service commitment to their clients.

The type, number and capacity of new generators to be installed at the data centre is shown in ***Table 3.1***. All seven of the new generators are the same engine model as six of the existing generators at PG2, i.e. CAT 3516B-HD.

Table 3.1: New Generators to be Installed

Building	Permit ID numbers	Engine Model	Power Rating (MW_e)[a]	Status	Number	Total MW_{th} input*
PG1	A101 to A106 (PG1_01 to PG1_06)	CAT 3516B-HD	2.00	Installed	6	34.29
	A107 to A108 (PG1_07 to PG1_08)	SDMO X2500C	2.00	Installed	2	11.43
PG2	A201 to A208 (PG 2_01 to PG2_08)	SDMO X2800C	2.24	Installed	8	51.2
	A209 to A214 (PG2_09 to PG2_14) **and new generators A215 to A221 (PG2_15 to PG2_21)**	CAT 3516B-HD	2.00	Installed	13 **(incl. 7 new)**	74.29 **(including 40 MW_{th} new)**
				Total	**29**	**171.20**

**Note: As the generator manufacturers do not always provide thermal input data, an assumption of 35% efficiency has been applied to the electrical output power rating of each generator set. A power factor of 0.8 has already been applied to the generator power rating to adjust for the losses between the generator and alternator.*

3.3 Testing Regime

The generators are tested regularly to demonstrate they are capable of fulfilling the backup supply requirements. The overall testing regime remains as was set out in the original EP application with fortnightly start-up tests, quarterly black building tests and annual full load tests. The grouping of generators in the testing regime has been updated to incorporate the seven new generators and the start-up tests now take approximately 30-40 minutes longer overall. The updated testing regime is presented in ***Table 3.2***.

Scheduling of the test runs takes into account the potential for effect on local air quality and as a result the black building and full load tests are conducted on a weekend when a lower background burden on the local air quality is expected.

The black building test takes four days to complete. Within one month Equinix schedules:

- PG1 groups 1-3 testing in weekend 1;
- no testing is scheduled for weekend 2 (which is allowed as a backup to weekend 1 if required); PG2 groups 1-5 in weekend 3; and
- no testing is scheduled for weekend 4 (which is allowed as a backup to weekend 3 if required).

Overall, only PG2 group 5 has changed as a result of this EP permit variation as it now includes the additional seven new generators.

The annual full load test is completed over 5 weekends as follow Equinix schedules:

- PG1 groups 2&3 weekend one;
- PG1 group 1 weekend two; PG2 groups 1&2 weekend 3; PG2 groups 3&4 weekend 4; and
- PG2 group 5 weekend 5.

Overall, only PG2 group 5 has changed as a result of this EP permit variation as it now includes the additional seven new generators.

Details of the assessment of air quality impacts from the testing regime can be found in ***Section 11***

Table 3.2: Testing Regime

Type of test / Frequency	Indicative Duration	Scheduling	Load
Fortnightly – start up test	5 minutes	■ Weekdays ■ The generators are started individually, one after another ■ Takes approximately 180 minutes to run all of the generators.	No load
Quarterly (three times year) – black building test	1 hour	■ Weekend testing first and third weekend of a testing month ■ Generators are started in groups: ○ First weekend/second weekend of the month PG1 groups 1-3 ○ Third/fourth weekend of the month PG2 groups 1-5	60% maximum
Annually – full load test	1 hour	■ Weekend testing over five consecutive weekend ■ First weekend – PG1 groups 2&3 ■ Second weekend – PG1 group 1 ■ Third weekend – PG2 groups 1&2 ■ Fourth weekend – PG2 groups 3&4 ■ Fifth weekend – PG2 group 5 ■ One engine after the other, at 100% load	100% load; for full load bank test

3.4 Fuel Storage

The description of the PG1 day and bulk tanks remains as described in the original EP application (including Schedule 5 response). The variation application however includes six new 43,000 litres bulk tanks in PG2 which brings the total number of 43,000 litres bulk tanks in PG2 to 10. There are also seven new day tanks (c.1,000 litres capacity), one in the vicinity of each new generator, which are double skinned (self bunded to 110% volume) and fitted with leak detection alarm.

As per the original EP application (including Schedule 5 response), the PG2 bulk fuel tanks are double skinned with a leak detection system, within a concrete bund (which is intended to be impermeable to oil and water as per Environment Agency guidance). The concrete bund captures fuel leaks and is designed to transfer fuel from the bund into an underground diesel holding tank that is capable of holding more than 110% of a single tank. The holding tank is segmented and visual examined regularly. Recovery arrangements are in place with a specialist subcontractor if necessary.

The PG2 bulk tanks are located outside but have means of removing rainwater from the bund that does not penetrate the bund wall. In the event of oil or oily water being present this is removed using a vacuum pump, and recycled or disposed using an appropriate waste disposal company if deemed appropriate.

The diesel filling procedure remains the same as the procedure set out for the existing EP and has been reproduced in ***Appendix A*** for ease. Fuel is transferred from bulk tanks to day tanks via dedicated permanent pumping systems. They are “pipe-in-pipe” with leak detection systems. All the tanks are fitted with level detection systems (high-high, high, low and low-low) and are checked every month to confirm the correct level is kept in each. In case of a fire alarm, the pumping system is automatically shut down.

The maintenance and inspection procedures remain the same as set out in the original EP application (Schedule 5 response), i.e.:

- Daily: Visual inspection of fuel tank areas including bunds and holding tank.
- Monthly: Visual inspection of area and equipment; clean-up bunds; verify spill containment kits; verify level in tanks accuracy; confirm water content in tanks meets diesel requirements (automatic test or water detecting paste dip test).
- Six-monthly: as per monthly, with in addition a verification of any fuel polishing being required.
- Annually: as per monthly, with in addition a verification of the low and high fuel level alarms; sampling of the fuel for analysis in each tank; perform fuel polishing and verify effectiveness.

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. These remain the same as the procedures set out for the existing EP and have been reproduced in ***Appendix B***.

3.5 Cooling Systems

There is no change to the cooling systems as a result of this EP variation application.

4. EMISSIONS

4.1 Introduction

There have been no changes to the type of activities undertaken at the data centre. As per the existing EP, the principal emissions are to air from maintenance testing of the emergency back-up generators.

Emergency running of the generators is extremely infrequent, and indeed since PG1 opened in 2008 and PG2 in 2012, there have been no reported events where the backup generators have started in a power supply capacity. All starts have been for maintenance and testing purposes, which is an integral part of Equinix's service commitment to their clients.

There are no new material changes to waste generation, and no changes to emissions to water, sewer or ground.

4.2 Emissions to Air

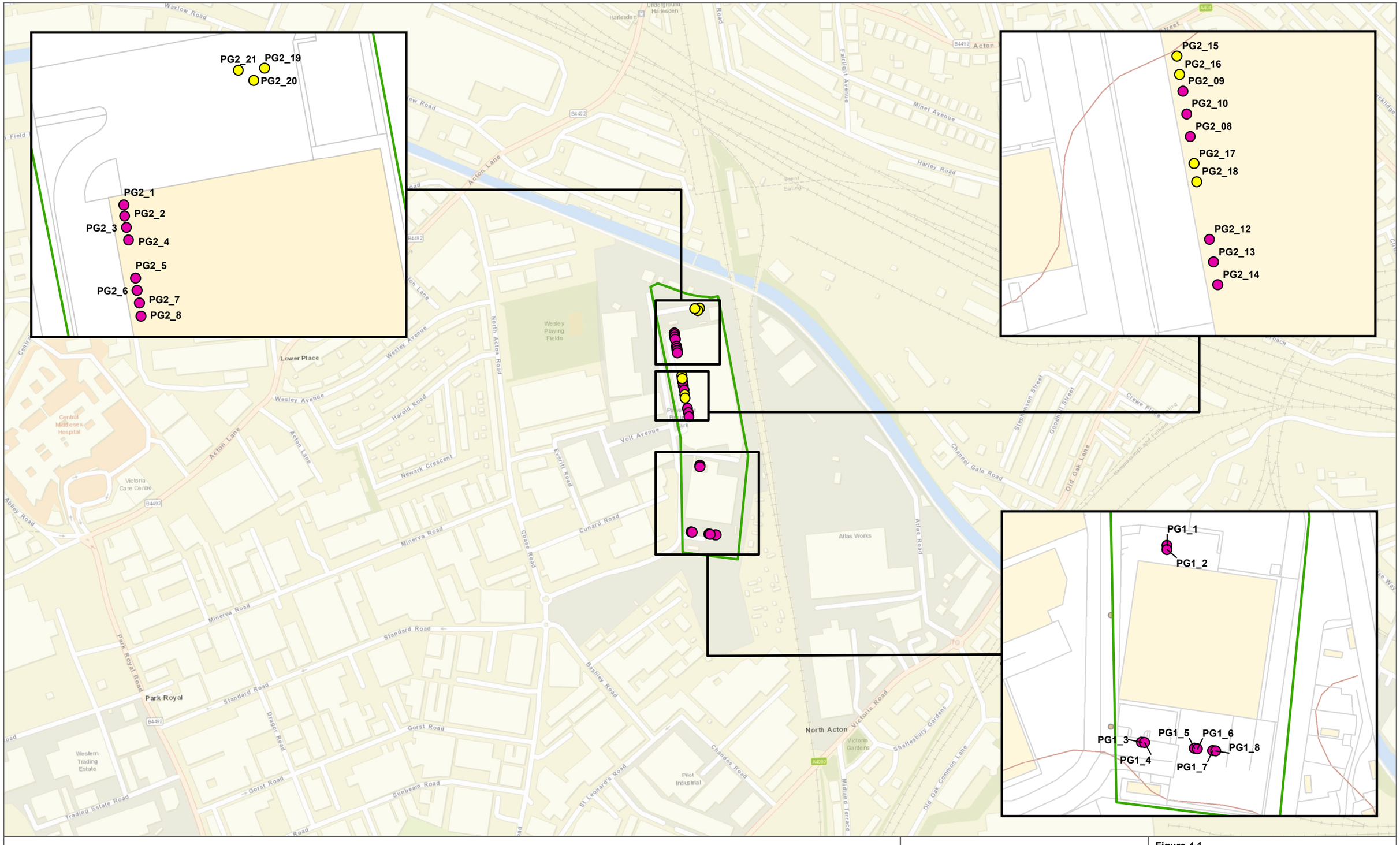
4.2.1 Point Source Emissions to Air

The only notable point source emissions to air from the data centre are from the generators. Characteristics for the seven new generators are listed in ***Table 4.1*** and the location of each emissions point at the Site is shown in ***Figure 4.1***.

Air dispersion modelling has been undertaken for these sources. The air quality assessment considers the potential impact of the seven new generators in combination with the 22 generators in the existing EP. More details can be found in ***Section 12*** and the air quality impact assessment report in ***Appendix C***.

Table 4.1: Point Source Emissions to Air

Building ID	Emission Point ID	Emission Source	Parameter	Quantity
PG1	PG1_01 to PG1_08: Generators already included in Permit EPR/TP3500PB			
PG2	PG2_01 to PG2_14: Generators already included in Permit EPR/TP3500PB			
	PG2_15 to PG2_21	CAT 3516B-HD	NO_x, SO_2, CO, Particulates	No limits set. Backup generators only.



New Emission Points to Air

Existing Emission Points to Air

Permit Boundary

0 50 100 150 200 Metres

N

Figure 4.1
EP Variation – Air Emission Point Locations
2, Powergate Business Park, Volt Ave
London NW10 6PW

SCALE: 1:5000	VERSION: A01
SIZE: A3	DRAWN: OB
PROJECT: 0425532	CHECKED: WB
DATE: 02/12/2020	APPROVED: HB

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EQUINIX

PROJECTION: British National Grid

Path: Q:\Oxford\Projects\0425532 Equinix Park Royal Permit.GB\2nd App - Jan19\AQ\GIS\MAPS\Figure4.1_EmissionPointsAir_A02.mxd

4.2.2 Fugitive Emissions to Air

There is a potential for localised fugitive emissions to air of hydrocarbon vapour from the bulk diesel fuel storage tanks breathers.

4.2.3 Fluorinated gas (F-gas) legislation

As per the original EP application, the data centre uses F-gas and other regulated coolants within the operational portion of the data centre. This does not include processes under the activity that this permit is applied for i.e. combustion activities.

4.3 Emissions to Water

4.3.1 Point Source Emissions to Water

No changes to emissions to water are proposed in this variation application.

4.3.2 Fugitive Emissions to Water

No changes to fugitive emissions to water are proposed in this variation application.

4.4 Emissions to Sewer

4.4.1 Point Source Emissions to Sewer

No changes to emissions to sewer are proposed in this variation application.

4.5 Emissions to Land and Groundwater

4.5.1 Point Source Emissions to Land and Groundwater

No changes to emissions to land and groundwater are proposed in this variation application.

4.5.2 Fugitive Emissions to Land and Groundwater

There are no expected changes to fugitive emissions to land and groundwater as part of this operational changes described in this EP variation application.

Four of the seven new generators are situated in cases on poured concrete flooring inside the PG2 warehouse style building, the other three new generators are located in acoustic containers just north of PG2 and are on hard standing. The Site surfaces generally consist of hardstanding in good condition both inside and outside of the buildings. The six new bulk tanks associated with PG2 (as described in section 3.4), are fully-bunded to 110% of their volume, such that discharge of diesel to land is expected to be avoided in the event of a loss of primary containment.

The PG2 bulk tanks, including the six new bulk tanks, are located outside but there is a means of removing rainwater from the bund that does not penetrate the bund wall. Oil and oily water within the bund will be removed using a vacuum pump, and recycled or disposed using an appropriate waste disposal company. A drain in the bund diverts any spillage to an underground diesel holding tank. The holding tank is segmented and visual examined regularly. Recovery arrangements are in place with a specialist subcontractor if necessary.

The day tanks, including the seven new day tanks in PG2, are double skinned, inside the buildings and fitted with leak detection alarm.

As described in section 3.4, the maintenance and inspection procedures remain the same as set out in the original EP application (Schedule 5 response); and the diesel filling procedure remains the

same as the procedure set out for the existing EP (which has been reproduced in ***Appendix A*** for ease).

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. These are provided in ***Appendix B***.

The drainage for the site has not changed and the drainage drawings are reproduced in ***Appendix H***

The Site Condition Report has been updated to reflect the change in description of the activities (i.e. the seven new generators); however the site condition and baseline description remains as provided in the original EP application. Details of the existing condition of the Site can be found in the Site Condition Report, presented in ***Appendix F***.

5. OPERATING TECHNIQUES

5.1 Applicable Technical Standards

A review of the European Commission's relevant Best Available Techniques (BAT) Reference Documents (BREFs), Technical Guidance Notes (TGN) and relevant sector and industry guidance was carried out as part of the original EP application including:

- Environment Agency's Data Centre FAQ Headline Approach, June 2018 presented in ***Table 5.1***;
- Medium Combustion Plant Directive and the Government's Medium Combustion Plant Directive, Specified Generator Regulations page (https://www.gov.uk/guidance/medium-combustion-plant-andspecified-generators-environmental-permits) ***Table 5.2***;
- Best Available Techniques (BAT) Reference Document for Large Combustion plants, 2017 presented in ***Table 5.3*** (for general measures appropriate to data centres, as the data centre does not contain any Large Combustion Plants (LCP) under the meaning of Chapter III of the Industrial Emissions Directive (2010/75/EU)).

This review has been revisited as a result of the variation.

5.2 Operating Techniques Review Tables

Each of the above documents is presented in tabular form on the following pages and have been re-reviewed in the context of the EP variation application. Best Available Techniques that are not considered applicable are greyed out.

Table 5.1: Data Centre FAQ Headline Approach, 2018

	EA Summary Requirement	Equinix Response
1	We accept that oil fired diesel generators are presently the default technology for standby generators in data centres. However the permit application still requires a BAT discussion detailing the choice of engine, the particular configuration and plant sizing meeting the standby arrangement (e.g. 2n).	The Equinix Powergate data centre works to a 2n standby arrangement, where n is the load requirement of the data centre. The seven new engines, purchased in 2018 are 3G standard emission and the 22 permitted engines are a mix of 2G and 3G standard emissions. The engines in place reflect local and global investment and acquisition decisions by Equinix and were selected at the time of purchase to provide the appropriate power capacity, reliability and serviceability for the function they are required for, namely emergency generation. Equinix is committed to the purchase of 2G engines for any future replacement engines or future expansion. As required by Improvement Condition 3 of the existing EP, Equinix will be completing a feasibility study into the installation of 2G engines for the engines currently not at this specification. As per Improvement Condition 1, Equinix is also committed to a feasibility study into retro-fitting abatement measures. These commitments are detailed in ***Table 15.1*** of this document. Dispersion modelling (see ***Section 11***), indicates that predicted impacts on air quality from the testing regime are acceptable and that the likelihood of air quality standard exceedance is significantly less than 1%.
2	Standby engine capacities are added together in MW_{th} input at the quoted standby rating, being usually 110% of the continuous rating (if >=50MW_{th} the site then needs an EA 1.1A Combustion Activity EPR permit)	The Site installed capacity is well in excess of 50 MW_{th} howsoever calculated.
3	If precise MW_{th} figures are unavailable and spec sheets or face-plates are unclear, the calculation for MW_{th} derived from MVA output is based on: power factor 0.8 and an assumed poor conversion efficiency of 0.35 for MW_{th} to MW_e e.g. 3MVA = (3*0.8)/0.35 = 6.86MW_{th}.	See ***Table 3.1.*** This methodology has been followed. The MW_e outputs quoted are assumed to include power factor correction from MVA. MW_{th} figures are not generally available from generator manufacturers.

	EA Summary Requirement	Equinix Response
4	The sum of generator plant capacities is based only on MW_{th} inputs of all plant regardless of the standby configuration. MW_e output constraints such as realistic customer load or other practical output limiting factors do not constitute a limit to the MW_{th} input as defined in the EA's guide RGN02.	As noted above, the installed capacity is well over 50 MW_{th}, irrespective of calculation methods.
5	Proximity of data centres with a company campus, adjacent, neighbouring or close-by buildings in urban locations (e.g. within a common trading estate but only separated by a road width or notional distance) may constitute a single site for determining the boundary	Not applicable for the Powergate Site, which is a single data centre.
6	Permits will include a maximum 500 hour 'emergency/standby operational limit' for any or all the plant producing on-site power under the limits of the combustion activity; and thereby emission limit values ELVs to air (and thus engine emissions monitoring) are not required within the permit.	This threshold will not be exceeded. The same limit applies as per the existing EP.
7	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.	This is likely to occur very rarely given the dual substation supply at the Site for each building. No periods of off-grid operation have been recorded since PG1 became operational in 2008 and PG2 became operational in 2012.
8	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 (and hence no monitoring) under IED/MCPD. Though clearly the EA expects planned testing and generator operations to be organised to minimise occasions and durations (subject to client requirements). Ideally a target should seek to keep individual generator testing to below 50 hours/annum each.	Scheduled individual generator run times will be well under 50 hours per year. During fortnightly testing each is fired for approximately 5 minutes, and operated for only around an hour during quarterly and annual tests.
9	In summary 7, & 8 means the whole or part site can only operate as emergency plant up to 500 hours as an absolute	Noted. This threshold will not be exceeded.

	EA Summary Requirement	Equinix Response
	limit for grid backup issues; but that individual plant (at any load) with its own stack (or a stack with multiple plant) with justification can be operated for up to 500 hours (ideally <50) each as part of its non-emergency role under maintenance and testing.	
10	For the purposes of determining operating hours, data centre diesel generators are regarded as having a minimal start-up or shut-down times. Operational hours start on the first fuel ignition.	This has been assumed in the air quality assessment found in ***Appendix C***.
11	Data Centre permits (unless they apply and justify it in a permit application) will expressly have a limit on the activity to exclude voluntary 'elective power operation' such as demand side response (i.e. on-site use) or grid 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 a clear way to demonstrate minimisation of emissions to air as 'Emergency plant'.	No voluntary elective power operation for on-site use, STOR or FCDM is proposed.
12	The default engine specification as a minimum for new plant to minimise the impacts of emissions to air (NOx) is 2g TA-Luft (or equivalent standard). A detailed cost benefit analysis (CBA) is otherwise needed justifying worse emission such as 4g TA-Luft plant or for example a justification under FCDM.	The Equinix Powergate data centre works to a 2n standby arrangement, where n is the load requirement of the data centre. The seven new engines, purchased in 2018 are 3G standard emission and the 22 permitted engines are a mix of 2G and 3G standard emissions. The engines in place reflect local and global investment and acquisition decisions by Equinix and were selected at the time of purchase to provide the appropriate power capacity, reliability and serviceability for the function they are required for, namely emergency generation. Equinix is committed to the purchase of 2G engines for any future replacement engines or future expansion. As required by Improvement Condition 3, Equinix will be completing a feasibility study

	EA Summary Requirement	Equinix Response
		into the installation of 2G engines for the engines currently not at this specification. As per Improvement Condition 1 Equinix is also committed to a feasibility study into retro-fitting abatement measures. These commitments are detailed in ***Table 15.1*** of this document. Dispersion modelling (see ***Section 11***) indicates that predicted impacts on air quality from the testing regime are acceptable and that the likelihood of air quality standard exceedance is significantly less than 1%.
13	CBA for improved exhaust emissions, dispersion and mitigations from the plant is expected for the maintenance/testing and the emergency standby roles. We would be looking for improvements particularly if Local Air Quality (LAQ) modelling (under H1) indicates anything other than an insignificant contribution to short term local air quality for the 'planned' maintenance emissions of the plant.	EA guidance on dispersion modelling assessment (2019) can be found on https://www.gov.uk/guidance/specified-generatorsdispersion-modelling-assessment An updated air quality dispersion model was prepared by ERM to assess the potential impact of the operation of additional generators on local air quality. The air quality assessment considers the impact of the seven new generators in combination with the generators existing permit. Summary findings are included as ***Section 11*** of this document and the detailed report is presented in ***Appendix C***.
14	Retrofit abatement techniques for existing installations for engine emissions such as selective non-catalytic or catalytic reduction (SNCR or SCR) would not normally be expected for standby plant to mitigate the emissions for standby/emergency operation. BAT might include improved flue gas dispersion (e.g. stack modifications, increased height) or improved low NOx engine management controls or possibly fuel choice.	See responses to Questions 1 and 12 for currently planned interventions.
15	Operations 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 black building and full load tests are planned for weekends when the NOx contribution from the local road network on the Powergate Business Park and the road network in general is expected to be lower than week days. See ***Section 3.3***. These tests represent part of Equinix's commercial offering to guarantee maximum uptime to clients.

	EA Summary Requirement	Equinix Response
16	When AQ modelling the emissions from the engines, the certified technical standard provided by the manufacturer should be used (i.e. likely worst case emissions). However any 'fit for purpose' monitoring of the actual emissions from installed plant will be considered as evidence of the likely real impacts as part of the permitting decision process.	Worst-case emissions have been used for modelling.
17	The groundwater monitoring of fuel storage tanks and distribution pipework using GW boreholes is risk based for the site condition report (SCR) and IED 5-yearly monitoring. Should GW monitoring be required for underground tanks and/or the SCR, the boreholes should be positioned for whole site surveillance (for the SCR) rather than as a very local control immediately around the buried fuel oil tanks (i.e. not be just an addition to double skinned tanks already protected by leak detection and hence ignoring distribution pipework etc.).	Equinix does not operate or plan to operate underground storage tanks for diesel and consider that their operational approach to prevention of releases to land minimises this risk to site condition. Due to the nature of operations and the preventative measures in place, Equinix does not propose to undertake groundwater or soil sampling or monitoring.
18	10-yearly soil sampling under IED is normally not needed but still needs some justification.	As identified in the original EP application, soil sampling took place as described above and in the appended H5 before the data centre was developed. Due to the nature of operations and the preventative measures in place, Equinix does not propose to undertake further soil sampling.
19	The permit application must assess and provide evidence of actual reliability data for the local electricity grid distribution (including data centre internal electrical design) for the EA to judge the realistic likelihood of the plant needing to operate for prolonged periods in an emergency mode (especially if emissions model so as to exceed short term air quality standards).	No periods of off-grid operation have been recorded since PG1 started operation in 2008 and PG2 started operation in 2012.

	EA Summary Requirement	Equinix Response
20	Optimising grid reliability within the site as part of general BAT to minimise emergency operating hours is required – evaluation is needed within the permit application on the Tier reliability standard under ISO27001 and Uptime.	Equinix does not subscribe to Uptime Institute Tier Levels per se but the Equinix equivalent tier level rating the Powergate Site is Tier 3. The Site is certified to ISO27001:2013.
21	Reporting of standby engine operational run hours and discussion of any electrical outages (planned or grid failures regardless of duration) required annually.	Equinix notes that this is the expectation for annual reporting to the EA, as per the existing EP, and proposes to continue on that basis.
22	Assuming AQ modelling, based on operating scenarios, indicates a local air quality risk then notification to the EA of unplanned (and pre-notification of planned) continuous grid outage exceeding 18 hours LAQM (or the otherwise assessed short term interval from modelling) is likely required under a permit schedule 5 notification.	Equinix proposes to continue to operate to existing EP EPR/TP3500PB notification requirements.
23	The notification requirement stated in the permit should also indicate the actual number of generators that need to be operating above which the local air quality is at risk e.g. 'notification of continuous emergency operation exceeding 18hours with 5 or more engines operating together is required' (i.e. model shows 4 or less engines unlikely to breach LAQ)	As above, Equinix proposes to continue to operate to existing EP EPR/TP3500PB notification requirements.
24	Assuming AQ modelling, based on emergency outage operating scenarios, indicates a very significant risk to local air quality and identified receptors, the EA will ask the operator to have a written action plan to manage the issue for prolonged emergency running of the plant (including sensitive receptors list and mitigations, assessments and impacts evaluation against modelled risk conditions i.e. occurrence at periods of	As per Improvement Condition 7, Equinix will develop an Air Quality Management Plan (AQMP) outlining response measures to be taken in the event of grid failure. This AQMP will capture the new seven generators in this EP variation application. See ***Section 15.1***.

	EA Summary Requirement	Equinix Response
	most concern in the year, possibly ambient air monitoring surveillance at very sensitive receptors). An AQ outage action plan is also likely required for sites which might operate in conjunction with other neighbouring large sites during an outage i.e. data centre hubs.	
25	Due to the emphasis of the permit on electrical (and cooling) systems it is noted that the EA considers the F-Gas regulations as falling under the remit of the EPR permit (for notifications and management) where F-gases (or potentially any polluting potential substance) are used directly under the combustion aspects of the permitted activity (e.g. switchgear). It is important to notify the EA of any significant releases. Other uses of F-gases e.g. for server room cooling are not strictly under the EA permit but are regulated by the EA generally so it may still be prudent to make the EA aware of your F-gas releases.	See ***Section 4.2.3***. F-gases are used exclusively for server room cooling, an activity that does not form part of the permitted activities for the site.
26	The permit application should detail the likely quantities of waste engine oil generated annually – EWC 13 02 waste oils following servicing for example. Although unlikely to be huge, the Pollution inventory has a reporting threshold of 1 tonne for non-hazardous waste but technically no lower thresholds for hazardous waste oil.	Currently waste lubricating oil is removed by sub-contractors who perform servicing and maintenance of the generators at Powergate. The zero threshold is noted and these data will be collected from the subcontractor as part of the annual EA reporting process. In 2019/20, only millilitre quantities of oil were removed for testing and no bulk replacement took place. Given the lack of routine operation which would cause degradation of the lubricating oil, this situation is expected to be typical of a given year. An external company is brought in on site annually to test the stored diesel fuel. They test a variety of parameters, including clarity, adenosine triphosphate, water content and particle count. If required the fuel is then cleaned on site by the same company (fuel polishing). Samples are taken after the polishing to ensure that the quality of the cleaned fuel is acceptable.
27	The permit application is for the combustion plant and associated environmental concerns and not for the Data	Noted.

	EA Summary Requirement	Equinix Response
	Centre itself. The applicant should be aware that the permitting process and application is accessible to the public so should have regard to 'Commercial in Confidence' and Critical National Infrastructure. In the first instance discuss particular concerns directly with the EA and/or exclude such priority information from the application but indicate that such is 'available on request'.	

Table 5.2: Medium Combustion Plant and Specified Generator Regulations Guidance, updated 25 September 2019

Key Definitions and Scope		Comments
Excluded Generators	Excluded Generators are generators that are exempt from Schedule 2 5B of the Permitting Regulations. Excluded generators are not included when determining capacity of the permitted specified generator site. Excluded generators are those that meet the following condition – Are part of an IED installation under Chapter II or III. BAT applies to these installations so air quality is protected. It should be noted that a generator which is a Part B (1.1 or 5.1) or permitted Waste Facility (Small Waste Incineration Plant, SWIP) is not excluded. Have a defined nuclear safety role under a nuclear site licence issued by the Office for Nuclear Regulation. Emergency 'backup generators' (see definition below) that are not tested for more than 50 hours a year. Data centres that use an on-site emergency backup generator when the transmission frequency is unstable are excluded. Are operated offshore Generators installed on a gas storage or unloading platform (as defined in Regulation 2 of the Offshore Combustion Installations (Pollution Prevention and Control) Regulations 2013.	The seven new generators, as per the 22 permitted generators are emergency 'backup generators' that individually are not tested for more than 50 hours a year. As per the case of the existing EP, the seven new generators are not 'specified generators' under Schedule 25B of the Environmental Permitting (England and Wales) Regulations 2016 (as amended), as emergency generators only used to provide power at a site during an emergency are excluded.
Backup Generator	Means a generator that is operated for the sole purpose of providing power at a site during an onsite emergency from the 1 January 2019. Balancing Services, and Demand Side Response operations, whether procured or not, such as Triad Avoidance or Fast Frequency Response are not on site emergencies and a generator that provides these services is not excluded.	The seven new generators, as per the 22 permitted generators are emergency 'backup generators' that individually are not tested for more than 50 hours a year.

Key Definitions and Scope		Comments
Emergency Operation	There is no restriction on the total operating hours in the event of an onsite emergency. However operators should make best endeavours to reduce the period and frequency of emergencies. Similarly there is no restriction on the hours of operation by 'black start' backup generators.	No periods of off-grid operation have been recorded since PG1 started operation in 2008 and PG2 started operation in 2012.
Testing Backup Generators	Operators must not carry out more than 50 hours testing a year for each backup generator. Operators must get agreement in writing from your regulator if you want to increase this limit. The regulator can exclude commissioning time within the written agreement. For each backup generator, operators must record the number of hours you test during the year. This is to demonstrate that you meet the exclusion criteria. If the limit of 50 hours testing a year is exceeded without written agreement the regulator will take appropriate enforcement action.	The updated testing regime is described in **Section 3.3**. As per the existing EP the new seven generators are individually tested for less than 50 hours per year. Equinix will record, for each generator/ the data-centre as applicable: ■ Number of test/maintenance running hours per year; ■ Number of emergency generation events and running hours – per year; and ■ Quantity and type of backup generation fuel used over the period.
Best practices in testing Backup generators	Operators should aim to minimise the environmental impact from emissions to air wherever feasible when testing emergency backup generators. The regulators considers the following are best practice: With multiple backup engines, testing should be staggered. The period and frequency of testing should be kept to the minimum sufficient to demonstrate the reliability at the appropriate load. Testing should be scheduled to periods when ambient background NOx can be expected to be low i.e. not during peak traffic periods. It is considered appropriate to utilise the electricity generated during testing for onsite use. Good practice when installing backup generators include the careful placement away from sensitive receptors, exhaust flues terminating vertically without obstructions to increase dispersion and not below residents windows or venting onto car parks etc.	The updated testing regime is described in ***Section 3.3*** black building and full load tests are conducted on a weekend when a lower background burden on the local air quality is expected, the fortnightly tests are conducted weekdays. The generators are tested for less than 50 hours per year.

Table 5.3: Best Available Techniques (BAT) Reference Document for Large Combustion Plants, 2017

Section	Subsection	BAT#	BAT Text	Requirements	Comment
General BAT Conclusions	Environmental Management System EMS	BAT1	In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates the features presented in the BREF.	See BREF for detailed requirements	There is no change to the EMS as a result of this EP variation application. An ISO14001 accredited environmental management system (EMS) is in operation for their Powergate data centre, latest review date 5 June 2020. See ***Section 6*** and ***Appendix D*** for further information
	Monitoring	BAT2	BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load (1), according to EN standards, after the commissioning of the unit and after each modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	(1) In the case of CHP units, if for technical reasons the performance test cannot be carried out with the unit operated at full load for the heat supply, the test can be supplemented or substituted by a calculation using full load parameters	As the seven new and 22 permitted generators are considered individually to be medium combustion plant and for the purpose of emergency generation, they are only required to comply with the MCPD requirements for monitoring instead of LCP BREF.
	Monitoring process parameters for	BAT3		■ Fuel gas - Flow	Normal operating conditions for the data centre is grid supply of electricity.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
	emissions to air and water			- Oxygen content, temperature and pressure - Water vapour content ■ Waste water from flue-gas treatment	As Other than Normal Operating Conditions (OTNOC) conditions occur only in an emergency situation, there is no opportunity to schedule monitoring. To monitor during testing regimes would extend the running period of engines, thus worsening any air quality impact they may have. Not required to monitor as MCP. See BAT2 above, i.e. is required to comply with MCPD requirements only. No waste water to monitor.
	Monitoring of emissions to air	BAT4	BAT is to monitor emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	■ NH_3 ■ NO_2 ■ N_2O ■ CO ■ SO_2 ■ SO_3 ■ Gaseous chlorides ■ HF ■ Dust ■ Metals and metalloids ■ Hg ■ TVOC	NOx, CO, SO2 and dust potentially applicable Normal operating conditions for the data centre is grid supply of electricity. As OTNOC conditions occur only in an emergency situation, there is no opportunity to schedule monitoring. To monitor during testing regimes would extend the running period of the engines, thus worsening any adverse air quality impact they may have.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
				■ Formaldehyde ■ CH_4 ■ PCDD/F	
	Monitoring emissions to water from flue-gas treatment	BAT5			Not applicable. No flue-gas treatment
	General environmental and combustion performance	BAT6	In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given below.	Techniques Fuel blending and mixing Maintenance of the combustion system Advanced control system Good design of the combustion equipment Fuel choice	Equinix has an extensive preventative maintenance regime, which includes maintenance and good design of the combustion equipment to deliver the requirement of an emergency back-up generator. This has not changed as a result of this EP variation application. Refer to ***Table 5.1*** response to items 7, 15 and 26.
	General environmental and combustion performance	BAT7	In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO_x emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO_x ratio, homogeneous reagent distribution and optimum size of the reagent drops).		Not applicable. No use of selective catalytic or non-catalytic reductions.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
		BAT8	In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	(No requirements specified)	Emissions reduction for the data centre includes the scheduling of the black building test and full load tests on weekends i.e. not during periods of poor air quality associated with weekday traffic. Details of the testing regime can be found in ***Section 3.3***.
		BAT9	In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the following elements in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1):	i. Initial full characterisation of the fuel used including at least the parameters listed below and in accordance with EN standards. ISO, national or other international standards may be used provided they ensure the provision of data of an equivalent scientific quality; ii. Regular testing of the fuel quality to check that it is consistent with the initial characterisation and according to the plant design specifications. The frequency of testing and the parameters chosen from the table below are based on the variability of the fuel and an assessment of the relevance of pollutant releases (e.g. concentration in fuel, flue-gas treatment employed); iii. Subsequent adjustment of the plant settings as and when needed and practicable (e.g. integration of the fuel characterisation and control in the	Fuel supply is ultra-low-sulphur diesel from commercial supply. Usage is extremely low due to normal operational for the data centres being powered by grid supply. As a result, the fuel selected is optimal for the use intended, i.e. emergency supply.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
				advanced control system (see description in Section 10.8.1)).	
		BAT10	In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases, that includes the following elements:	■ Appropriate design of the systems considered relevant in causing OTNOC that may have an impact on emissions to air, water and/or soil (e.g. low-load design concepts for reducing the minimum start-up and shutdown loads for stable generation in gas turbines) ■ Set-up and implementation of a specific preventive maintenance plan for these relevant systems; ■ Review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary; ■ Periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary	Normal operating condition for the data centres is grid supply of electricity. Tests within the testing regime which have the potential to significantly affect local air quality (black building test and load bank test) are scheduled on weekends, i.e. not during periods of typically poor air quality associated with weekday traffic. In the event of emergency generation being required, the number of running hours will be recorded and reported to the EA.
		BAT11	BAT is to appropriately monitor emissions to air and/or to water during OTNOC	The monitoring can be carried out by direct measurement of emissions or by monitoring of surrogate parameters if this proves to be of equal or better scientific quality than the direct measurement of emissions. Emissions during start-up and shutdown (SU/SD) may be assessed based on a detailed emission	Normal operating conditions for the data centres is grid supply of electricity. As Other than Normal Operating Conditions (OTNOC) conditions occur in an emergency situation, there is no opportunity to schedule monitoring of emergency operations.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
				measurement carried out for a typical SU/SD procedure at least once every year, and using the results of this measurement to estimate the emissions for each and every SU/SD throughout the year.	Monitoring of the testing regime is as per BAT2 above, i.e. is required to comply with MCPD requirements only.
	Energy Efficiency	BAT12	In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated ≥ 1 500 h/yr, BAT is to use an appropriate combination of the techniques given below	*Techniques* ■ Combustion optimisation ■ Optimisation of the working medium conditions ■ Optimisation of the steam cycle ■ Minimisation of energy consumption ■ Preheating of combustion air ■ Fuel preheating ■ Advanced control system ■ Feed-water preheating using recovered heat ■ Heat recovery by cogeneration (CHP) ■ CHP readiness ■ Flue-gas condenser ■ Heat accumulation ■ Wet stack ■ Cooling tower discharge ■ Fuel pre-drying ■ Minimisation of heat losses	Not applicable. The engine/generator sets provide backup generation only and do not run for >1500 hr/yr.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
				■ Advanced materials ■ Stream turbine upgrades ■ Supercritical and ultra-supercritical steam conditions	
	Water usage and emissions to water	BAT13-15			No routine water usage and no emissions to water
	Waste Management	BAT16	In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking: (a) waste prevention, e.g. maximise the proportion of residues which arise as by-products; (b) waste preparation for reuse, e.g. according to the specific requested quality criteria; (c) waste recycling;	Techniques: Generation of gypsum as a by product Recycling or recovery of residues in the construction sector Energy recovery by using waste in the fuel mix Preparation of spent catalyst for reuse	Waste produced by the permitted activity is managed by subcontractors. If left over a long period of time the fuel in the tanks degrades and becomes less pure. Once a year a subcontractor comes to site and accesses each bulk tank analysing the quality of the fuel. Depending on the results, they will undertake fuel polishing improving its quality, taking any waste diesel off-site with them Mineral lube oil is also brought and taken off site by the subcontractor changing the oil.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
			(d) other waste recovery (e.g. energy recovery)		
	Noise Emissions Flaring	BAT17	In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.	*Techniques* ■ Operational measures ■ Low-noise equipment ■ Noise attenuation ■ Noise-control equipment ■ Appropriate location of equipment and buildings	The updated testing regime in total for the whole data centre is less than 100 hours in the year. Extended running will occur only in an emergency situation. Four of the new PG2 generators are located within a building and the other three are in acoustic containers.
BAT conclusions for the combustion of solid fuels	BAT conclusions for the combustion of coal and/or lignite	BAT18-23			Not applicable
	BAT Conclusions for the combustion of solid biomass and/or peat	BAT24-27			
BAT conclusions for the combustion of liquid fuels	HFO- and/or gas-oil-fired boilers	BAT28-30			Not applicable
	HFO- and/or gas-oil-fired engines	BAT31	In order to increase the energy efficiency of HFO and/or gas oil combustion in reciprocating engines,	*Techniques* ■ Combined cycle	The purpose of the diesel generators is for emergency supply only. There is no opportunity for combined cycle operation.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
	Energy efficiency		BAT is to use an appropriate combination of the techniques given in BAT 12 and below.		
	HFO- and/or gas-oil-fired engines NO_x, CO and volatile organic compound emissions to air	BAT32	In order to prevent or reduce NO_x emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.	*Techniques* ■ Low-NO_x combustion concept in diesel engines ■ Exhaust-gas recirculation (EGR) ■ Water/steam addition ■ Selective catalytic reduction (SCR)	The Equinix Powergate data centre works to a 2n standby arrangement, where n is the load requirement of the data centre. The seven new engines, purchased in 2018 are 3G standard emission and the 22 permitted engines are a mix of 2G and 3G standard emissions. The engines in place reflect local and global investment and acquisition decisions by Equinix and were selected at the time of purchase to provide the appropriate power capacity, reliability and serviceability for the function they are required for, namely emergency generation. Equinix is committed to the purchase of 2G engines for any future replacement engines or future expansion. As required by Improvement Condition 3 Equinix will be completing a feasibility study into the installation of 2g engines for the engines currently not at this specification. As per Improvement Condition 1 Equinix is also committed to a feasibility study into retro-fitting abatement measures. These commitments are detailed in ***Table 15.1*** of this document.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
					Dispersion modelling (see ***Section 11***) indicates that predicted impacts on air quality from the testing regime are acceptable and that the likelihood of air quality standard exceedance is significantly less than 1%.
		BAT33	In order to prevent or reduce emissions of CO and volatile organic compounds to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or both of the techniques given below.	*Techniques* ■ Combustion optimisation ■ Oxidation catalysts	The purpose of the diesel generators is for emergency supply only. Combustion is optimised for this purpose. The seven new engines, as per the existing 22 engines, are considered individually to be medium combustion plant and for the purposes of emergency generation, they are not required to comply with emissions limits in the MCPD.
	HFO- and/or gas-oil-fired engines SO_x, HCl and HF emissions to air	BAT34	In order to prevent or reduce SOX, HCl and HF emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.	*Techniques* ■ Fuel choice ■ Duct sorbent injection (DSI) ■ Wet flue-gas desulphurisation (wet FGD)	Ultra-low-sulphur fuels as a primary source. Ultra-low-sulphur diesel is specified for purchase. Actual annual purchase is very low (one delivery of c. 40,000 every two-three years). The seven new engines, as per the existing 22 engines, are considered individually to be medium combustion plant and for the purposes of emergency generation, they are not required to comply with emissions limits in the MCPD.

Section	Subsection	BAT#	BAT Text	Requirements	Comment
	HFO- and/or gas-oil-fired engines Dust and particulate bound metal emissions to air	BAT35	In order to prevent or reduce dust and particulate-bound metal emissions from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.	*Techniques* ■ Fuel choice ■ Electrostatic precipitator (ESP) ■ Bag filter	The seven new engines, as per the existing 22 engines, are considered individually to be medium combustion plant and for the purposes of emergency generation, they are not required to comply with emissions limits in the MCPD.
	Gas-oil-fired gas turbines	BAT36-40			Not applicable
10.4 BAT conclusions for the combustion of gaseous fuel		BAT40-54			Not applicable
10.5 BAT conclusions for multi-fuel-fired plants		BAT55-59			Not applicable
10.6 BAT conclusions for the co-incineration of waste		BAT60-75			Not applicable

6. ENVIRONMENTAL MANAGEMENT SYSTEMS

6.1 ISO 14001

As identified in the original EP application, Equinix operates an ISO 14001 accredited environmental management system (EMS) for the Site. Equinix successfully recertified its ISO14001, ISO50001 & ISO45001 on 12th December 2020 and is awaiting its new certificate. The current ISO 14001 certificate was provided as part of the original EP application and is re-provided in ***Appendix D***. The EMS will be reviewed and updated to include the additional seven generators.

6.2 Summary of Equinix Environmental Management System

The following is a summary of the contents of the Equinix EMS. Further detail on any aspect is available on request.

Contents:

1. Purpose
2. Scope of Document
3. Management Systems Elements
    - 3.1. Health Safety and Environment Policy
    - 3.2. Health Safety and Environment Organisation and Roles and Responsibilities
    - 3.3. Health Safety and Environmental Communications
    - 3.4. Compliance with Legislation
    - 3.5. Scope of the Health Safety and Environment Management System
    - 3.6. Health Safety and Environment Objectives
    - 3.7. Health Safety and Environment Training
    - 3.8. Employee Health Safety and Environment Competence
    - 3.9. Monitoring
    - 3.10. Record Management
    - 3.11. Visitors
4. Health and Safety Section
5. Occupational Health
6. Environmental Management Section
    - 6.1. Significant Environmental Aspects
    - 6.2. Environmental Incident Reporting
    - 6.3. Environmental Spill Response Process
    - 6.4. Environmental Emergency Preparedness
    - 6.5. Water Quality and Legionella Management
    - 6.6. Waste (incl. licences and permits, waste documentation and List of wastes codes)
    - 6.7. Hazardous Waste (incl. fluorescent light tubes, lead batters, printer cartridges and toner, WEEE, chemicals and hazardous materials
    - 6.8. Site Environmental Issues

6.9. Energy Management

7. WASTE MANAGEMENT

7.1 Waste Generation

Minimal additional waste is expected to be generated as a result of this EP permit variation. Waste generated from the permitted activities is waste lubricating oil and diesel fuel waste.

As per the original EP application (and Schedule 5 response), waste oil is only generated in limited amounts during the maintenance of the diesel engines of the generators. The maintenance is undertaken by an external subcontractor who collects and disposes of the waste oil generated.

An external company is brought on site annually to test the stored diesel fuel. They test a variety of parameters and if required the fuel is then cleaned on site using the site's fuel polishing system fitted on each fuel bulk tank. Minimal waste is generated through this cleaning process, which is managed through the external company.

7.2 Waste Minimisation

Waste minimisation measures are already in place, as per the original EP application and will continue to apply to the varied activities.

7.3 Waste Storage

The management of waste storage is as previously applied for and determined as per the existing EP. Waste oil is not stored on site or disposed of by Equinix.

8. RAW MATERIALS

The Sites uses the raw materials detailed in ***Table 8.1***. Typical consumption values are given, as all raw material usage is intermittent. There is no change to the consumption of water, mineral lube oil and biocides as part of this permit variation.

Table 8.1 Raw Materials Usage

Substance	Approximate Annual Consumption	Typical Storage Capacity	Use	Risk
Water	No change as a result of this EP variation			
Diesel	The original EP application identified that 40,000 litres were delivered in 2017/18. This was the first delivery since 2015/16. Since then 74,000 litres have been delivered in 2019/20 as part of the increase in bulk storage.	The site has bulk storage with enough capacity for the site to run is island mode for 36 hours. PG1 has a 22,000 litres and a 33,463 litres bulk tank. As part of the variation, PG2 has 6 additional bulk tanks at 43,000 litres each. The total for PG2 is therefore a total of 10 x 43,000 litres bulk tanks. Each new generator has its own day tank (c. 1,000 litres capacity)	Generator fuel	Flammable liquid and vapour, Toxic to aquatic life with long lasting effects
Mineral Lube Oil	No change as a result of this EP variation			
Biocides	No change as a result of this EP variation			

9. ENERGY

9.1 Energy Usage

The data centre at the Site is supplied by the national grid during normal operation. The load expected varies depending on the customers using the data centre. The supply of energy from the national grid will continue to be the normal source of energy. Backup generation will be increased to match the requirements of the data centre up to a factor of 2n, where n is the load requirement of the data centre. ***Table 3.1*** provides detailed of the increase in backup generation capacity as a result of this permit variation.

9.2 Energy Efficiency

As per the information in the original EP application, Equinix uses the power usage effectiveness (PUE) metric to measure the energy efficiency of a data centre's infrastructure under normal operating conditions.

$$PUE = \frac{total\ energy\ entering\ the\ data\ centre}{energy\ used\ by\ IT\ equipment\ inside\ the\ data\ centre}$$

Each of the data centres has a PUE target set against a base year of 2019 to accomplish a 5% improvement in energy efficiency over a 3 year period.

9.3 Energy Management System

There is no expected change in the Energy Management System as a result of the operational changes described in this EP variation application. Equinix operates an ISO 50001 accredited energy management system for their Powergate Business Park data centre, at the latest review date of 5 June 2020. The seven generators are to be included in the management system. Equinix is awaiting for its updated ISO 50001 certificate following recertification on 12th December 2020; however the current version is presented in ***Appendix D***.

9.4 Climate Change Agreement

There is no expected change to the Climate Change Agreement (CCA) as a result of the changes made to this operation under this variation application.

Equinix (UK) Ltd's CCA is included in ***Appendix E***. Equinix's performance in Target Periods One and Two can be examined in the following First and Second Target Reports:

- First Target Report:

  https://www.techuk.org/images/programmes/DataCentres/CCA_First_Target_Report_FOR_PRINT.pdf

- Second Target Report:

  https://www.techuk.org/images/CCA_Second_Target_Report_04.pdf

10. NOISE

An assessment of the potential for impact on sensitive receptors from the seven new generators in terms of noise has been undertaken and is presented in ***Appendix I***.

The assessment includes an updated noise modelling study by ERM that has been carried out to simulate the potential changes resulting from the seven new emergency generators at the site in combination with the operation of the 22 generators presented in the original application. The assessment is based on background noise data from a noise study by Applied Acoustic Design ref. 07069/003/MB (part of the original planning application for the site, ref. P/2007/1369-ST); data from a site visit that was undertaken by ERM on Friday 6 September 2019; and specified noise data provided by Equinix.

Background noise is from a mixture of industrial and commercial units, in particular from the adjacent Inco Europe processing plant that is located immediately to the south west of the site. The noise environment is typical of a noisy urban area.

There have been no changes to the arrangement of generators in PG1 as part of the EP variation application.

Four of the seven new generators (PG2_15–PG2_18) are located within the PG2 building alongside the generators from the original application, and the remaining three generators (PG2_19–PG2_21) are located in acoustic containers to the north of the PG2 building on the ground.

The nearest noise sensitive receptors are:

- The Bashley Road Travellers' Site - over 100 m away from the southern-most noise sources at PG2; and
- Residential properties on North Acton Road, some 250 m away, with intervening buildings between the sources and receptors.

The assessment found that the predicted Rating Level is likely to be below background noise at the Travellers' Site. Considering the context of the noise, the absolute noise level and the predicted noise level of 40 dB $L_{Aeq,\ 15\ minute,}$ it is not considered likely to result in significant noise disturbance.

The assessment also found that the predicted Rating Level is also likely to be below background noise at North Acton Road. Considering the context of the noise, the absolute noise level, and the predicted noise level of 41 dB $L_{Aeq,\ 15\ minute}$ it is not considered likely to result in significant noise disturbance in an urban environment.

Although the Noise Impact Assessment does not predict adverse impacts, an updated Noise Management Plan has been provided in ***Appendix I***.

11. AIR QUALITY

The full Air Dispersion Modelling Report can be found in ***Appendix C***. A summary of the findings is presented below.

11.1 Summary of Air Dispersion Modelling Findings

The air quality assessment that was submitted as part of the original EP application (in February 2019) has been reviewed and updated to reflect the addition of the seven new PG2 generators (which will operate in-combination with the permitted 22 generators) and to accommodate changes in the testing regime. The assessment methodology, baseline data, meteorology data, remain largely as reported in the original air quality assessment that was reviewed and approved as part of the existing EP, however some refinements pertaining to the statistical analysis have been made.

The testing scenarios have also been amended as part of the EP variation application to accommodate the seven new generators.

The information provided follows Environment Agency guidelines for the requirements for dispersion modelling and guidelines for assessing the impacts of emissions from engines which are infrequently used. The Environment Agency requires evidence that emissions from the installation do not result in the air quality standards being exceeded, or that the probability of exceeding is unlikely. Such evidence is provided in this document.

The generators are regularly turned on during the year, in order to follow the Equinix standard engine testing regime. In case of a need for emergency power generation, the generators would also be operated in order to supply electricity to the Site. The testing regime of all 29 of the engines on the Site was assessed.

The testing regime of the generators at the Equinix Powergate Site is not predicted to result in a significant adverse impact on air quality at sensitive human receptors. Whilst the assessment predicts that there is a marginal increase in the potential in principle for the total number of hours exceeding the hourly NO_2 standard to be greater than the 18 allowed, a statistical assessment suggests that the chance of this happening in practice is highly unlikely ($3.0x10^{-34}$ %); far below the 1% probability threshold .

The testing regime of the generators is predicted to have the potential to create exceedances of the 24-hour NO_x standard for the protected conservation areas on 2100 m^2 of a local wildlife site. However, it is noted that this is only expected occur should there be coincidence of engine testing with unfavourable dispersion conditions.

Also, it was predicted that:

- The testing regime of the Site will not have any significant effects on the annual mean NO_2 standard; and
- The testing regime of the Site will not have any significant effects on the annual mean NO_x, nitrogen deposition and acid deposition standards for the surrounding protected conservation areas.

An emergency power generation scenario with all the Site's generators running at the same time for an hour was also assessed. In this case, an exceedance of the hourly NO_2 standard and of the 24-hour NO_x standard for protected conservation areas is predicted to occur. The engines have never in practice been used to provide emergency power since the datacentre was built, 2008 for PG1 and 2012 for PG2. Also, not all the engines would actually be used for emergency power generation as the Site is designed with a 2n arrangement (where the n is the number of generators is required to meet the data centre load). This modelled scenario and breach of the hourly and 24-hour mean air quality standards is therefore quite unlikely to happen. Emergency power generation would not be

expected to impact adversely the annual mean NO_2 standard or the annual mean NO_x, nutrient nitrogen deposition or acid deposition for the protected conservation areas in the vicinity of the Site.

It was also predicted that the PM_{10} emissions from the engines do not have the potential to breach the air quality standard for PM_{10}. Sulphur dioxide emissions were not assessed as the Site uses ultra-low-sulphur diesel.

12. SITE CONDITION REPORT

The site condition of the data centre has not changed since the original EP application was submitted, as there has been no change to the site boundary and no ground pollution incidents have been reported. No additional baseline data/site investigation has been undertaken for this application, however the Site Condition Report (SCR) has been updated with details of the additional fuel storage at the data centre associated with the additional generators.

The updated SCR can be found in ***Appendix F***.

13. MONITORING

13.1 Emissions to Air

The existing EP requires that Equinix provide an annual report of the activities set out in Schedule 4 Table S4.2. An emissions inventory is also required to be completed annually.

No change is proposed as a result of this EP variation application in the way Equinix reports to the Environment Agency the following metrics in relation to the backup generation activity at the Site's data centre:

- Number of test/maintenance running hours per year;
- Number of emergency generation events and running hours – per year; and
- Quantity and type of backup generation fuel used over the period.

The annual report and emissions inventory will incorporate details for the seven new generators as well as the permitted 22 generators.

As per the existing EP, no periodic monitoring of emissions is proposed due to the backup nature of the generation.

14. ENVIRONMENTAL RISK ASSESSMENT

14.1 Identify and Consider Risks from the Site

The environmental risk assessment of the original EP application has been reviewed and updated to include the seven new generators and additional fuel storage. This has included identification of sources, pathways and receptors. The overall assessment of risk is the combination of probability vs consequence, and minimal changes have been made to this as a result of the seven new generators. The risk assessment is presented in ***Table 14.1***.

Separately, the EA's H1 tool has been updated for the seven new generators. The database file is supplied with this application via Onedrive as XXXXX. Detailed modelling of the emissions to air is described in ***Section 11*** of this document. [Link to be inserted as part of application submission]

14.2 Climate Change Risk Assessment

A climate change risk assessment has been completed for this variation application as this was not a requirement when the original EP application was submitted. This is supplied in ***Appendix G***.

Table 14.1: Environmental Risk Assessment

Hazard	Operational Scenario	Receptor	Pathway	Risk Management Techniques	Probability of Exposure	Consequence	Overall Risk
Emission to air *(NOx, CO, particulates)*	Testing	See detailed air quality modelling ***Section 11***	Dispersion through the air	Testing regime scheduled for minimum practicable impact – see detailed air quality modelling in ***Section 11*** and ***Appendix C***	Low	Medium	Medium
	Emergency operation	See detailed air quality modelling ***Section 11***	Dispersion through the air	■ The site has an uninterruptable power supply (UPS) units, the design is for 6 minutes autonomy at the end of battery life; during a utility failure it is expected that generators will start and take the load within 1 minute of the failure occurring ■ Emergency running within 1 minute of blackouts ■ Site has not experienced blackouts that require emergency running since it commenced operation in 2008	Very Low	High	Medium
	In case of fire	See detailed air quality modelling ***Section 11***	Dispersion through the air	Each generator container or room has a fire alarm panel (flame detection) interfaced to the site wide fire alarm system. A fusible link interfaced with fire alarm system and drop valves on both the fuel transfer and feed line to the generator are also provided to terminate the flow of fuel to the engine. When the fusible link melts, it isolates the fuel feed to the engine which shuts the generator down in the event of the fire which triggers the fire alarm. The generator containers are designed to withstand the fire.	Low	Low	Low
Emission to water of bulk fuel	Accidental release of diesel to	Grand Union Canal	Overland flow	The site is hard surfaces and kerbed around the edges. The likelihood of a spill large enough to overwhelm the kerbing is very	Very Low	Medium. Site clean-up and possible	Low

Hazard	Operational Scenario	Receptor	Pathway	Risk Management Techniques	Probability of Exposure	Consequence	Overall Risk
	ground surface			low, not least as bulk fuel storage is in multiple tanks with secondary containment and there are no plausible scenarios for multiple catastrophic failures		remediation required	
Emission to sewer (*Cooling water blowdown)*	Maintenance	Waste water treatment plant (WWTP)	Combined sewer	Emission is by arrangement with the sewerage undertaker	Very low	None (planned)	Very low
Emission to sewer *(Bulk fuel)*	Accidental	WWTP	Combined sewer following a direct spill onto land through catastrophic failure of tank / pipework / overfill, bund and site surfacing	Bulk storage tanks are situated within a bund(s) that are 110% storage capacity of the largest tank. Each day tank is double-skinned. Any water that accumulates in external bunds is to be tested prior to discharge into rainwater drains. Oil and oily water will be removed using a vacuum pump, and recycled or disposed using an appropriate waste disposal company. The areas in which the bulk and day tanks are located are subject to a daily site housekeeping walkaround to look for issues. The diesel filling procedure is defined and set out in ***Appendix A***. The generators are all stood on pour concrete floors. The Sites consist of hardstanding in generally good condition both inside and outside of the building.	Low	Medium. WWTP may need to quarantine the affected flow	Low

Hazard	Operational Scenario	Receptor	Pathway	Risk Management Techniques	Probability of Exposure	Consequence	Overall Risk
				The site drainage system is detailed in ***Appendix H*** 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. These are provided in ***Appendix B***.			
Emission to land *(Bulk fuel)*	Accidental	Land within the installation boundary (hard standing is kerbed and losses to ground surface are expected to enter sewer rather than run off site).	Direct spill onto land through catastrophic failure of tank / pipework / overfill, bund and site surfacing	See response for Emission to water and sewer (bulk fuel)	Low	Medium. Site clean up and possible remediation required	Medium - Low
Emission to groundwater *(Bulk fuel)*	Accidental	The site is more 1.5km from the nearest aquifer (Secondary A) and more than 6km from a source protection zone	Infiltration through land surface following direct spill as above	See response for Emission to water and Sewer (bulk fuel)	Very low	Medium. Site clean up and possible remediation required	Low
Odour	No known scenarios						

Hazard	Operational Scenario	Receptor	Pathway	Risk Management Techniques	Probability of Exposure	Consequence	Overall Risk
Noise and Vibration	Generator testing / emergency operation	Local businesses / residential receptors	Airborne	• Testing regime scheduled for daytime hours • Emergency running likelihood is very low and unlikely to be of extended duration (see emissions to air) See also ***Section 10*** of this document.	Very low	Medium – nearest residences are c. 50m. Nearest businesses are c. 50m	Low
Litter / pests	Normal operation	Neighbouring industrial and commercial units	Windblown	• Housekeeping is given a high priority as company policy • Waste generating activities occur within the data centre building and are not external • Waste generated by the data centres is not putrescible	Very low	Low	Very low
Visible emissions *(Black smoke on start-up)*	Generator testing / emergency operation	Neighbouring industrial and commercial units	Airborne / visual	• Minimisation of planned testing • Low likelihood of emergency running (see emission to air)	Low	Low – short duration visible emission	Low
Surface water flooding from a weather event	All operational scenarios	Site operations restricted	Direct effect	• Surface water drainage to combined sewer • Site operations are principally internal	Low – not in a fluvial flood plan	Low – operational impact	Low

15. IMPROVEMENT CONDITIONS

The existing EP includes Improvement Conditions. The seven new generators will be included in the studies required by the improvement conditions that are already set out in the existing EP. Those improvement conditions are outlined in ***Table 15.1***.

Table 15.1: EP Improvement Conditions

Improvement Condition	Summary of Requirement
Improvement Condition 1	A feasibility study into retro-fitting abatement measures
Improvement Condition 2	A feasibility study into installation of vertically discharging stacks, replacing the horizontal stacks in place.
Improvement Condition 3	A feasibility study into the installation of 2g engines for the engines currently not at this specification.
Improvement Condition 4	A report showing actual monitoring of short term NOx emissions from the testing regime.
Improvement Condition 5	A review of other options other than ICs 1, 2 and 3 which may reduce short term NOx emission impacts through reduced emissions or increased dispersion.
Improvement Condition 6	A report outlining the maintenance and operating regime and schedule, and how these have been used to minimise emissions, and any improvements which can be made to these to reduce emissions.
Improvement Condition 7	An Air Quality Management Plan outlining response measures to be taken in the event of grid failure.

APPENDIX A DIESEL FILLING PROCEDURE

APPENDIX B EMERGENCY RESPONSE PROCEDURE

APPENDIX C AIR QUALITY IMPACT ASSESSMENT

APPENDIX D ISO 14001 AND ISO 50001 CERTIFICATE

APPENDIX E CLIMATE CHANGE AGREEMENT

APPENDIX F UPDATED SITE CONDITION REPORT

APPENDIX G CLIMATE CHANGE RISK ASSESSMENT

APPENDIX H DRAINAGE PLAN

APPENDIX I NOISE IMPACT ASSESSMENT AND MANAGEMENT PLAN

APPENDIX J COMPLIANCE ASSESSMENT REPORT

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