Cyfoeth Naturiol Cymru
Natural Resources Wales

Natural Resources Wales permitting decisions

Vantage Data Centers UK Limited

Decision Document:

Newport Data Centre

Application for a Substantial Variation – *Minded to Issue Decision*

The variation number is: PAN-015219 (EPR/BB3599CW/V003)

The operator is: Vantage Data Centers UK Limited

The Installation is located at: Newport Data Centre, Imperial Park, Celtic Way, Marshfield, Newport, NP10 8BE.

Consultation commences on: 04/11/22

Consultation ends on: 05/12/22

We are minded to issue the variation for Newport Data Centre operated by Vantage Data Centers UK Limited.

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

This is a draft decision document, which accompanies a draft permit variation.

In this document we say "we have decided". That gives the impression that our mind is already made up; but as we explain below, we have not yet done so. The language we use enables this document to become the final decision document in due course with no more re-drafting than is absolutely necessary.

It explains how we have considered the Operator's Application, and why we have included the specific conditions in the *draft* permit variation that we are proposing to issue to the operator. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position. Unless the document explains otherwise, we have accepted the Applicant's proposals.

The document is in draft at this stage, because we have yet to make a final decision. Before we make this decision we want to explain our thinking to the public and other

interested parties, to give them a chance to understand that thinking and, if they wish, to make relevant representations to us. We will make our final decision only after carefully taking into account any relevant matter raised in the responses we receive. Our mind remains open at this stage: although we believe we have covered all the relevant issues and reached a reasonable conclusion, our ultimate decision could yet be affected by any information that is relevant to the issues we have to consider. However, unless we receive information that leads us to alter the conditions in the draft Permit, or to reject the Application altogether, we will issue the Permit in its current form.

We try to explain our decision as accurately, comprehensively and plainly as possible. Achieving all three objectives is not always easy, and we would welcome any feedback as to how we might improve our decision documents in future.

Purpose of this document

This decision document:

- explains how the application has been determined
- provides a record of the decision-making process
- shows how all relevant factors have been taken into account
- justifies the specific conditions in the permit other than those in our generic permit template.

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

Key issues of the decision

The following section outlines key issues in our decision. The issues with most potential significance in the substantial variation were:

- Air quality impacts during normal testing operation
- Noise impacts during normal testing operation
- Measures to minimise likelihood of emergency operation
- Possible Air quality impacts during unplanned emergency operation
- Possible Noise impacts during unplanned emergency operation
- Prevention of accidental release through adequate containment of liquids (fuel, oils, and other consumables)

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1 Our proposed decision

Based on the information currently available to us we are currently minded to issue a permit to the Applicant as explained above. This would, if issued, allow it to operate the Installation, subject to the conditions in the Permit.

We consider that, in reaching that decision, we have taken into account all relevant considerations and legal requirements and that the permit will ensure that a high level of protection is provided for the environment and human health.

This Application is to operate an installation which is subject principally to the Environmental Permitting Regulations 2016 (EPR) and is subject to the requirements of the Industrial Emissions Directive (IED) and the Medium Combustion Plant Directive (MCPD).

The permit contains many conditions taken from our standard Environmental Permit template including the relevant Annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the permit, we have considered the Application and accepted the details are sufficient and satisfactory to make the standard conditions appropriate.

This document should be read in conjunction with the application and supporting information and permit.

2 How we reached our decision

2.1 Receipt of Application

No claim for commercial or industrial confidentiality has been made by the operator. We have not identified information provided as part of the application that we consider to be confidential. The decision was taken in accordance with our guidance on commercial confidentiality.

2.2 Consultation on the Application

The consultation requirements were identified and implemented. The decision was taken in accordance with RGN 6 High Profile Sites, our Public Participation Statement and our Working Together Agreements. Furthermore we considered the Well-Being of Future Generations (Wales) Act 2015 and the Environment (Wales) Act 2016 during our assessment process. The application was for a substantial variation, meaning that we consulted on the duly made application and on our draft decision.

We advertised the Application by a notice placed on our website, which contained all the information required by the EPR/IED, including advising people where and when they could see a copy of the Application. The application consultation started on 08/03/22 and ended on to 05/04/22. A copy of the Application and all other documents relevant to our determination (see below) are available for the public to view. Anyone wishing to see these documents could arrange for copies to be made.

We sent details of the Application to the following bodies, which includes those with whom we have “Working Together Agreements”:

- Food Standards Agency
- Health and Safety Executive
- Local Council (Newport City Council) – planning and environmental health
- Local Health Board (Aneurin Bevan Health Board)
- Public Health Wales

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly.

Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 3. We have taken all relevant representations into consideration in reaching our determination.

2.2.1 Draft Permit Consultation

We are now carrying out a consultation on our draft decision. This consultation will begin on 03/11/22 and end on 05/12/22.

2.3 Requests for Further Information

In order for us to be able to consider the Application duly made, we needed more information. We requested further information relating to:

- Details of the proposed engines in respect of Medium Combustion Plant (MCPD) data and requirements
- Various technical details relating to the air quality modeling for the proposed variation – including computer modelling files
- Confirmation of maximum impacts on protected ecological receptors
- Updated air quality management plan (AQMP)
- Noise modelling computer files
- And various other minor technical clarifications / corrections as detailed in the Schedule 5 notice.

Upon receipt of further information from the operator we were able to consider the application Duly Made. It is noted that our request asked the operator to update their AQMP, but that the response did not provide such an update, instead indicating that revisions envisaged would be relatively minor, noting that the "*content, structure and response procedure will follow the same approach, but with revised risks where appropriate…*" The operator indicated an intent to provide this "minor" update during permit determination. We accepted this position as appropriate for duly making, as the intent of the operator was clear, given the AQMP on file for the existing installation and the indication that this would form the basis for the applicant's proposed revised and updated AQMP.

In fact, during determination we issued a Schedule 5 Notice requiring a substantially revised and updated AQMP with greater scope than the original AQMP, as we found that this information was necessary for our decision. The Schedule 5 Notice was sent on 01/06/2022 with a response date of 18/07/22. The Applicant's response to the

Schedule 5 Notice was provided on 18/07/22 The additional information supplied satisfied the requirements of the Schedule 5 notice.

A copy of the information notice and e-mails requesting further information were placed on our public register as were the responses when received.

3 The Legal Framework

The variation will be issued under Regulation 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an installation as described by the IED;
- plant as described by Schedule 25A covering the Medium Combustion Plant (MCP) Directive
- subject to aspects of the Well-Being of Future Generations (Wales) Act 2015 and the Environment (Wales) Act 2016 which also have to be addressed.
- A “relevant installation” in respect of Schedule 24 of EPR: Energy Efficiency Directive (new MCP >20 MWth aggregated or individual)

We address the legal requirements directly where relevant in the body of this document. Natural Resources Wales (NRW) is satisfied that this decision is consistent with its general purpose of pursuing the sustainable management of natural resources (SMNR) in relation to Wales, and applying the principles of SMNR. In particular, NRW acknowledges that it is a principle of sustainable management to take action to prevent significant damage to ecosystems. We consider that, in granting the Permit a high level of protection will be delivered for the environment and human health through the operation of the Installation in accordance with the permit conditions. NRW is satisfied that this decision is compatible with its general purpose of pursuing the sustainable management of natural resources in relation to Wales and applying the principles of sustainable management of natural resources.

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

The Installation is subject to the EPR because it carries out an activity listed in Part 2 of Schedule 1 of the EPR as well as an activity described in Schedule 25A of the EPR:

- Section1.1 Combustion Activities - Part A (1) (a) Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts.

The Schedule 1 Section 1.1 activity is at an existing data centre which is itself not regulated under the EPR: only the combustion activity is. The schedule 1 Section 1.1. activity comprises of 202 individual compression-ignition diesel engines, each of which is >1MW_{th} but <15MW_{th}, with a number of different capacity engines being employed as detailed in the permit and application. Each individual engine is an MCP and we do not consider the MCP aggregation rules (Article 4) to apply.

The installation consists of both new and existing medium combustion plant. The 125 engines newly permitted via this variation (V003) are classed as new medium combustion plant as they were put into operation after 20 December 2018 (emission points A78-A202). 'Put into operation' means the plant being fired up to its full load with its design fuel. Of the 77 engines already permitted in permit BB3599CW/V001, 15 of were put into operation after 20 December 2018 and are therefore new MCP (emission points A63-A77) and also subject to MCP requirements now. The remaining 62 engines are existing medium combustion plant (emission points A1-A62) as they were put into operation prior to 20 December 2018. Existing MCP are subject to a transitionary arrangement and do not need to comply with the requirements of Schedule 25 of EPR until the relevant compliance date.

An installation may also include "directly associated activities", which at this Installation includes the following supporting activities. These are unaltered, although extended in scope by the variation:

- Fuel storage
- Surface water drainage

Together, the listed and directly associated activities comprise the Installation.

4.1.2 The Site

The site is located to the south west of Newport, in the northern part of Imperial Park. At its closest point, it is approximately 80 m to the south east of the A48 and the site's south western boundary is adjacent to Celtic Way. The total permitted area is approximately 4 ha, excluding the data hall which is not part of the installation.

The immediate site surroundings are current and former industrial estate areas, including industrial units, service roads and car parking, as well as soft landscaping, small areas of woodland and a pond. The nearest human receptors are adjacent industrial units to the south of the installation boundary. The closest residential receptors are dwellings on Pencarn Avenue, about 150 m to the north east of the northern corner of the site. Other notable human receptors are a pre-school nursery approximately 240 m to the north west of the site and St Joseph's High School, which is approximately 500 m from the site.

The site itself is not subject to any environmentally sensitive designations. At its closest point the Gwent Levels-St Brides Site of Special Scientific Interest (SSSI) is located approximately 0.5 km to the south east. The River Usk Special Area of Conservation (SAC) and Severn Estuary SAC, Special Protection Area (SPA) and Ramsar wetland are further afield at approximately 2.8 and 3.5 km to the east and south east respectively.

There are a number of local wildlife sites and areas of ancient woodland within a 2 km screening distance, with the nearest being:

- Celtic Springs approximately 120 m to the north west,
- the LG Duffryn sites 1 and 2 on South Lake Drive approximately 0.3 km to the south of the main building; and
- the Duffryn Pond approximately 1 km to the east.

The Applicant has provided a plan which we consider is satisfactory, showing the extent of the site of the facility. There is a relatively small increase to the permitted area associated with the proposed variation and capacity increase: the boundary extends further (approximately 50 m) to the north east. Other boundaries are

unchanged by the variation. The plan also shows the layout of the 202 engines and associated emission points.

A plan is included in the permit and the Applicant is required to carry on the permitted activities within the site boundary. (*note that the site plan is rotated such that North is not at the top of the diagram, and the north-east boundary is on the right of the page)*.

4.1.3 What the Installation does

Newport Data Centre provides Data services to a number of third party clients, holding sensitive and significant information on their behalf. The data centre itself is not subject to regulation under EPR, but requires a continuous, secure and reliable electricity supply to maintain its service. Extensive arrangements are in place to minimise the risk of mains power failure, and are described below.

The Environmental Permit is for diesel-powered generators would provide back-up power in the unlikely event of a supply failure at the data centre from the National Grid. The substantial variation increases the number of engines on site from 77 to 202, increasing the total thermal capacity of combustion on site from 146 MW_{th} to 520 MW_{th}. Other than changes to fuel tank configuration (see below), increase in number of engines (with associated increase in fuel storage, consumables use etc) and small increase in permit boundary as noted to accommodate the new banks of engines, the arrangements on site are substantially unchanged by the permit variation.

There are two possible operating scenarios:

- Intentional (generally planned) daytime operation for the purposes of testing, maintenance etc only, and consisting of:
    - individual engines testing as part of quarterly servicing and maintenance schedule (2 x 2h and 2 x 15m tests per engine per annum, no overlapping)
    - Cell testing (also known as “black building” test) – in which grid power to a cell is intentionally stopped, and all engines initially operate. The test lasts for 15 minutes, but the number of engines is expected to reduce by at least one after 10 minutes or less, reflecting electrical demand. This load shedding is according to the actual load power requirement (which is determined by the actual cell data power requirement, and the n+1 engine configuration, meaning that at least one engine should cease operation within the test period,

potentially more depending on actual data / energy requirement at the time). Each of the 37 cells is tested twice-yearly (totalling 74 cell tests per annum), and only one of these tests occurs on any given day, with no overlapping with individual engine testing.

  - Testing after unplanned repair, known as a "break fix" event, and minimised in frequency and duration, where possible being tied in to planned testing, servicing and maintenance, typically 15-30 minutes per engine/event.

- Emergency (unplanned) operation in the event of a grid power supply failure. This is a rare scenario (See Section 5.3, below.) – National Grid reports a minimum supply reliability of 99.999964% in the most recent six years for which information is available.

So normally, the only operation of the engines is for testing, maintenance etc, individually or in small groups. In the event of interruption to the power supply to the site, emergency operation will occur, with up to all engines operating, but this is considered to be at low likelihood of occurring, and typically a low duration event.

There are six types of generator permitted in the following numbers:

- 10 x Perkins 4006-23TAG3A (1.970 MW_{th})
- 29 x MTU 12V1600G20F-E (X715C2) (1.457 MW_{th})
- 18 x Volvo Penta TAD 1642GE (1.311 MW_{th})
- 5 x Mitsubishi S12R-F1PTAW2 (T1650C) (3.226 MW_{th})
- 15 x Kohler KD45V20-5DEP (2.987 MW_{th})
- 125 x Kohler KD45V20-5DES (2.987 MW_{th}) (these are added by the substantial variation and are essentially similar in specification to the existing Kohler KD45V20-5DEP engines, although 120 of them have enhanced noise attenuating enclosures).

The engines are grouped into 37 operational "cells" of between 5 and nine engines, with the majority forming cells of 5. Each cell has a "n+1" configuration, meaning that there is one more engine per cell than the maximum output required, to allow continued full power provision in the event of the failure of one engine.

In addition to the restrictions above on planned operation (maximum one cell test per day, and no overlapping of different tests of any sort), the operational hours for planned

testing are restricted to 09:00 to 17:00 Monday to Friday, excluding bank and public holidays in order to minimise impact on local receptors.

The engine locations are marked on the site plan and are discussed in further detail in the application, as are the details of the different cells, and the reference numbers for the different engines and cells. Each engine has sufficient fuel supply for 48h operation, giving a total additional fuel storage on site of 1988 m^3 in 127 tanks as a result of the permit variation. Appropriate primary and secondary containment measures are in place to prevent accidental contamination to ground/groundwater from the delivery or storage of diesel fuel or engine fluids.

The main potential environmental impacts from the installation are noise from the engines and pollutants emitted in the exhaust gases of the engines. Exhaust gases are discharged from 202 individual stacks, each associated with one of the engines. Stack heights for the 77 originally permitted engines and new cell TF5 (5 engines) are 3.184-3.937 m, while the remaining 120 new engines will have final stack heights of 12.3 m when all are operational. In a phased development described below in section 5.1, a further 60 of the engines only (CWL 11 expansion) will have an interim stack height of 9.3m, which will be increased before CWL 12 becomes operational.

The only surface water drainage from site is uncontaminated surface water run-off discharging to the sites drainage system.

4.1.4 Relevant regulatory guidance

The application is to vary the permit for an IED installation (which comprises of numerous MCP diesel engines). The operator is therefore required to demonstrate that the facility at least meets Best Available Technique (BAT) for the sector. We have defined BAT performance for the type of installation as follows:

- While article 14(3) of IED states that "*BAT conclusions shall be the reference for setting the permit conditions*", there are no published BAT conclusions that are directly relevant to the operation.
    - Although the total thermal capacity of the installation is 520 MW_{th}, neither Chapter III of IED (for large combustion plants) nor the large combustion

plant BATc are directly applicable as the individual combustion plant (engines) are each less than 15 MW_{th} and are discharged through separate stacks which could not reasonably be combined, and thus aggregation is not applicable.

- In this situation, Article 14(6) of IED applies, making the regulator responsible for determining BAT in consultation with the operator.
- We have determined that BAT be defined as follows for the facility:
    - As each individual plant is subject to the MCPD, the requirements of the Directive (Schedule 25A of EPR) for each individual engine may be considered minimum standard BAT for the collective combustion plant, noting that exemptions apply for plant operating for a limited number of hours.
    - As the most relevant BAT conclusions, we may refer to the LCP BATc "for information" only if applicable.
    - The above is supplemented but not replaced by any BAT definitions in our adopted regulatory guidance:
        - Natural Resources Wales "BAT for [installation] combustion plant outside of the scope of the LCP BREF – Interim Position", 30th April 2019
        - Environment agency guide "Data Centre FAQ Headline Approach; Draft Version 8.0 (17/07/17)" – adopted by NRW in the above position document.
        - It is noted that subsequently, the EA have released further versions of this document, up to Version 11 (11/05/20) – to which we will also refer, and will generally follow unless replaced by other NRW guidance or policy
        - As backup generators on an IED Chapter II installation, the plant is excluded from the specified generator regulations, but may provide indicative BAT, for example the maximum annual duration of testing operations.
    - Finally, we note that Article 18 of IED may require measures "beyond BAT" to be taken if required in order to achieve compliance of air quality standards. This is a potentially relevant consideration in this determination.

4.2 The site and its protection

4.2.1 Assessment of site baseline condition report

The operator provided a description of the condition of the site at permit issue and has updated this for the variation application. The increase in permitted area is minor, and there are no substantive changes to the site condition report as a result of the variation. We consider the report is satisfactory. The decision was taken in accordance with our guidance on site condition reports – guidance and templates (H5).

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The operator has a duty to ensure that soil and groundwater are protected in order to meet the requirements of Articles 14 (1)(b), 14(1)(e) and 16(2) of the IED. Containment measures to achieve this, by preventing accidental releases, were described in detail in the original application. No new techniques or approaches are introduced as a result of this variation. Both new and existing engine fluids will have adequate primary and secondary containment, including appropriate additional measures such as drip trays for all fluid fill points, supervised deliveries, accessible spill kits and site security to prevent unauthorised activity. Consumable fluid stocks and waste (oil and antifreeze) will have adequate containment and security.

It is noted that For the 77 originally permitted engines and the 5 new engines known as cell TF5 (A78-A82), each generator cell has its own fuel storage tank made up of two separate inner tanks, these self-bunded tanks are the main fuel storage for each cell of generators. Each generator also has a smaller day tank which is situated within the bunded generator enclosure providing secondary containment. For the other 120 new engines, there are no shared bulk fuel tanks, and each individual engine sits on top of an individual above ground, double skinned “belly tank” which provides integral secondary containment. The use of individual belly tanks with integral fill points eliminates risks from external pipework as all fuel is contained within the engine container. Details of individual tank capacities is given in the application.

As detailed in the application, some of the generators and fuel tanks are situated on concrete plinths, surrounded by hardstanding, while others are situated in areas of

stone chippings. Where present the concrete surface provides additional (tertiary) containment, but as the generators and tanks are within integrally-bunded metal containers, and the fuel supply system is made up of double skinned pipes, all fluids are in any case subject to adequate secondary containment, even where not on concrete hardstanding. All piping is above ground. There are no bulk fuel storage facilities which are shared between the generator cells. All fuel storage tanks are situated close to the point of use, minimising pipework distances and hence risk of leaks.

The only surface water drainage from site is uncontaminated surface water run-off discharging to the site drainage system. A drain isolation system is in place which can detect spills. 'Bladders' located within the pipes will inflate and capture the contaminated water within the drainage system which can then be pumped out and disposed of appropriately. Combined with the containment arrangements described above, it is considered that the risk of pollution of ground/groundwater is minimal.

4.2.3 Closure and decommissioning

Permit condition 1.1.1 requires the Operator to have a written management system in place which identifies and minimises risks of pollution including those arising from closure.

At the definitive cessation of activities, the Operator has to satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or groundwater, taking into account both the baseline conditions and the site's current or approved future use. To do this, the Operator has to apply to us for surrender, which we will not grant unless and until we are satisfied that these requirements have been met. The operator has indicated that an outline site closure plan will be drafted within 6 months of permit variation.

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

The Operator is the sole Operator of the Installation and has applied for the variation. We are satisfied that the operator will continue to be the person who will have control over the operation of the Installation under the varied permit; and that the Operator will

be able to continue to operate the Installation so as to comply with the conditions included in the Permit.

4.3.2 Management

The Applicant has stated in the Application that they have an integrated management system that incorporates an Environmental Management System (EMS) that is certified to ISO 14001:2015 and meets the requirements for an EMS in our "*How to comply with your environmental permit guidance*". The Applicant has stated that the scope of the EMS will be increased to include the new engines.

We are satisfied that appropriate management systems and management structures will be in place for this Installation, and that sufficient resources are available to the Operator to ensure compliance with all the Permit conditions.

4.3.4 Accident and Incident management

Permit condition 1.1.1a requires the implementation of a written management system which addresses the pollution risks associated with, amongst other things, accidents and incidents. The operator has submitted a comprehensive accident management plan with the variation application, forming appendix F to their main report. The scope of the site accident plan has been increased to include the new engines but is essentially similar to that already in place for the site. Reasonably foreseeable accidents such as loss of containment, fire, adverse weather and unauthorised entry have been covered, along with processes such as accident investigation and reporting. We are satisfied that this plan is suitable and sufficient, but note that the Air Quality Management Plan (AQMP), a specialised form of incident management plan, is addressed separately by the applicant, and in section 5.3 below.

4.3.6 Site security

We are satisfied that appropriate infrastructure and procedures are in place to ensure that the entire site remains secure. The application states that the site has a 24 hour security presence, CCTV, and is fully fenced to minimise the risk of unauthorised access.

4.3.7 Operating techniques

We have reviewed the techniques proposed by the operator and have compared these with BAT as defined above in section 4.1.4, mainly in the Environment Agency "*Data*

Centre FAQ Guidance" adopted by NRW. The operating techniques that the operator must use are specified in tables S1.2a and S1.2b in the environmental permit.

The proposed techniques / emission levels for priorities for control are in line with the benchmark levels contained in the relevant guidance and we consider them to represent appropriate techniques for the facility.

We accept that the diesel generators represent a commonly used technique for standby generators in data centres. The installation will incorporate the following techniques that are considered to be BAT as detailed in the guidance:

Engine Selection

Engine selection is a key BAT consideration as it defines fundamental performance. All 125 new engines are Kohler KD45V20-5DES, designed and operated to meet the TA-Luft "2g" emissions standard (at 5% O2). This is considered the minimum BAT standard in our guidance for data centre engines. It is noted that the new engines will be limited by software control to 75 % of prime power output to ensure that the required NO_X performance is achieved. While the rated thermal capacity of each new engine remains at 2.987 MW, the effective thermal capacity is therefore reduced to 2.24 MW. We consider that this is an acceptable means of achieving the TA-Luft 2g performance.

Given the number of engines, their total thermal capacity and potential impact on air quality during emergency operation, particularly NO_X (see section 5.1 and 5.2), we have considered whether "beyond BAT" performance is required. However, we do not consider that this is necessary, given the extremely likelihood of operation for a significant duration, for further information see section 5.3 and 5.4.

Oxides of Nitrogen (NO_x) control

The minimum specification for new plants for NO_x emissions control for data centre engines is 2g TA-Luft (or equivalent standard), corresponding to a NO_x emission concentration of 2000 mg/m^3. The generator specification for all engine types (new and existing) are in line with the NO_x emission concentration of 2000 mg/m^3 (at 5% O_2).

Plant design is key to NO_x control through efficient combustion, and this is achieved by initial engine selection and maintained through monitoring and control via an electronic management system (Engine Control Unit - ECU) that measures and records process parameters and controls. Ongoing performance is maintained and confirmed by planned maintenance and testing of the engines. We consider that the techniques for NO_X control are BAT for the installation.

The use of secondary control measures (Selective Catalytic Reduction - SCR or selective non-catalytic reduction - SNCR) are not considered to be BAT due to the effectiveness of primary controls, increased operational complexity and the short-term intermittent nature of the standby plant. This is discussed further in section 5.1 and 5.2.

Sulphur dioxide (SO_2) control

In combustion processes, the fuel is the source of sulphur in the gaseous emissions. Therefore, SO_2 emissions from the generators are controlled via the primary technique of fuel selection. Low-sulphur fuel which contains 0.1% (1,000ppm) sulphur is used at the installation. This is in line with the requirements of the Sulphur Content of Liquid Fuels (SCOLF) regulations 2007 of 0.1% (1,000 ppm) for diesel fuel, and also below the requirements of TA Luft 2002 which recommends <0.2%sulphur.

It is considered that the primary techniques employed to control SO_2 emissions are BAT for the installation.

Carbon Monoxide (CO) control

At the proposed 75% maximum power operation, the CO emissions from all of the proposed new generators is well below the TA-Luft BAT performance level of 650 mg/m^3 at 84 mg/m^3 ($5\%O_2$). This is considered BAT for the installation.

Volatile Organic Compounds (VOC) Control

The emission of VOCs (also referred to as hydrocarbons in engine emissions) from the new generators will be controlled in the same way as CO emissions, i.e., via

combustion efficiency techniques and are unchanged from the original permitted facility engines. This is considered BAT for the installation

Particulate Matter control (Total Particulate Matter, PM_{10} and $PM_{2.5}$)

The proposed engines, capped at 75% power, achieve a total particulate matter performance of 4 mg/m^3 (5%O_2), considerably below TA-Luft 2g performance of 130 mg/m^3 (5% O_2). The emissions of PM_{10} and $PM_{2.5}$ are necessarily lower than this. This is considered BAT for the installation.

The use of filters on standby plant in not regarded to be BAT, and is unnecessary at the achieved performance level.

Noise Emission control

The proposed new engines will be located in sound attenuating enclosures. Five of the new engines will have the same "super sound proofed" enclosures which reduce the sound power level to 103 dB(A). The existing engines on site range from 102-109 dB(A) sound power level with the attenuation in place. The remaining 120 new engines will be within "WB Power Services Acoustic Enclosures" which reduce the sound power level considerably lower, to 88 dB(A). Based on the assessment of impact in section 5.2 and 5.5, we are satisfied that this performance is BAT.

Plant Design, monitoring and Maintenance

For all combustion plant, plant design features and planned preventative maintenance are important primary measures to maintain optimum performance and minimised emissions in line with manufacturer's performance specification for the units. Plant design is determined by engine selection, and as described above is to meet or exceed the TA-Luft 2g performance standard at operational parameters. Scheduled maintenance is as described in the original permit application. Live control and monitoring is via engine electronic control units (ECU) which monitor and record various key process parameters, automatically tune engine performance, and raise alarms for intervention if pre-set values are exceeded. This is described in the original application and largely unchanged by the variation.

All regular maintenance is completed to the timescales specified by the equipment manufacturer, as optimised by best industry practices and operating experiences. Nevertheless, live testing of the engines is minimised as far as possible to limit emissions and their impacts (primarily noise and air quality, see below). No testing will be overlapping, and only single engine / single cell tests are permitted, all within the hours of Mon-Fri 9.00am-17:00pm (excluding bank holidays) and with only one cell test per day..

Emission Limits and monitoring

NO_x, SO_2, CO and PM emissions meet the BAT limits defined in the TA-Luft 2g standard referred to in the Data Centre FAQ guidance. Emissions are therefore limited by conformance with this specification. Under MCPD, formal permit Emission Limit Values (ELVs) for emissions to air would normally be set (for NO_X only for diesel fuel), but are not required (Article 6(8)) due to the combustion plants operating no more than 500 hours per year as a rolling average over a 3 year period.

The operator has not proposed any emission limit values or monitoring, arguing that this is in line with BAT as defined in the Data Centre FAQ guidance for plant operating less than 500 h per year. We agree that the plant will operate for less than 500 h per year and have made this a permit condition, and therefore agree that the plant may be exempted from emission limit values defined in MCP Directive. We have therefore not set air ELVs in the permit.

We have reviewed the requirements concerning monitoring of MCPs, and consider that monitoring is required under EPR Annex 25A (MCPD Article 7(1) and Annex III), irrespective of whether the plant is operational for limited hours only. We have therefore set emission monitoring requirements for newly permitted MCPs in accordance with the requirements and for substances relevant to the plant, namely CO. Although ELVs have not been set, this will enable ongoing assurance that the engines are meeting the TA Luft performance standard. We have decided that this approach should also be applied to MCPs already permitted on site by V001 of the permit, and have therefore introduced monitoring requirements for engines A1-A77 as part of this variation as an NRW-initiated action. The operator has agreed with this approach.

We do however recognise that the minimum emissions testing requirements of MCPD are potentially onerous for operators of backup plant which is planned only to operate for system testing. We consider the plant to be "low risk" owing to its very low number of operational hours. In fact, extensive monitoring requirements could result in the plant being operated for emissions testing only, with resultant additional emissions, which may not be justified. We will therefore allow ELV testing to be co-ordinated with planned testing operations, to be conducted to the standard prescribed in Technical Guidance Note M5 for low risk plant, rather than the more onerous MCERTs approach which is applied to many installations. We have also specified in the permit that the monitoring standard/method shall ensure "Representative engine monitoring". Provided that results of required testing confirm that the TA-Luft 2g performance standard is demonstrated to be met, we consider that representative monitoring may be achieved by testing for example one engine per cell only, or other similar arrangement as may be agreed between Natural Resources Wales and the operator. If monitored performance deteriorates, we may notify the operator that additional representative testing (i.e. additional engines) is required. We consider this to be a reasonable and proportionate regulatory approach.

There are no emissions to water other than of uncontaminated surface water (rainwater), and drainage arrangements are not significantly impacted by the variation (a small area is added to the permit boundary as noted above). No emissions limits or monitoring are required and this is unchanged by the variation.

Conclusion

We are satisfied that the design and operating techniques constitute BAT for plant design and operation, incorporating process control, monitoring and maintenance.

We have specified that the applicant must operate the permit in accordance with descriptions in the variation application, including all additional information received as part of the determination process.

These are specified in the Operating Techniques table in the permit.

4.3.7 Energy efficiency

We are satisfied that the Applicant will ensure that energy is used as efficiently as possible.

The installation is not a very large user of energy. The generators will only operate occasionally, less than 50 hours per annum for routine testing. Energy efficiency is assured as far as possible through planned maintenance. The operator will regularly review the energy use as part of permit condition 1.2.1. The Operator is required to report energy usage under condition 4.2 and Schedule 4, including the total amount of diesel used and the testing and emergency operating hours of the site and of each engine. This will enable Natural Resources Wales to monitor plant operation (which must be minimised) and energy efficiency at the Installation.

As explained in section 3, the EPR Schedule 1 Part 2 Section 1.1 Part A(1) combustion activity is considered a "relevant installation" falling within the scope of Schedule 24 of EPR, which requires plant undergoing substantial refurbishment to take a cost-benefit analysis in respect of high-efficiency cogeneration and waste heat / district heating. However, we agree with the applicant that a Schedule 24 Energy Efficiency Directive Cost-Benefit Analysis is not required because Schedule 24.2(4) disapplies the requirement to back-up electricity generating installations that are planned to operate under 1,500h per year (as a rolling average over 5 years). Operation of the installation is expected to be considerably under this threshold. Emergency operation is limited to under 500 hours per calendar year, and along with testing total operation will be under this value, with testing hours minimised and expected to be <50h/engine/year.

4.3.8 Efficient use of raw materials and avoidance, recovery or disposal of wastes

This requirement addresses raw materials used, and wastes produced at the facility. Raw materials will consist of diesel, engine oil/lubricants and antifreeze/coolant, and any electrical/mechanical spares/parts. Waste will be kept to a minimum. Accordingly, the main wastes produced are used oils, filters antifreeze. Fluids are all recycled, while it is expected that solid wastes will be disposed of.

Having considered the information submitted in the Application, we are satisfied that the waste hierarchy referred to in Article 4 of the Waste Framework Directive will be

applied to the generation of waste and that any waste generated will be treated in accordance with this Article.

We are satisfied that waste from the Installation that cannot be recovered will be disposed of offsite using a method that minimises any impact on the environment. Permit condition 1.4.1 will ensure that this position is maintained.

4.3.9 Reporting

We have specified the reporting requirements in Schedule 4 of the Permit to ensure data is reported to enable timely review by Natural Resources Wales to ensure compliance with permit conditions and to monitor the efficiency of material use and waste recovery at the installation. There are no substantive changes to reporting requirements, other than to reflect the emissions monitoring required (section 4.3) and the additional number of engines that will be operational

5 Minimising the Installation's environmental impact

Regulated activities can present different types of risk to the environment, these include odour, noise and vibration; accidents, fugitive emissions to air and water; as well as point source releases to air and surface water, and generation of waste. All these factors are discussed in this and other sections of this document.

For an installation of this kind, the principal emissions are :

- Emissions air pollutants and noise from engines, arising from
    - planned (testing) operation and;
    - unplanned (emergency) operation,
- The key air pollutants from either mode of operation are
    - Oxides of nitrogen (NO and NO_2 expressed as NO_2 (NO_x))
    - Particulate Matter (PM)
    - Carbon Monoxide (CO)
    - Carbon Dioxide (CO2)
    - Sulphur Dioxide (SO_2) (low sulphur fuel will be used, <0.1%)
- Also, risk of unplanned emissions arising from emergencies such as leaks or spillage (see 4.3.4)

The next sections of this document explain how we have approached the critical issue of assessing the likely impact of emissions of noise and air pollutants from the Installation on human health and the environment and what measures we are requiring to ensure a high level of protection. The actual impacts of the installation are subject to an element of uncertainty, because the facility is a backup unit only (see 4.1.3). The impact assessment is therefore split into the following sections.

- Sections 5.1 (Air impacts) and 5.2 (Noise impacts) – Definite impacts which will occur and are limited to those from planned and foreseeable testing of the engines,
- Section 5.3 – assessment of the measures in place to minimise the likelihood of requirement to operate for emergency backup generation
- Sections 5.4 (Air impacts) and 5.5 (Noise impacts) – modelled potential additional impact which would result from low likelihood emergency operation of the plant. These impacts may be higher than we would permit for a plant intending to operate for a defined number of hours, based on assessment of risk, which is a function of impact (harm) and likelihood of occurrence.

We have reviewed the operator's assessment of the environmental risk from the facility. The operator's risk assessment is satisfactory. The assessment shows that, applying the conservative criteria in our guidance on Environmental Risk Assessment, all emissions may be categorised as unlikely to cause significant pollution with the exception of short term NO_X emissions resulting from emergency operation of the generators, as detailed below. We discuss the operators risk assessment in more detail as follows:

5.1 Assessment of Impact on Air Quality of planned testing operation

This section and section 5.4 of the decision document deals with the dispersion modelling of emissions to air from the engine exhausts (A1-A202) and their impact on local air quality. Section 5.1 considers the effects of planned testing operation, and 5.4 of emergency operation. The impact of both modes of operation on conservation sites is considered in section 5.10. The data centre is not situated in an Air Quality Management Area (AQMA) and there are no AQMAs with 2 km of the site.

The Operator has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon human health. These

assessments predict the potential effects on local air quality from the Installation's stack emissions using the AERMOD (V9.0.0.23) dispersion model, which is a widely accepted computer model used in regulatory dispersion modelling. The modelling provided by the operator has been subject to detailed audit by NRW specialists.

The model used 5 years of meteorological data collected from the meteorological station at Cardiff Airport between 2011 and 2015. We did query whether more recent data was appropriate, but the applicant justified their decision of the selected years adequately. The impact of the nearby buildings and terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

The air impact assessments (comprising of the application submission and the further information provided before the application was Duly Made), and the underlying dispersion modelling, were undertaken on the following basis:

- It was assumed that the pollutant emission rates would be as specified by the engine manufacturers (concentrations and flows), with appropriate corrections / conversions and assumptions regarding emissions characteristics.
- The substances subject to detailed modelling:
    - Oxides of nitrogen (NO_x), expressed as NO_X and NO_2 – the principal pollutants of concern in the assessments
    - Carbon monoxide (CO)
- The following substances were subject to a less detailed screening assessment:
    - Sulphur dioxide (SO_2)
    - Partiuculates / Dust (as PM_{10} and $PM_{2.5}$)
    - Hydrocarbons, also referred to as Total Organic Carbon (TOC)
    - For unplanned emergency operation, NO_X as NO
- The modelled operating hours for planned testing reflected those in the application, being for quarterly servicing of each engine (2 x 15 minute and 2 x 2 hour per engine per year) plus cell testing (all of the engines in each cell individually, for 15 minutes, with load shedding of 1 engine after 10 minutes).
- The modelling for unplanned emergency operation assumed that all engines on the installation were operated at once for ten minutes, with load shedding (of 1 redundant engine per cell) and continued operation of the remaining engines for one hour.
- The impact of the installation upon air quality was undertaken at discrete receptors for human health and environmental receptors, as detailed in the application, and using

relevant Environmental Standards (ES) as detailed below and contained in statutory guidance.

- The main focus of impact assessment was on short term (hourly or daily) ES, but assessment has also been made on long term (annual) impact of proposed operation.

The report accompanying the air quality modelling indicated modelling of 3 operational scenarios (existing site plus CWL 11 initial expansion of 1 cell TF5, (77 existing + 5 engines) – Phase 1, full CWL 11 expansion of (77 + 5 + 60) engines – phase 2, and CWL 11+ CWL 12 full site expansion of 125 (77 + 5 + 60 + 60) engines – phase 3. The air quality impact assessment then largely summarised two developments, Phase 2 full CWL 11 only, and phase 3 CWL 11 and CWL 12. Furthermore, the application detailed that other than TF5 expansion which has stack height of 3.645 m in line with existing engines, the CWL11 expansion would utilise stack heights of 9.3m, being extended to 12.3m with the development of CWL 12. Our audit of the dispersion modelling confirmed that for phase 3 the applicant had modelled all 120 new engines other than TF5 with 12.3 m stacks, and in a separate scenario CWL11 only with 60 x 9.3m stacks (and TF5 with 3.645m stacks), so the permit reflects this proposed phased development of the facility. Our focus below is on the impacts from the "final" configuration (Phase 3, 120 new engines, 12.3 m stacks plus TF5 with 3.645 m stacks), as the interim phase 2 development with fewer engines has been demonstrated to have a lower overall air quality impact, as detailed in the report, albeit with a shorter interim stack height.

We are in agreement with the modelling approach. The assumptions underpinning the model have been checked and are reasonably precautionary. The way in which the Applicant used dispersion models, its selection of input data, use of background data and the assumptions it made have been reviewed by Natural Resources Wales modelling specialists to establish the robustness of the Applicant's air impact assessment. The output from the model has then been used to inform assessment of potential health impacts.

<u>NO_X as NO_2</u>

The short-term Environmental Standard for Nitrogen Dioxide is an hourly limit value of 200 µg/m^3, with up to 18 one-hour exceedances allowable per year. The applicant

has defined a "screening threshold" of 156 µg/m^3 which is the ES minus twice the long-term average background NO_2 concentration (to represent short-term fluctuations). If Process Contributions (PC) from the proposed development are below the screening threshold, then it is considered unlikely that the ES would be breached. The background data is taken from Newport AURN monitoring site, is the highest annual average value for years 2014-19, and is considered precautionary.

The applicant's modelling shows that for planned individual engine testing, the maximum PC for NO_2 based on hourly averages for modelling of 5 years of meteorological data, does not exceed the screening threshold (the highest reported value is 126 µg/m^3 at receptors), and thus the installation is not likely to result in a breach of the short term ES for NO_2. We have undertaken check modelling, which produced slightly different results, but also concluded that the ES was unlikely to be breached as a result of planned testing.

For testing of cells of a number of engines, the original permit application (BB3599CW/V001) assumed 1 hour of testing per cell (with load shedding). Operational experience has shown that testing can be restricted to 15 minutes per cell, so new modelling reflects this. The original application did show that the cell testing could result in a breach of the ES of 200 µg/m^3 but was considered unlikely to do so as explained in the V001 decision document. Modelling undertaken for the proposed permit variation by the applicant has indicated that cell testing of the proposed new engines is unlikely to result in a breach of the ES, with the maximum NO_2 impact for new engines modelled as 70 µg/m^3 at discrete receptors, well below the defined 156 µg/m^3 screening threshold. Our check modelling, while producing different maximum concentrations and locations, supports the conclusions that the new engines will not result in a breach of the ES. Furthermore, the applicant has reported that with the revised 15-minute modelling for the existing engines, the maximum NO_2 at receptors has reduced to 193 µg/m^3. While it is impossible to completely exclude the potential for a breach of the ES of 200 µg/m^3 (having due regard for background concentration), taking into account the revised modelling it is considered unlikely that planned cell testing at the installation would result in a breach of the short term NO_2 ES, and highly improbable that such operation would result in greater than the permitted 18 exceedances of the ES per year, given that there are only 12 cells in the originally

permitted facility. The actual emissions from these already consented engines are unaffected by the variation.

As a simple screening assessment of planned operation on annual average NO_X, the applicant has reported the maximum impacts of one engine operating continuously for the year, which is a simplification of the impact of 202 different engines, but a significant over-estimate of the hours of operation of engines for testing. The maximum reported impact from such operation, is an annual average contribution of 1.4 µg/m^3, which is 3.5% of the long term NO_2 ES of 40 µg/m^3 and cannot automatically be considered insignificant as it exceeds our standard screening threshold of 1% of an annual ES. However, the predicted environmental concentration (PEC), taking into consideration background pollution, is 23 µg/m^3, and therefore the annual average ES of 40 µg/m^3 is unlikely to be breached as a result of installation operation.

CO

The applicant has applied the same modelling approach for carbon monoxide, as outlined above for NO_X, but using the relevant emission characteristics for the pollutant and the applicable environmental standards of 30,000 µg/m^3 hourly mean and 10,000 µg/m^3 eight hourly average. They have calculated impacts from planned new engine testing for the proposed variation. The maximum PC reported for individual engine testing was 135 µg/m^3 (0.45%) as an hourly average, and 31 µg/m^3 (0.31%) as a 8-hour average. In accordance with our guidance, the applicant has concluded that these impacts are insignificant at <10% of a short-term ES.

For testing of cells of a number of engines, the maximum CO impact was calculated as 154 µg/m^3 (0.51%) as an hourly average, and 35 µg/m^3 (0.35%) as an 8-hour average. In accordance with our guidance, the applicant has concluded that these impacts are insignificant at <10% of a short-term ES.

As all impacts (as PC) are found to be insignificant, there is no need to consider the Predicted Environmental Concentration (PEC) or refer to a screening threshold as referred to for NO_X. We are in agreement with the conclusion that CO emissions are insignificant with reference to relevant environmental standards. There is no annual limit for CO so no annual average impact assessment is required.

SO_2

The applicant has used the maximum fuel S content (0.1% by mass) to calculate the maximum SO_2 emission parameter, and used the modelling above to calculate the environmental impact by factoring the environmental concentrations based on the ratio of NO_X to SO_2 in the emissions. They have considered the applicable environmental standards for SO_2 of 350 µg/m^3 hourly mean and 266 µg/m^3 15-minute average, with 24 and 35 exceedances respectively of the standard allowable per year. The maximum hourly SO_2 concentration is calculated as 22 µg/m^3 (6.3%) for a single engine, and 28 µg/m^3 (8%) for cell testing. For 15-minute averages, the maximum impacts are 30 µg/m^3 (11%) for a single engine and 38 µg/m^3 (14%) for a cell. Some of these impacts are above 10% and cannot be considered insignificant against the short-term screening threshold. The operator reports an SO_2 background of 3 µg/m^3 as an annual average, making the maximum hourly PEC 28 µg/m^3 (8%) for single engine, 34 µg/m^3 (10%) for a cell, and maximum 15-minute PEC 36 µg/m^3 (14%) for single engine and 44 µg/m^3 (17%) for cell testing. The operator states that there is no risk of the short-term SO_2 ES being exceeded at receptors as a result of planned operation, and we agree with this conclusion.

Particulate Matter as PM_{10} and $PM_{2.5}$

The application documents did not include an assessment of operation of the proposed expanded installation on PM_{10} and $PM_{2.5}$ standards, and these were provided in response to our Schedule 5 notice (see above). The applicant used a simplified, conservative assessment to assess maximum particulate matter impacts, as explained in their response, including the precautionary assumption that all emitted particulate is PM_{10} and $PM_{2.5}$ respectively for assessment against the standards. The maximum PC, for particulate from cell testing, as a daily average, was calculated as 0.07 µg/m^3 (0.15% of PM_{10} ES of 50 µg/m^3 as a 24-hour mean, which may be exceeded 35 times a year). At <10% of the short-term ES, the impact of the proposed variation can be considered insignificant.

A further screening calculation (as explained in the Schedule 5 response) has been used to assess the worst-case annual impact against PM_{10} and $PM_{2.5}$ standards. The calculated maximum impact from cell testing is 0.01 µg/m^3, which is 0.03% of the PM_{10}

annual average ES of 40 µg/m^3, and 0.04% of the $PM_{2.5}$ annual average ES of 25 µg/m^3. These can be considered insignificant against a screening threshold of <1%, and are conservative estimates proportionate to the pollutant levels described. We agree with the applicant that proposed planned operations will not have a significant impact on particulate environmental standards.

Hydrocarbons as VOC

The assessment of Hydrocarbon/VOC emissions were calculated in response to our Schedule 5 notice, using the same method as for PM_{10} and $PM_{2.5}$. As the chemical composition of the VOC is unknown, the applicant followed the standard precautionary permitting assumption of assessing all VOC against the ES for Benzene (30 µg/m^3 24-hour average, 5 µg/m^3 annual average), a harmful VOC with a very low ES. This precautionary approach does not imply or suggest that benzene would be among the emitted VOC pollutants.

The precautionary screening assessment indicated that the maximum 24-hour PC from cell testing was 0.2 µg/m^3 (0.7% of the ES), and that the maximum annual PC from testing was 0.025 µg/m^3 (0.5% of the ES). Using the methodology described above, these impacts can be considered insignificant as they are below the relevant significance screening thresholds of 10% and 1% respectively.

5.2 Assessment of Noise Impact of planned testing operation

The operator submitted a detailed BS4142 Noise Impact assessment (NIA) for the proposed facility with their variation application. As a result of our Duly Making request for further information for the modelling files, the operator not only provided these, but provided a revision to the NIA (V3, 21/02/22) as explained in their response.

The operator has completed a detailed noise model using the SoundPlan Software (Version 8.2) based on environmental measurements of existing (background) noise when the installation was not operational (2019 data). Sound power levels for existing engines were taken both from manufacturers specification and from measurements near operating engines, with the higher of the two values being used. Calculations of noise impact at sensitive receptors were made for a number of scenarios including the existing permitted facility and the proposed expanded facility comprising of 202

engines. The NIA and modelling has been subject to detailed audit by NRW specialists. The audit and check modelling undertaken broadly support the conclusions made by the Operator.

As detailed in the report, The proposed new engines will be located in sound attenuating enclosures. 5 of the new engines will have noise attenuating enclosures which reduce the sound power level to 103 dB(A), and the remaining 120 engine enclosures will reduce the sound power level considerably lower, to 88 dB(A). The existing engines on site have sound power levels ranging from 103-109 dB(A) with the attenuation in place. It is noted that the assessment assumes that final performance of all plant, mitigation measures and enclosures meet or exceed those indicated in the submitted report and are maintained accordingly. See Section 4.3 of this report for measures in place to ensure effective inspection and maintenance.

Impact assessment is made approximately to the standard BS4142 criteria by considering the calculated noise impact at sensitive receptors, of the facility, compared with a background without the site operating, as follows:

- As stated in BS4142 a difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context – referred to as “major adverse” impact in the report when over 10 dB
- As stated in BS4142 a difference of around +5 to +10 dB is likely to be an indication of an adverse impact, depending on the context – referred to as “moderate adverse” impact in the report.
- As stated in BS4142 the lower the rating level is, relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context. The report describes a minor adverse impact as being a 1 to 5 dB difference over background, and a negligible impact as being below 1 dB.

The reported results show that the main impact at each receptor is from the existing permitted engines, for individual engine testing (15-minute and 2-hour), and for cell

testing. None of the proposed new engines are predicted to create a noise impact with greater than minor impacts (2 may cause minor impact at 1 receptor). Our checks broadly agree with the results presented in the submitted report which concludes that the inclusion of the new engines will not significantly affect the existing impact from the site, due to the fact that the existing engines are the dominant noise source on-site and the new engines sound levels are lower than the existing engines at all receptors. The assessment shows that the sound emissions from 120 of the new engines are more than 10 dB below the existing engines, and the other 5 new engines have sound emissions the same as the quietest engines already permitted at 102 dB.

We are satisfied that the proposed variation to the installation will not significantly affect the noise at receptors. Where the report predicts likely moderate or major noise impacts at receptors, this is unchanged, and is a result of the already permitted engines. Owing to the infrequent operation of the individual engines for testing, the duration of existing site major impact is calculated to be two hours or less at any individual receptor, with the total duration at all receptors 2.5 hours. The maximum duration of moderate impact at any single receptor is under 50 hours per year.

5.3 Assessment of likelihood of emergency operation and measures to minimise occurrence

The assessment above details the extent of impacts which will occur, as a result of intentional operation of the permitted facility. As explained, the purpose of the facility is to provide backup power in the event of failure of the mains supply to site. Were this to occur, additional impacts would arise, possibly from the operation of all the engines on site together. These possible impacts are assessed below, and would occur only if electricity supply to the site was interrupted, or if for any other reason the site went into emergency backup mode of operation.

A key issue in assessing the risk from permitting of the facility is therefore the likelihood of the site operating in emergency mode.

In their application, the operator states that "*Prolonged emergency operations are not anticipated*" and summarises extensive arrangements which are in place to minimise the likelihood of needing to operate in emergency mode. We are satisfied that they

have provided evidence to show that this risk has been minimised as far as reasonably practicable. Key factors are as follows, with other information being available in the application:

- The National Grid Electricity Transmission System ("super grid") is extremely reliable. National Grid reports a reliability of 99.999974% for 2019-20 and a minimum reliability of 99.999964% in the most recent six years for which information is available.
  This equates to a maximum of just over 11 seconds of supply interruption/fluctuation in a year. Given the facility has a battery-powered uninterruptable power supply to provide supply for a minimum of 21 seconds required to initiate the generator engines, it can be seen that the likelihood of engine deployment for a prolonged period is a very low probability event.

- The majority of power outages in the UK occur between the Super Grid and the user. The Data centre is directly connected to the electricity supply Super Grid via two independent connections.

  Both supply power concurrently under normal operational conditions, and both could be used in isolation if the other part of the grid supply system were to fail.
  There are no local distribution centres between the site and the National Grid; consequently local power outages should not result in prolonged or extensive emergency operation. This is regarded as unique for data centres and is fundamental in further reducing the likelihood of emergency operation.

- For the purposes of impact assessment, it has been assumed that an emergency operation would last for one hour. We consider this to be reasonable. Obtaining realistic estimates for the likelihood of such events is difficult. The operator reports that for emergency scenario planning purposes a 1-2 hour outage of the super grid can conservatively be considered as a 1 in 20 year event. The actual likelihood of occurrence is considered lower.

- To date, there has never been a full site electricity supply failure requiring all generators to operate concurrently. There was a National Grid supply incident in October 2021 that led to emergency operation of three cells of engines. The National Grid experienced a power excursion for a couple of seconds. The three cells were affected ran for between 20 minutes (expected operation given the event) and < 5

hours. The extended operation of 2 cells was the result of a component malfunction which meant that the site could not correctly switch back to National Grid supply once the cells went into mode.

We are satisfied that as a result of incident investigation and follow-up action detailed in the application and site NRW regulation record, sufficient measures are in place to considerably reduce the likelihood of slightly extended engine operation as a result of minor National Grid supply disruption.

- The likelihood of emergency operation owing to on-site equipment failure is proactively reduced through routine maintenance, inspection and equipment replacement. The likelihood of extended operation on emergency power is reduced by the site business continuity plan, with measures including a considerable inventory of spares on site, and staff available to respond to any emergency outages, technical failures etc.

Overall, we are satisfied that the likelihood of emergency operation of the site is extremely low, and have permitted the facility accordingly, with regard to the impact of emergency operation which is described below. We have imposed additional permit conditions also described below to reflect the expected operating mode and impacts.

5.4 Assessment of likely Impact on Air Quality of emergency operation

The underpinning modelling assessment of impact on air quality of emergency operation of the facility is as detailed above in section 5.1. For emergency operation impact assessment, the modelling assumed that all engines would operate at once for ten minutes, with load shedding (of 1 redundant engine per cell) and continued operation of the remaining engines for one hour. This approach differs slightly from the original permit application where it was assumed that all engines would run for the full hour, meaning that original and current emergency modelling are not directly comparable. Results have been calculated for every hour in every year of modelling, i.e. 8760 hours per year, or 43,800 hours in total, and the least favourable result reported. We agree with this precautionary approach.

As explained in section 5.3 above, it is impossible to be certain of frequency or duration of unplanned emergency operation, but we are satisfied that the modelling undertaken is representative of a reasonable worst case emergency operation duration. Nevertheless, owing to the residual uncertainty over possible impacts of the facility, we have included additional conditions in the permit, as explained in the conclusion of this section, to ensure that the impacts in an emergency situation remain adequately controlled. Impact assessment is made against short-term standards only. We are in agreement with this approach; given the expected short-term operation in emergency mode, assessment against annual standards is not applicable.

NO_X as NO_2

The short-term Environmental Standard for Nitrogen Dioxide is an hourly limit value of 200 µg/m^3, with up to 18 one-hour exceedances allowable per year. The maximum modelled hourly NO_2 predicted environmental concentration from emergency operation of the facility and taking into account background pollution was calculated by the applicant as 6000 µg/m^3, a substantial breach of the ES. The number of hours per modelled year where emergency operation could cause a breach of the ES was calculated as a maximum of 2992 hours (or 34% of the year). NRW's check modelling broadly agreed with these results.

Statistical analysis was carried out by the applicant and determined that even if there was an outage for 24 hours in a single year, the hypergeometric mean gives the probability of an exceedance of the air quality objective of less than 1%, given that 18 hourly exceedances per year may be allowed. While we obtained somewhat different values, we agree that the hypergeometric mean is less than 1%, indicating that the annual ES, allowing for 18 hourly exceedances, is unlikely to be exceeded by a single 24 hour operation of the site on emergency basis.

If operation of all engines on site were planned and expected to take place for significant duration, the impacts quantified above would be unlikely to be permitted by NRW. Article 18 of the Industrial Emissions Directive requires that further measures are taken to control emissions if it is expected the ES would be beached. However, because the likelihood of occurrence is low, we do not consider that the ES is likely to be breached.

Further consideration of unplanned operation impacts on human health is required on the basis that these events and impacts are unlikely to occur, but may do so for short durations and cause localised air quality issues. Ambient NO_2 levels at sensitive receptors in this situation may not only exceed the ES of 200 µg/m^3 for short durations but may be significantly higher as indicated. In accordance with our adopted guidance for Data Centres, the approach in this case is to consider a different standard, the Acute Exposure Guidance Level (AEGL) as defined by the US EPA and applicable to "*rare exposure to airborne chemicals*". Therefore emergency operation of the facility for any more than a trivial period is assessed using the criteria used for assessment of emergency events such as chemical releases and fires – it is not an event which is expected to occur.

Three levels of AEGL are defined for any substance assessed under the scheme. AEGL-1 is the lowest level, where notable discomfort or irritation may occur, but effects are non-disabling, transient and reversible upon exposure ending. AEGL-2 is a level at which irreversible or serious long-lasting health effects may occur, and AEGL-3 is a level at which life-threatening health effects or death may occur. The focus in this assessment is mainly on AEGL-1, with AEGL-3 not being relevant.

AEGL's are defined for short-term exposures of 10 minutes, 30 minutes, 60 minutes, 4 hours and 8 hours. For NO_2 the AEGL-1 is the same (940 µg/m^3) for all exposure periods of 10 minutes to 8 hours and the AEGL-2 varies with exposure period, from a minimum of 12,600 µg/m^3 for an 8 hour exposure, to a maximum of 38,000 µg/m^3 for 10-minute exposure. The AEGL-1 is directly comparable with the UK Health and Safety Executive 8-hour workplace exposure limit of 960 µg/m^3.

The applicant has compared modelled NO_2 impact at receptors with AEGL levels. They report no predicted breaches of AEGL-2, with the maximum hourly impact at a receptor (6000 µg/m^3) being slightly under half of the lowest (8 hour) AEGL-2 of 12,600 µg/m^3. We agree with the conclusion that AEGL-2 (and therefore also AEGL-3) levels are unlikely to be breached by operation of the facility.

The applicant's modelling results indicate that for full operation of the proposed facility (202 engines) could at worst case result in up to 1429 hours per year which breach the AEGL-1 (16% of hours in the year). It is noted that on a like-for-like modelling basis, this is substantially more than if fewer engines were employed. Comparable figures were not presented for the currently permitted facility, but partial expansion only (65 new engines on CWL 11, with no CWL 12 addition, giving site total of 142 engines) would result in a maximum of 234 hours in a year breaching AEGL-1 (2.67% of year). From our check modelling we are satisfied that the application reasonably estimates the possibility of AEGL-1 being breached by emergency operation of the site.

Further management of these unlikely, but potentially high impact events is discussed in the conclusion section below.

CO, particulate matter, hydrocarbons and nitric oxide (NO)

The applicant has stated that "*No other pollutants have been identified as being at risk of exceeding relevant Environmental Standards for Air Quality in an emergency, given the anticipated duration of an emergency outage and the lower emission concentrations of the regulated pollutants*". Our check modelling supports this conclusion and we are satisfied that the key pollutant of potential concern in an emergency operation of the site is NO_X as NO_2. The applicant has detailed calculations for NO which indicate that anticipated levels are below the relevant ES.

Conclusion and additional controls imposed by Air Quality Management Plan (AQMP) and Bespoke permit conditions

We are satisfied that the impact assessment undertaken adequately quantifies the reasonable worst case emissions from emergency operation of the installation, focussing on NO_2. We recognise that these potential impacts are higher than we would permit for a facility that was expected to operate for a defined number of hours (excluding testing, considered separately above), in recognition of the low likelihood of occurrence. We do not consider that any ES (particularly the ES for NO_X) is likely to be breached given the expected frequency/duration of emergency operation, and neither expect the AEGL-1 to be breached, and that given the additional controls below, and non-expected emergency operations will be effectively managed as an incident response to minimise impact. Emergency operation does not result in a

credible scenario where AEGL-2 or above are breached. In reaching this position we have balanced the credible but unlikely environmental impacts of emergency operation of the facility against the need to maintain critical services in the event of a significant National Grid supply interruption, which would in itself be a very serious incident.

Nevertheless, given the uncertainty around potential emergency operation, and the possible low likelihood but high impact emissions, we considered that additional controls were necessary. In line with the "Data centre FAQ Headline Approach" guidance adopted by NRW, (based on when an emergency outage operating scenario indicates a very significant risk to local air quality and identified receptors), NRW has already required the operator to have a written action plan to manage prolonged emergency running of the plant (including sensitive receptors lists and mitigations, assessment and impact evaluation against modelled risk conditions). This helps to ensure a plan is in place taken into account local factors and how to improve/mitigate against impacts. In order to determine the variation application, we required the AQMP to be revised and updated for the proposed site capacity. It is an interim plan, that identifies further measures need to be developed. One of those measures is the evaluation of actual impact of any emergency operation greater than 4h (a very low likelihood scenario), by monitoring, and / or a combination of monitoring and modelling. The additional requirements for the AQMP will be addressed through **IC5** – **IC8**. These require that additional work is developed, and that a revised and updated AQMP is submitted within 12 months of issue of the variation, for approval by Natural Resources Wales. The permit, along with the current, and required revised AQMP will ensure that:

- Any emergency operation of all or a significant proportion of the engines on site will be notified immediately to NRW, for management as an air quality pollution incident by the relevant authorities (including NRW) if necessary as determined by its duration
- Work undertaken by the operator in advance as detailed in the AQMP will allow the level of risk to quicky be identified by the operator and shared with the regulator, and proportionate actions to be taken. As an incident continues/develops, this risk assessment will be reviewed/revised as necessary

- Monitoring and/or Modelling to be implemented within 1 year of permit issue will ensure that the risk at receptors of an extended duration incident (>4h) will be confirmed by ground-truthing
- Limits set in the permit (see permit Table S1.1) are explicit that if there is credible information that relevant Air Quality Standards have been exceeded at receptors (for relevant time periods as applicable), then operation of the installation shall immediately cease or be reduced to a level where the standard is no longer at risk.

Recognising the significant risk to air quality posed by ongoing or repeated emergency operation, as well as the AQMP and **IC5** – **IC7** detailed above we have incorporated the following additional controls into the Environmental Permit:

- **IC7** requires full re-appraisal of the Installation Environmental Risk Assessment and AQMP if prolonged emergency operation occurs, or if the reported National Grid reliability falls below 99.99%. It requires the operator to propose changes to the site and permit if necessary.
- The limits of the permitted activity specifically state that emergency generation shall cease or be reduced if there is credible information that there may be an immediate danger to human health or threat of an immediate significant adverse effect on the environment, as defined and detailed in the permit Table S1.1. Continued operation may only be at a level which no longer poses an immediate risk.

We are satisfied that we have taken highly precautionary additional measures in the Environmental Permit to limit the possible air quality impacts of the unlikely operation of the site in emergency mode

5.5 Assessment of likely Noise Impact of emergency operation

The underpinning modelling assessment of noise impact of emergency operation of the facility is as detailed above in section 5.2. For emergency operation impact assessment, the modelling assumed that all engines would operate at once for ten minutes, with load shedding and continued operation of the remaining engines. The load shedding assumptions differ slightly for that in the air quality modelling, and are detailed in the application, with 0-4 engines being shed per cell, with most cells expected to shed 2 engines. This is in accordance with operator knowledge of most likely and credible load requirements.

A conservative approach has been taken in that it is assumed for noise assessment that the lowest impact engines are shed per cell, giving the maximum impact at receptors. It is likely that the actual overall impact would be lower as it is improbable that all of the highest impact engines would be those that remained running.

As explained in section 5.2 above, the proposed new engines will be located in sound attenuating enclosures which reduce the sound power levels to between 103 dB(A) (5 engines), and 88 dB(A) (120 engines). The existing engines sound power levels range from 103-109 dB(A) with the attenuation in place. For this reason, as with testing operations, the main impact at each receptor is from the existing permitting engines. While the impact of possible emergency operation of the site would be >10dB (significant adverse impact), the additional 125 new engines will not significantly affect the existing impact from site, due to the fact that the existing engines are the dominant noise source on-site and the new engines predicted impacts are lower than the existing engines at all receptors.

As explained in section 5.3 and stated in the application, *"Any emergency scenario represents an extremely unlikely situation*"; it is not something which is expected to routinely occur. Given the additional controls implemented for air quality and described in section 5.4 (Air Quality management plan, improvement conditions **IC5** – **IC7,** bespoke permit conditions and limits) which include where appropriate reference to noise impacts, we do not consider that any further permitting control measures are needed in respect of noise from emergency operation.

5.6 Assessment of impact to surface and ground water

As detailed above in section 4.2.2, containment measures are in place for fluids associated with engine operation. The only permitted water discharge from the installation is of uncontaminated rain/surface water. Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent pollution of ground and surface water.

5.7 Emissions to sewer

There are no permitted emissions to sewer

5.8 Fugitive emissions

There are no anticipated significant fugitive emissions. Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise fugitive emissions and to prevent pollution from fugitive emissions.

5.9 Assessment of odour impact

There are no anticipated significant fugitive emissions. Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where not practicable to minimise the effects of odour .

5.10 Impact on Habitats sites, SSSIs, non-statutory conservation sites etc

Impact of facilities is assessed if they fall within specified screening distances of protected sites; usual 10 km for National Site Network (sites protected under Conservation of Habitats and Species Regulations 2017), and 2km for all other protected sites. For combustion facilities >50MW$_{th}$, our guidance states that we may require screening distances to be increased to 15 km. For this facility, given the nature of emissions (intermittent operation and emission via low stacks, with very localised maximum impact) we have determined that the standard screening distances are appropriate.

National Site Network – SAC, SPA and Ramsar

There are 2 sites within 10 km screening distance of the installation that fall under the protection of the Habitats Regulations:

- Severn Estuary SAC, SPA and Ramsar (approximately 2.8 km to the South East of the Installation)
- River Usk SAC (approximately 3.5km to the East of the Installation)

Appropriate assessment and HRA conclusion:

In light of the conclusions of an appropriate assessment, and taking account of the advice received from protected sites advisors, it has been established that the project will not adversely affect the integrity of any National Network designated site, taking into account any conditions or restrictions as applicable, either alone or in-combination with other plans and projects. (As documented in section 4 of OGN 200 form 1, and section 5 if applicable). Further information is given in the Form 1 Habitats Regulation Assessment, which is on the public register.

SSSI Assessment

There is one Site of Special Scientific Interest (SSSI) within 2 km screening distance of the installation:

- Gwent Levels – St Brides (about 550m from the installation at closest point, lying to the South and West of the site)

The potential impact on the SSSI of the proposed variation to the installation has been assessed, according to the requirements of Section 28I of the Wildlife & Countryside Act 1981 as amended by the Countryside and Rights of Way Act (CRoW) 2000. The assessment is documented on the Appendix 4 form which is on the public register. It concludes that the proposed expansion of the facility is not likely to damage features of the SSSI.

Non Statutory Sites Assessment

The following other habitats sites have been identified within a 2 km screening distance of the installation:

- Celtic Springs
- LG Duffryn Site 2
- LG Duffryn Site 1
- Duffryn Pond
- Afon Ebbw River (3 sub-sections)
- Coed Ffynon-Oer
- Cwm Pensidan
- Aer Fort
- Court wood
- Various Ancient Woodland (24 discrete areas)

The Environment Act 1995 provides legal protection; it prevents us from permitting something that will result in significant pollution; it is on this basis that we assess impact from permitted facilities on such sites.

Emissions to air only were considered for potential impact on these sites, all other potential impacts (such as disturbance) were considered irrelevant, as none of the sites are within the installation itself. We would generally conclude that the Installation is not causing significant pollution at these other sites if the Process Contribution (PC) at the receptor is less than the relevant Environmental Standard (ES), provided that the Applicant is using BAT to control emissions.

The relevant emitted pollutants with possible habitats impact were NO_X, SO_2, as compared with Environmental Standards (ES) for NO_X, SO_2, nutrient nitrogen deposition, and acidification. The main impact of interest is as compared with short-term ES owing to the intermittent nature of emissions, although the contribution to long-term averages is also assessed.

The short-term ecological ES for NO_X is 75 µg/m^3 as a 24-hour average. The long-term ecological ES for NO_X is 30 µg/m^3 as an annual average. There is no short-term ecological ES for SO_2. The lowest long-term ecological ES for SO_2 is 10 µg/m^3 as an annual average. These are the same for all protected ecological sites. Deposition critical loads are discussed below.

NO_X - Planned testing

The application states that the ES is not predicted to be breached at any ecological receptor as a result of planned engine testing. NRW check modelling supports the conclusion that the short-term ES for NO_X for ecological sites is unlikely to be breached. The applicant has calculated that the maximum 24 hour mean from individual new engine testing occurs at Lg Duffryn site and is 33 µg/m^3. Similarly the maximum 24 hour mean from new engine cell testing is 34 µg/m^3. These are well below the 24 hour ES of 75 µg/m^3, and so we accept that operation is unlikely to cause significant pollution. Impact at other protected sites is correspondingly lower, a function of dispersion (distance from site and prevailing wind direction). The contribution of planned testing to long-term (annual) ES for NO_X is considered insignificant at the protected sites (<1% contribution).

NO_X – potential emergency operation

Detailed quantification of unexpected emergency emissions is not routinely required in permit applications, and an appropriate approach is needed for backup engines, which goes beyond what we would normally require. As explained above, emergency operation of all of the engines to provide backup power is a very rare event (*1 in 20 year event for 2 hours of* emergency *operation*). Detailed modelling which considers every year of operation for 5 years of meteorological data, has found that the absolute maximum impact on protected ecological receptors could be above the short term ES

(75 µg/m^3), at up to 455 µg/m^3 as a daily average based on the engines running for 1 hour. However, for this impact to occur, worst case weather (dispersion) characteristics would have to occur for the full 24 hours at the same time as a very rare power supply interruption. Even if it were to occur, it would be with an anticipated frequency of exceedance of much less than 1 day a year

Statistical calculations made by the operator of probability of a breach of the human health NO_X standard at closer receptors (<200m) puts the probability of exceedance at considerably less than 1%, based on the number of hours per year when dispersion characteristics mean that the ES would be exceeded. It is considered that the likelihood of exceedance of the ecological ES at the protected ecological sites during infrequent emergency operation is similarly low.

There are no standard permitting criteria for assessing risk from possible, but unlikely emergency events. Given that an air emission level is regarded as insignificant if it is <1% of the ES, it is considered (on a case-specific basis) that a <1% likelihood of exceedance in an emergency is similarly an insignificant risk to the protected site. We are therefore satisfied that the proposed variation to the installation is unlikely to cause significant NO_X pollution in respect of these non-statutory sites.

SO_2 – all operations

Given the use of low-sulphur (<0.1%) and the low operational hours of the engines (both planned and emergency operation), the impact of both can be considered insignificant (<1% of ES) at the protected sites. The varied installation is unlikely to cause significant SO_2 pollution.

Deposition- Nutrient nitrogen and acid

As noted above, the annual average contribution of NO_X and SO_2 from the proposed engines (emergency and testing) are themselves insignificant, so the resultant contribution to deposition critical loads will also be low. Critical loads are expressed as annual averages, and for this type of combustion source are only dependent on NO_X and SO_2 emissions.

Although site-specific critical loads for the sites have not been confirmed, the applicant has provided screening calculations for nutrient nitrogen and acid deposition based on the most sensitive receptors available for any habitat.

For nitrogen deposition, considering the expected hours of engine operation, and for the most impacted ecological receptor, the maximum impact is insignificant, 0.2% of the screening critical load (3kg/ha/yr). The impact at other sites will be somewhat lower and remains insignificant.

The contribution of NO_X and SO_X from the proposed engines on acid deposition at the most impacted ecological receptor calculated as 0.001 Kg_{eq}/ha/yr. Although site-specific acid critical loads have not been confirmed, the impact at all sites is insignificant (<1%) when compared against any potentially relevant acid critical load.

We are satisfied that as deposition contributions are insignificant, we can rule out the likelihood of significant pollution by deposition at non-statutory protected sites.

OPRA

We are satisfied that the Applicant's submitted OPRA profile is accurate. The OPRA score will be used as the basis for subsistence and other charging, in accordance with our Charging Scheme. OPRA is Natural Resources Wales method of ensuring application and subsistence fees are appropriate and proportionate for the level of regulation required.

The agreed OPRA score at the installation is (to be confirmed). This will form the basis for ongoing subsistence fees.

ANNEX 1: Improvement Conditions

For explanation of reason for inclusion see sections above. Completed previous Improvement Conditions are not shown

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
IC5	The operator shall update the AQMP incorporating the following technical changes and considerations. The updated AQMP shall be provided to NRW for approval Clarify in Section 4 that (in accordance with permit condition 4.3.1) all emergency operations of the engines will immediately be reported to the Natural Resources Wales emergency number (0300 065 3000) irrespective of risk categorisation, and that agreed frequency/detail of subsequent updates may be based both on NRW response and assigned risk level. Clarify that if a whole site outage has lasted, or is expected to last for more then 4 hours, then Natural Resources incident hotline will be notified that the outage should be regarded as a potential air quality incident for possible management by the multi-agency Wales Air Quality Cell. Clarify in section 4.1 and 5.1.3 that (given that advance notification to potentially affected receptors is not proposed), any information/instruction to receptors would be via the regulatory authorities managing an incident, and that as such any advice (such as to close windows and remain indoors) would be determined by the authorities, with decisions informed by data from the operator. Asses the need for communication of the plan to local health partners (Aneurin Bevan health board), emergency services (fire and rescue), adjacent industrial receptors (see below) and ensure its communication to these organisations if required. Assess the need for, and if relevant triggers for, informing the local health partners (Aneurin Bevan health board), emergency services (fire and rescue), adjacent industrial receptors of an emergency generation incident upon occurrence in accordance with the procedure set out in section 4.1 of the AQMP. Ensure that the plan addresses the risk of (general) loss of power on ability to enact emergency plans, and that the plan is therefore capable of being implemented in a loss of grid power event. Confirm/validate the assessment in the plan that industrial units close to the installation are low sensitivity owing to the assumed presence of mechanical ventilation systems. If this assumption cannot be verified, amend the plan accordingly, for example to notify adjacent neighbours of an incident and the appropriate actions to be taken.	Revised AQMP to be provided to Natural Resources Wales within 12 weeks of permit variation V003 issue, or as otherwise agreed in writing with Natural Resources Wales

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
IC6	The operator shall submit a revised and updated AQMP for approval by Natural Resources Wales. The plan shall include, but need not be limited to the following: Proposals for a detailed ambient monitoring/modelling strategy, and meteorological measurements as referred to in AQMP V1 dated 18/07/22. In order to understand the magnitude of air quality impact at receptors during unplanned operation of >4h duration. These proposals shall include a timetable for implementation as soon as reasonably practicable, and consideration of resourcing during an electricity outage (available personnel and as relevant, assured provision of power for monitoring, communication and other essential equipment). Any other revisions/updates as a result of IC5, otherwise proposed by the operator in the V001 18/07/22 AQMP, or subsequently identified, including assessment of viability of any further potential measures to reduce NO_2 impacts. Records demonstrating that the plan (including outage impacts risk assessment) has been communicated to the local authority (Newport City Council Environment and Public Protection) and a description of how any relevant feedback has been considered / incorporated. The improvement condition shall be considered complete only following the approval of the revised AQMP by Natural Resources Wales. The operator shall implement the approved plan to the approved timetable, including the ambient monitoring/modelling strategy referred to above.	Revised plan to be provided to Natural Resources Wales within 12 months of the issue of Variation V003 or as otherwise agreed in writing with NRW

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
IC7	In the event that one or more of the following occur: emergency operation of 260 MW_{th} or more of the site engines for more than 2 hours of continuous operation, emergency operation of 260 MW_{th} or more of the site engines for more than 18 hours cumulative for any calendar year, The National grid annual reliability falls below 99.99% The operator shall submit for written approval by Natural Resources Wales, a revised environmental risk assessment and AQMP. The risk assessment and AQMP shall re-evaluate the risk, and impact on noise and air quality, of reasonably foreseeable emergency operation of the installation. Any event which has occurred shall be considered reasonably foreseeable as a future event, unless justified otherwise in full technical detail, and shall also result in a review of what other event(s) may subsequently considered as reasonably foreseeable. If the revised reasonably foreseeable impacts (taking into account scale and likelihood) would result in any relevant Air Environmental Quality Objective or US Environmental Protection Agency Acute Exposure Guidance Level (AEGL) being breached, then further mitigations shall be proposed in the plan, with a timetable for implementation, to bring the risk to an acceptable level where a breach of the parameters above is no longer likely. Mitigation measures for consideration shall include, but not be limited to those already identified, i.e. increased stack height, retro-fitting of selective catalytic reduction, and use of alternative fuels such as hydrotreated vegetable oil. If required the plan and timetable shall include any necessary proposals for varying the environmental permit in accordance with the proposed changes.	Within 3 months of any of the numbered specified criteria in IC7 being met or as otherwise agreed in writing with NRW

ANNEX 2: Consultation Reponses

A) Advertising and Consultation on the Application

The Application has been advertised and consulted upon in accordance with Natural Resources Wales Public Participation Statement. The way in which this has been carried out along with the results of our consultation and how we have taken consultation responses into account in reaching our draft decision is summarised in this Annex. Copies of all consultation responses have been placed on Natural Resources Wales public register.

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from: Newport City Council – Environment & Public Protection ("*NCC*")
First response 08/03/22 – duly made application:
Issues raised: Concern at potential risk of exceedance of 1-hour (short term) Environmental Standard for NO_2, need for assessment including other potential NO_X sources, need for Air Quality Management Plan (AQMP) to manage risk.
Summary of action taken / how this has been covered: • NRW agree with the need for an AQMP and this was requested, with extended scope, during the determination. As documented in section 2.3 and 5.4 above this was then found to be satisfactory. • Section 5.1, 5.3 and 5.4 above explain that, on the balance of probabilities, we consider that the short term Environmental Quality Standard for NO_2 is unlikely to be exceeded given quantified impacts of operation, and likelihood of National Grid supply interruption. • The assessment for this application includes existing background sources, as explained in section 5.1 and 5.4 NRW consider it appropriate to consider any further cumulative impact, in subsequent permit application determinations as necessary, if and when received.
Second response 22/08/22, following provision of AQMP by applicant
Issues raised: Continued concern at potential risk of exceedance of 1-hour (short term) Environmental Standard For NO_2, impact of low probability but high impact (emergency) events, and questioning whether further measures are needed to reduce emissions at source (e.g. selective catalytic reduction, SCR)
Summary of action taken / how this has been covered • Section 5.1, 5.3 and 5.4 above explain that, on the balance of probabilities, we consider that the short term Environmental Quality Standard for NO2 is unlikely to be exceeded • For low emergency operation, sections 5.1 and 5.4 explain how and why the applicant has assessed the effect on receptors both compared against the ES and the AEGL-1, which we consider reasonable.

- A satisfactory AQMP had been provided during determination to enable pro-active incident management of any significant emergency operation of the facility. Additional measures in the permit, described in section 5.4, ensure future operations are controlled and reviewed in the event of emergency operation beyond anticipated frequency/duration. Further development of the AQMP is required under Improvement conditions **IC5 – IC8** and will be provided to Newport Council upon completion, by the operator.
- The applicant has submitted that the proposed TA-Luft 2g engine performance is BAT, alongside relevant measures to minimise frequency and duration of emergency operation and hence emissions. We accept this conclusion, based on available BAT guidance, and the quantified impacts at receptors as detailed above.

Response Received from: Environmental Public Health Service Wales ("*Public Health Wales*")

First response 22/06/22 – duly made application *(agreed delayed response following correspondence with NRW):*

Issues raised:

Concern at air quality impacts in respect of increases in ambient NO_2 and other pollutants, concentration at sensitive human receptors from planned and emergency operation, with potential risk of exceedance of 1-hour (short term) Environmental Standard. Need to: minimise pollutant emissions (air and noise), make assessment including other potential NO_X sources, consult Health and Safety Executive, obtain suitable and sufficient Air Quality Management Plan (AQMP) to further manage risk, ensure prevention of ground pollution.

Summary of action taken / how this has been covered:

- Section 5.1, 5.3 and 5.4 above explain that, on the balance of probabilities, we consider that the short term Environmental Quality Standard for NO2 is unlikely to be exceeded, having regard for existing pollutant background concentrations. Other pollutants (PM_{10} and $PM_{2.5}$) have been addressed via further information from the operator as detailed above. Assessment in conjunction with any further proposed installations would be for those facilities when permit application(s) are determined.
- For low emergency operation, sections 5.1 and 5.4 explain how and why the applicant has assessed the effect on receptors both compared against the ES and the AEGL-1, which we consider reasonable.
- For this backup facility, a key element of minimising pollutant emissions is to reduce the likelihood of need for emergency generation capacity to be utilised. Section 5.3 describes the BAT measures in place to maintain grid supply to the facility as far as reasonably practicable.

  In this context, the applicant has submitted that the proposed TA-Luft 2g engine performance is BAT. We accept this conclusion, based on available BAT guidance, and the quantified impacts at receptors as detailed above. We will generally permit activities provided that ES are not exceeded and applications also demonstrate BAT; in these circumstances we consider that the level of pollution emitted is being kept as low as possible.
- A satisfactory AQMP had been provided during determination to enable pro-active incident management of any significant emergency operation of the facility. Additional measures in the permit, described in section 5.4, ensure future operations are controlled and reviewed in the event of emergency operation beyond anticipated frequency/duration. Further development of the AQMP is required under Improvement conditions **IC5 – IC7**.
- As a matter of routine, the HSE has been consulted on this application.
- Noise impact has been assessed by the applicant as detailed in section 5.2 and 5.5, with impact not predicted to significantly change as a result of the variation.

The site operates an ISO 14001 certified Environmental Management System which, along with the environmental permit, requires the appropriate documentation, investigation, and close-out of any complaints.

- Ground contamination is considered at permit issue, throughout the life of the permit, and at surrender, through the relevant permit conditions. We are satisfied that appropriate measures are in place.

Second response 16/08/22, following provision of AQMP by applicant

Issues raised:

Following detailed review, various technical corrections/changes were suggested to the content of the AQMP, to ensure that it fulfilled relevant guidance for AQMPs, and that all relevant stakeholders were, as necessary, made aware of its provisions.

Summary of action taken / how this has been covered

- An AQMP has been provided which satisfied most of the missing information requirements identified at the initial determination phase.
  The specific further points requiring consideration / alteration to the AQMP have been addressed in the improvement conditions IC5-IC7, where required.

Response Received from: Aneurin Bevan University Health Board (*ABUHB*)

Response 11/07/22 – duly made application:

Issues raised:

Concern at air quality impacts in respect of increases in ambient NO_2 concentration at sensitive human receptors from planned and emergency operation, with potential risk of exceedance of 1-hour (short term) Environmental Standard. Particularly in view of existing deprivation / health inequalities in nearby communities, and current NO_2 levels. Need to minimise air pollutant emissions even below air quality standards.

Summary of action taken / how this has been covered:

- Section 5.1, 5.3 and 5.4 above explain that, on the balance of probabilities, we consider that the short term Environmental Quality Standard for NO2 is unlikely to be exceeded, having regard for existing pollutant background concentrations.
- For low emergency operation, sections 5.1 and 5.4 explain how and why the applicant has assessed the effect on receptors both compared against the ES and the AEGL-1, which we consider reasonable.
- For this backup facility, a key element of minimising pollutant emissions is to reduce the likelihood of need for emergency generation capacity to be utilised. Section 5.3 describes the BAT measures in place to maintain grid supply to the facility as far as reasonably practicable.

  In this context, the applicant has submitted that the proposed TA-Luft 2g engine performance is BAT. We accept this conclusion, based on available BAT guidance, and the quantified impacts at receptors as detailed above. We will generally permit activities provided that ES are not exceeded and applications also demonstrate BAT; in these circumstances we consider that the level of pollution emitted is being kept as low as possible.
- A satisfactory AQMP had been provided during determination to enable pro-active incident management of any significant emergency operation of the facility. Additional measures in the permit, described in section 5.4, ensure future operations are controlled and reviewed in the event of emergency operation beyond anticipated frequency/duration. Further development of the AQMP is required under Improvement conditions **IC5 – IC7**.

- While we recognise the importance of reducing health inequalities and improving other public health factors, we are required to make our permitting decisions based

	upon an objective assessment of the proposals against the detailed legal requirements of EPR. We cannot choose the location of a development; we must permit or refuse a duly made application based on its merits. As we have explained above, we do not consider that, on the balance of probabilities, the proposed development is likely to result in breaches of any relevant ES. BAT is demonstrated, indicating that emissions have also been appropriately minimised.
The consultee was informed of the submission of an AQMP, but did not submit a further response	

2) Consultation Responses from Members of the Public and Community Organisations

None received

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