

Natural Resources Wales permitting decisions

**Vantage Data Centers UK Limited
(CWL 13 Data Centre)
Decision Document**

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New bespoke permit

The application number is: **PAN-019560**

The applicant is: Vantage Data Centers UK Limited

The Installation is located at: CWL13 Data Centre, North Lake Drive, Celtic Lakes, Newport, South Wales, NP10 8DE

The Permit number is: **CB3895HY**

Our Decision

We have decided to grant the permit for CWL13 Data Centre operated by Vantage Data Centers UK Limited.

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

Purpose of this document

This decision document:

- 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.

Application and Determination – overview and key issues

What the application is for

The application is for an installation to operate 60 light fuel oil compression-ignition engines to power electrical generators. These are to provide backup power to the data centre in the event of mains power supply interruption. NRW is not required to regulate the data centre itself. Normally, the engines will be run for very limited time only (5 hours/year) for testing purposes, and not all at the same time. Operation of all the engines together to provide backup power is considered a very low likelihood (1 in 20 year) event owing to the stability of the mains supply from the national grid.

Each engine is identical and has a thermal capacity of 2.987 MW; together the installation has a thermal capacity of 179 MW to provide 72 MW of electrical output (1.2 MWe per engine). It is intended the engines will run on Hydrotreated Vegetable Oil (HVO) but conventional petrochemical diesel may be used as an alternative.

Key environmental controls proposed are:

- Selective Catalytic Reduction (SCR) to minimise engines emissions to air of NO_x. and ammonia slip catalyst (ASC) to eliminate any associated ammonia emission.
- Acoustic enclosures of engines to minimise noise.
- Appropriate primary and secondary containment of potentially polluting liquids to minimise risk of emissions to ground/groundwater (fuel, oil, coolant, Adblue).

Further detail on the Applicant's proposals is given in the application and summarised throughout this decision document.

Key permitting considerations

The key considerations in reaching our decision were:

- Backup power technology selection and application of Best Available Techniques (BAT).
- Demonstration of BAT in minimising risk of engine emergency operation by ensuring reliability of mains supply.
- Environmental assessment and impact of engine operation – emergency and testing (principally emissions to air [NO_x] and noise).

Our assessment of these will be discussed in detail later on in this document.

General determination matters

Other determination matters are summarised in the sections below. Our approach to these is considered routine for the application type.

Confidential information

No claim for commercial or industrial confidentiality has been made. We have not identified information within the application that we consider to be confidential.

Consultation

The consultation requirements were identified and implemented. For this new bespoke application, we consulted initially on the duly made application, and on our draft decision. The consultation decision was taken in accordance with RGN 6 High Profile Sites, our Public Participation Statement and our Working Together Agreements.

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

- The Health and Safety Executive (HSE)
- Environmental Public Health Service Wales
- The Food Standards Agency
- Newport City Council – planning & environmental health departments

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

The consultation on the duly made application started on **03/02/2023** and ended on **03/03/2023**.

The consultation on the draft decision started on **28/04/23** and ended on **31/05/23**.

The consultation adverts were placed on our website.

Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 4. We have taken all relevant representations into consideration in reaching our determination.

Operator

We are satisfied that the applicant is the person who will have control over the operation of the facility after the grant of the permit. The decision was taken in accordance with EPR RGN 1 Understanding the meaning of operator.

The Facility

The decision on what constitutes the facility was taken in accordance with [RGN 2](#) “*Understanding the meaning of regulated facility*”.

The regulated facility is an installation which comprises the following activities listed in Part 2 of Schedule 1 to the Environmental Permitting Regulations and the following directly associated activities.

- Schedule 1 Part 2 Section 1.1 Part A(1) (a) : Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts (*60 x 2.987 MWth Kohler KD45V20 compression ignition backup generator sets*).
- Directly Associated Activity – Fuel storage for the engines
- Directly Associated Activity – Surface water drainage (uncontaminated rainwater)

In addition, each engine is subject to Schedule 25A of the Environmental Permitting Regulations as it is a new Medium Combustion Plant (MCP). This is reflected in the permit where the relevant MCP conditions have been implemented. We do not consider the MCP aggregation rules (Article 4) to apply. This article states that:

“A combination formed by two or more new medium combustion plants shall be considered to be a single medium combustion plant for the purposes of this Directive and their rated thermal input shall be added together for the purpose of calculating the total rated thermal input of the plant, where:

- *the waste gases of such medium combustion plants are discharged through a common stack, or*
- *taking into account technical and economic factors, the waste gases of such medium combustion plants could, in the judgement of the competent authority, be discharged through a common stack”*

In this case discharge is not through a common stack, nor do Natural Resources Wales judge that they reasonably could be, taking into account technical and economic factors.

It is noted that the application refers to another installation permit in the same area (Newport Data Centre, permit number EPR-BB3599CW), details of which are available on our [Online Public Register](#). The application describes why this current application is considered as an independent installation and we accept this in line with our guidance RGN 2. The names and permit numbers of the operators of other installations located immediately nearby CWL13 are detailed in the permit's introductory note owing to their potential for combined local environmental impacts .

Legislation

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.

All applicable European directives have been considered in the determination of the application. We are satisfied that cost-benefit analysis of high-efficiency co-generation opportunities is not required (The Energy Efficiency Directive; Schedule 24 of EPR) as the plant will be back-up only operating under 1,500 hours per year.

The site

The site is located to the south west of Newport, in Imperial Park. The immediate site surroundings are current and former business, industrial and commercial activities. The CWL13 site is to the south east of the CWL11/12 Data Centre and associated installation for backup power generation.

The nearest human receptors are adjacent commercial industrial units (Imperial Courtyard). The closest residential receptors are dwellings on Pencarn Avenue and Powis Close, about 230 m and 250m from the site respectively. Other notable human receptors include a pre-school nursery approximately 650 m to the north west of the site.

The site itself is not within any environmentally sensitive designations. At its closest point the Gwent Levels-St Brides Site of Special Scientific Interest (SSSI) is located approximately 0.26 km to the south east. Other environmentally designated receptors are identified in the application and are discussed below

The applicant has provided a plan which we consider is satisfactory, showing the extent of the facility and emission points.

A plan is included in the permit and the operator is required to carry on the permitted activities within the site boundary. The regulated facility is for the backup generators. The data hall building itself is not part of the installation and is excluded from the installation boundary.

[Site condition report](#)

The applicant has provided a description of the condition of the site.

We consider this description is satisfactory. The decision was taken in accordance with our [guidance](#) on site condition reports – guidance and templates (H5). The submitted report follows the H5 template and was accompanied by detailed appendices of supporting information including desk study and intrusive ground investigation.

[Operator Competence](#)

[Relevant convictions](#)

Our Enforcement Database has been checked to ensure that all relevant convictions have been declared. No relevant convictions were found. The operator satisfies the criteria in RGN 5 on Operator Competence.

[Financial provision](#)

There is no known reason to consider that the operator will not be financially able to comply with the permit conditions. The decision was taken in accordance with [RGN 5](#) on Operator Competence.

Environmental Risk Assessment and Controls

Operating Techniques

The Applicant has stated in the Application that they will maintain and operate an integrated management system. It will incorporate an Environmental Management System (EMS) that will be certified to ISO 14001:2015. The applicant has described how it will meet the requirements for an EMS in our *“How to comply with your environmental permit guidance”*. There is no known reason to consider that the operator will not have the management systems to enable it to comply with the permit conditions. The decision was taken in accordance with [RGN 5](#) on Operator Competence.

The EMS includes an Accident Management Plan which was submitted as appendix F to the application. We have reviewed key general controls such as site security and incident/accident investigation and are satisfied that suitable arrangements will be in place. Specific detailed operating techniques for the engines are summarised below in our consideration of BAT.

Owing to the possible impacts on air quality from emergency operation of the facility, we have included an Improvement Condition (IC1) in the permit requiring the operator to ensure that a suitable and sufficient Air Quality Management Plan (AQMP) is in place for CWL13. This is a specific type of Accident Management Plan for air quality impacts. Further detail is given below.

We have reviewed the techniques proposed by the Applicant and have compared these with BAT as defined in the guidance identified above. The operating techniques that the operator must use are specified in tables S1.2a and S1.2b in the permit.

Description of installation activities and assessment of BAT

The application is for an Industrial Emissions Directive (IED) installation permit (which comprises of 60 individual MCP engines). The applicant is therefore required to demonstrate that the facility at least meets BAT for the type of activity. BAT comprises both equipment/technology selection and the way in which it is controlled and operated. This section therefore summarises both of these topics. Further detailed information is provided in the application documentation.

Regulatory Guidance

Normally BAT is defined by published BAT conclusions for the activity. There are no [published BAT conclusions](#) that are directly relevant to this operation. Although the total thermal capacity of the installation is over 50 MW, neither Chapter III of IED (for large combustion plants, LCP) nor the LCP 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 LCP aggregation rules are not applicable.

We have therefore defined BAT performance for the type of installation as follows in accordance with IED Article 14(6) requirements:

- As each individual plant is subject to the MCPD, the requirements of the Directive (Schedule 25A of EPR) may be considered minimum standard, 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*” if applicable.
- The above is supplemented by any BAT definitions in our 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 document.
Subsequently, the EA have released further versions of this document, up to Version 11 (11/05/20) – We will generally follow updates 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.

Equipment configuration

The installation consists of 60 light-fuel oil engines with generators to provide backup power to the data centre. Physically, they are located immediately outside the data centre building as two blocks of 30 engines, to the north and south of the main building respectively. This is shown in the site plan in the permit. Each engine is self-contained, with fuel and other liquid storage being within to the modular design and consisting of integrally banded containment. Each engine has sufficient fuel supply for 48 hours operation, giving a total additional fuel storage on site of 960 m³ in 60 tanks of 16 m³. There is no external pipework or interconnection of fluids between engines and fill/connection points also have spill protection measures. Each engine has an exhaust stack of 21.2m height, which is 1m above the parapet of the main data centre building, which also supports the stacks. The stack height was determined by air dispersion sensitivity study and, being substantially taller than many engines of this class of thermal capacity, demonstrates improved dispersion accordingly.

Operationally, the engines are arranged into 10 x cells of 6 engines, each of which supports a fixed sector of the data centre. The cells are in “n+1” configuration, meaning that there is one more engine than the maximum required load, to provide contingency in case of equipment unavailability. A battery-based uninterruptible power supply provides power to the data centre for the short period between mains power disturbance and availability of power from the engines (stated in the application as up to 21 seconds).

Engine testing

Planned operation of the engines consists only of testing as described, with the following key features and restrictions:

- Each engine is tested individually 4 times a year – for 2 hours or 15 minutes on an alternating quarterly basis.
- Cells of 6 engines are tested together (“black building test”) to simulate a power outage – for 15 minutes twice yearly.
- There is no testing of all 60 engines together – maximum 1 cell at a time.

- There is no overlapping of different testing scenarios at the installation and only one cell test per day, although individual engines testing may occur on the same day as a cell test, sequentially.
- Planned testing only occurs between 09:00-17:00 on working days, excluding weekends and bank holidays.
- An assessment has been made of effect of cumulative testing on CWL13 and CWL11/12 together (see below). On the basis of this work, it has been determined that testing for the two sites need not be co-ordinated, so tests on the two installations may occur simultaneously although each are limited as above within the installation.

One other testing type is proposed – so called “break-fix” testing which is to establish that engine is operational again after a fault/repair outside of the planned servicing and maintenance. This would be for per individual engine, and would be a minimum of 15 minutes, and typically up to around 30 minutes. The Applicant has indicated that up to a maximum of 15 hours break-fix testing per year for the facility may be needed, representing a small proportion of total engine operation. We are satisfied that impact assessment for individual engine planned testing also adequately represents the similar impacts from unplanned testing.

Emergency operation

In the very unlikely event of interruption or failure of the national grid mains supply to the site, all the engines on site will start automatically. The engines will then run until operation on mains supply is restored. Each cell is controlled separately, so if mains supply to some cells but not others is interrupted, only the affected cells will operate.

Update to application – load shedding

The CWL 13 submitted application refers to “load shedding”, whereby the number of engines running may be reduced if power demand is lower than generating capacity. This is how CWL11/12 operates, both for cell testing and emergency operation. However, the operator has updated the application (27/04/23) and explained that load shedding is not relevant to CWL13, owing to design/configuration constraints. Other than individual engine testing, if a CWL13 cell operates (cell testing or emergency operation), all engines will run continuously for the duration of the event. We have reviewed this change, and consider that it does not affect our determination, as impact assessment for CWL13 was in any case precautionary, and did not account for any

reduction via load shedding (air and noise modelling). The record of this change has been saved to our document management system, and noted in the Operating Techniques of the permit (Table S1.2a) Any references in the submitted application to load shedding on CWL13 should be disregarded.

Minimisation of emergency backup operation – stability of Mains supply
National Grid power supply failure is considered an extremely low probability occurrence – with a 2 hour outage described as a 1 in 20 year event by the Applicant and longer outages even less likely. Consequently, it is difficult to accurately predict the duration of any emergency operation, and impact assessment is made for a 1 or 2 hour event. The National Grid reliability of the high voltage transmission system to which the data centre is connected is >99.999%.

The Applicant has stated that the existing nearby installation CWL11/12 *“has not experienced an electrical supply failure since operation commenced in 2009”*. Nevertheless it is acknowledged that disruptions falling short of full loss of power have occurred. This does not guarantee, but may be indicative of CWL 13 expected performance. In one event at CWL 11/12, a site component failure led to one cell of engines only operating for less than 5 hours. In another event a solar flare resulted in a very short duration dip (less than a second) on the national grid supply. As each cell of engines is independently controlled, some but not all detected supply interruption and went into emergency operation mode. Of those that operated, 1 cell ran for less than 20 minutes, 1 cell ran for less than 4 hours, and one cell for less than 5 hours. Site electrical component failure led to some engines running for longer than operationally necessary. Note that permit conditions require reporting, investigation, root cause analysis of such events (both for existing CWL11/12 permit and CWL13 permit), to minimise the chance of recurrence.

A key part of BAT for a facility of this type is therefore to reduce environmental impact of operation by minimising the likelihood of needing to operate in emergency power mode at all. This is achieved by security of supply from the main electricity provider, in this case the national grid and by security of supply from grid to point of use. This is described in detail in the application, with key features being:

- The data centre has two independent connections to the national grid high voltage (HV) network, with each connection being capable of powering the data centre if the other were to fail. This built-in redundancy minimises the likelihood of power supply failure between the grid and the user resulting in backup generator operation.
- There are no local distribution centres between the site and the national grid – typically supply interruption is far more likely between the HV grid and the user than on the grid itself, and this risk is reduced by there being no other users on the connection
- Preventative maintenance / routine replacement, incident response measures and critical equipment inventory minimise the risk of on-site power failures causing the engines to need to operate.

There is an operational balance between equipment sensitivity to detection of mains supply interruption (short duration “blips” etc) and the need for guaranteed power supply. For existing permitted CWL11/12, there has also been some issue with being able to stand-down emergency generators once any supply interruption is over as described above. The permit for CWL 13 will require all emergency operations to be reported to Natural Resources Wales. This allows incident investigation to take place, to learn from any events and where possible further reduce the frequency / duration of any future emergency operations. Improvement Condition IC4 requires the Operator to review the installation’s environmental risk assessment and air quality assessment if defined criteria are met, which would indicate that mains supply reliability is below that described in the application.

Engine selection and impact reduction technology

The proposed engines are Kohler KD45V20 units. The application refers to them as both KD45V20-DES and -DEP but this is not material to our decision. Each engine is identical and has a thermal capacity of 2.987 MW; with an electrical output of 1.2 MW per engine. It is intended the engines will run on Hydrotreated Vegetable Oil (HVO) but conventional petrochemical diesel may be used as an alternative, principally in the event of supply problems. Generation of Oxides of Nitrogen (NO_x) air pollution is thought to be lower with HVO than diesel, but the Applicant assumes emission performance based on diesel as a conservative approach. We agree with this, as data on HVO for NO_x reduction is mixed but as a minimum is not expected to be worse than diesel.

The data centre guidance indicates that “*minimum BAT*” for data centre engines is “*TA-Luft 2g*” or [equivalent] “*Tier II USEPA*” standard, as summarised alongside proposed engine performance in the table below.

	Oxides of Nitrogen: NO _x as NO ₂	Carbon Monoxide: CO	Particulate Matter (PM)	Hydrocarbons / Volatile organic compounds (VOC)
TA-Luft 2g specification¹	2000	650	130	150
Proposed CWL 13 performance¹	500	88	3	10
1. Quoted at standard reference conditions: Temperature of 273 K, pressure of 101.3 KPa and oxygen content of 5%				

While the guidance indicates that this is the minimum BAT standard, it does not state when a higher BAT standard may be expected, or what performance level may be achieved. The Application indicates that for all pollutants, primary measures (i.e. engine design and advanced electronic control approaches) are used to minimise pollutant generation. For NO_x only, secondary abatement is used to achieve the stated performance and is in addition to the KD45V20 engine specification. The technique is called Selective Catalytic Reduction or “SCR”, and involves injection of urea solution (“*adblue*”) into the hot flue gases to break down NO_x using ammonia (NH₃) released from the urea.

A side-effect of use of SCR with urea can be “ammonia slip” – the release of low levels of ammonia in exhaust gases. Ammonia is a pollutant which can affect human health and particularly ecological receptors. The Applicant proposes primary ammonia control through engine management and urea dosing rate, and also an Ammonia Slip Catalyst (ASC) following the SCR reactor to destroy any residual ammonia remaining. The use of ASC is a further control not always seen with SCR and represents further emissions control.

Sulphur dioxide (SO₂) emission control is achieved by fuel selection – with diesel being <0.1% sulphur, and the application indicating that HVO has an even lower sulphur content of <0.001%.

The engines are also installed in self-contained acoustic enclosures which reduce the site noise impact. The stated sound power level is 88 dB(A), corresponding to a sound pressure level of 65 dB(A) at 1m. This is substantially lower than for many self-contained engines and similar plant subject to installations permitting.

Conclusion – Best Available Technique

We accept that the proposed equipment, operating techniques and restrictions (as described in the application, summarised here, and conditioned in the permit) are in line with BAT for the installation. This is with consideration for the standards / guidance identified, and the impacts of operation described below. We accept that the diesel generators represent a commonly used technique for medium-term standby power provision in data centres and with the described controls, are an appropriate technology choice for the installation.

Measures are in place to minimise emergency operation of the engines, and to limit impacts when operated for emergency or testing purposes. Application of SCR for NO_x control and with ASC, and acoustic enclosure as described, both go beyond the minimum BAT standard, but we consider it to be site-specific BAT in this instance, given the potential for high impact otherwise during emergency operation of a high number of backup generators in the area. There is a high possibility that if one installation operated in emergency backup mode, others also would at the same location. Given the likely impacts on local air quality (NO_x) BAT in this instance is to employ SCR for newly installed engines along with an appropriate level of noise attenuation as determined by impact assessment.

Approach to assessing planned and unplanned operations

As described above there are two distinct modes of operation of the site – planned (and unplanned) testing of one or a single cell of engines, for limited duration, and emergency backup operation of all 60 engines together. Therefore environmental impacts that are dependent on operation (air emissions, noise), are described below both for planned testing scenarios, and for an unplanned full site operation of 1 hour as an indicative period. The assessment of testing are a reasonable worst-case estimate of expected impacts of intended operation. The assessment of emergency operation are an indication of unlikely, but possible impacts in the unlikely event of

emergency operation of the facility (referred to as a 1 in 20 year event) and are expected to be rarely, if ever experienced. Given the presence of other data centre backup engines in the locality, the applicant has assessed the impact of proposed operations both alone, and with consideration of other permitted sources in addition to more general “background”. We accept this as a reasonable and precautionary approach.

Air emissions and assessment

Summary of air quality modelling undertaken

This section concerns results from dispersion modelling of emissions to air from the engine exhaust stacks A1-A60 and the resultant impact on local air quality. The modelling provided by the applicant is summarised in the application report Appendix D “*CWL13 Permit Application – Air Quality Assessment*” (AQA), August 2022.

The modelling has considered both planned operation of the engines for testing (single engine and cell testing) and emergency operation of all engines together. Because the CWL 13 installation is adjacent to another data centre (CWL 11/12), impacts have been considered both of the installation on its own, and in combination with the other source. This is important as it is likely that both may operate together for emergency generation, and cumulative effects of testing on two adjacent sites may need additional controls.

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. We are satisfied that the results presented within the Applicant’s air quality assessment report can be used in evaluating air quality environmental impact for permit determination. Key issues/conclusions are summarised below, a more detailed analysis is provided in Annex 1.

The primary focus in this case is on potential impact to human health on local receptors; impact on protected ecological sites is considered separately below, and is on the basis of the same underlying dispersion modelling.

Overview of impact results for all pollutants

For all pollutants assessed other than NO_x (CO, particulate matter, VOC as benzene, SO₂), the Applicant has satisfactorily demonstrated that impacts of planned and reasonably foreseeable emergency operational scenario would either be insignificant or that any breach of the relevant Environmental Quality Standard (EQS) is unlikely, as Predicted Environmental Concentration (PEC) is below the EQS, taking into account the CWL13 emissions and background pollution. For emissions to be considered insignificant, the Process Contribution (PC) is less than 10% of the short-term, less than 1% of the long-term EQS). Full details of the impacts characterised are given in the applicant's AQA referenced above.

The pollutant impact of greatest potential concern is oxides of nitrogen (NO_x or NO₂). The short-term Environmental Standard for Nitrogen Dioxide is an hourly limit value of 200 µg/m³, with up to 18 one-hour exceedances allowable per year. Detailed analysis has been provided for the NO₂ impacts from planned engine testing, and emergency operation.

We are satisfied that planned testing is unlikely to result in a breach of any EQS, including for NO_x. The Applicant has demonstrated that combined effects of testing of CWL 11/12 and CWL 13 together are unlikely to result in EQS breach, so we are satisfied that testing does not need to be co-ordinated between the two installations, though noting the restrictions on testing within each installation as summarised above for CWL 13.

We recognise that emergency operation of CWL 13 could result in a breach of the hourly EQS for NO_x, but consider it a very unlikely possibility. We do not consider that CWL 13 emergency operation on its own is likely to result in a breach of the AEGL-1 level (described in Appendix 1) for rare exposure to airborne chemicals. However, acting in combination with CWL 11/12, it is possible that emergency operation could lead to breach of the EQS (>18 x 1h per year), and/or the AEGL-1 level, though the impacts are dominated by CWL11/12 contribution. We consider that the probability of either is small (<6% chance per year, even if the engines ran for 24 hours, which is in itself very unlikely), and that the risk in fact changes relatively little overall by the

permitting of CWL 13. An Air Quality Management Plan (AQMP), as required by permit improvement condition (below) will help to mitigate risk in the event of emergency operation of the engines on each installation.

Improvement Condition actions for air quality impact

It is noted that the above impact modelling and conclusions are based upon the emissions information provided by the Applicant. We have accepted the information provided, and consider it generally robust. However, it is noted in the application that the efficacy of the SCR is dependent on exhaust gas temperature and hence engine load. As such, NO_x reduction may be lower at start-up, although the pollutant generation is also lower at lower temperatures. It is understood that operational load/temperatures are achieved in a matter of seconds, but the application refers to 50% load being achieved in “<10 minutes”. Given that some engine runs will be 10-15 minute duration, it is important to understand emissions characteristics during this period. Emissions and abatement characteristics for HVO are also less well characterised than for diesel. The use of ammonia slip catalyst is relatively new technology, and their performance characteristics are not fully explained in the application. We have therefore included an improvement condition (IC2) for the operator to confirm that emissions characteristics for NO_x and NH₃ from short-duration operation on HVO are in line with the application details. We anticipate that this will be by measurements on installed (engines) but by agreement it may be from manufacturers data etc.

We also note that while we consider it unlikely that the NO₂ EQS or AEGL-1 would be breached, given the possibility of high impact but low probability events, a breach is possible. It could have significant short term impacts. While the majority of impact would be from CWL 11/12 (assuming 11, 12 and 13 were all running in backup mode), additional impact would result from CWL 13. CWL 11/12 has an Air Quality Management Plan (AQMP) to manage impacts in the event of emergency operation, and the Application for CWL 13 refers to updating this plan to include CWL 13. We agree that CWL13 should be covered by an appropriate AQMP and have included IC1 to require this to be put in place.

Any adequate AQMP will require co-operation and co-ordination between significant potential simultaneous sources of NO_x (i.e. different data centres), and this is also acknowledged in the application. Given that CWL13 is a separate installation to CWL 11/12, the wording of the IC requires that an approved AQMP is implemented for the facility. It is the Operators choice whether this is a single shared plan or separate plans, and this could change over time. However the approval by Natural Resources Wales of any plan will depend on adequate consideration of all local sources and co-operation between different parties, including any future data centres which may also apply for permitting in the area.

Emission limits

We have decided not to set emissions limits in the permit. This is consistent with the application proposals and our general approach for plants which operate for back-up only. We have had regard for the performance levels, expected operational hours and maintenance regimes specified. We are satisfied that operational performance will be maintained without imposition of emission limits, but this position is subject to review during the life of the permit. While the engines are Medium Combustion Plant, Article 6(8) of the directive allows exemption from emission limits for plant that do not operate more than 500 hours per year as a rolling average over 3 years, as conditioned in the permit.

Monitoring

We have decided that monitoring should be carried out for carbon monoxide as identified in the permit, using the methods detailed and to the frequencies specified. This is to meet the requirements of the MCPD which requires CO testing and was explained fully in our [decision document for the CWL 11/12 data centre](#) which is comparable in this respect.

We do however recognise that the minimum emissions testing requirements of MCPD are potentially onerous for Operators of backup plants which are only planned to operate for testing. We consider the plant to be “low risk” owing to its very low number of operational hours and expected low emission performance and have conditioned monitoring only because it is a statutory requirement. Extensive monitoring requirements could result in the plant being operated for emissions monitoring only, with resultant additional emissions, which may not be justified. We will therefore allow

emissions testing to be co-ordinated with planned testing operations, to be conducted to the standard prescribed in [web guide: Monitoring stack emissions: low risk MCPs and specified generators](#), 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 and is the one already adopted for the CWL11/12 data centre.

Noise Emissions and Assessment

Summary of noise modelling undertaken

This section summarises the noise impact modelling from the CWL 13 installation (engines A1-A60) and the resultant impact at potentially sensitive receptors. The modelling provided by the Applicant is summarised in the application report Appendix E “*Vantage - Site CWL13 – Noise Impact Assessment*” (NIA), August 2022 and was undertaken in SoundPlan version 8.2, a computer modelling programme widely accepted and used for installations permit applications .

The modelling has considered both planned operation of the engines for testing (single engine and cell testing) and emergency operation of all engines together. The CWL 13 installation is adjacent to another data centre (CWL 11/12), and the Applicant has been precautionary in considering other relevant noise sources – the CWL11/12 data centre backup engines, and the CWL 13 cooling air handling units (not part of the installation). This is important as it is likely that both may operate together for emergency generation, and cumulative effects of testing on two adjacent sites may need additional controls.

The way in which the Applicant has used noise models, its selection of source and environmental data, and the assumptions it made have been reviewed by Natural

Resources Wales modelling specialists to establish the robustness of the Applicant's NIA. We are satisfied that the results presented within the Applicant's report can be used in evaluating air quality environmental impact for permit determination. Key issues / conclusions are summarised below, a more detailed analysis is provided in Annex 2.

Overview of noise impact results

We are satisfied that the applicant has suitably calculated the impacts of planned and reasonably foreseeable emergency operation of the CWL 13 data centre (60 backup engines) using a precautionary approach. The assessment is in accordance with the assessment criteria of BS4142:2014+A1:2019 – “Methods for rating and assessing industrial and commercial sound”.

It is also noted that the cumulative impacts of CWL11/12 and CWL 13 are further affected by the addition of, and shielding effect from, the new CWL13 data centre building. As detailed in the report the effect of this is that for some receptors, even though CWL 13 engines contribute additional noise compared to just the CWL 11/12 permitted facility, the actual predicted impact goes down from that predicted for the CWL11/12 permit alone, when the CWL13 building was not present. We have taken a pragmatic and proportionate approach to understanding the real-world impacts of the proposed additional CWL 13 facility.

BS 4142:2014 assesses the likelihood of significant adverse impact by subtracting the measured background noise level from the rating level:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact.
- A difference of around +5 dB is likely to be an indication of an adverse impact.
- 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. The Applicant also uses different descriptions of noise impact, but we focus on those adopted in the standard.

We are satisfied that planned testing of CWL13 alone is unlikely to result in an adverse impact or significant adverse impact at sensitive receptors.

The Applicant has evaluated the combined effects of testing of CWL 11/12 and CWL 13 and concluded that testing does not need to be co-ordinated between the two installations (noting the existing restrictions on testing within each installation as summarised above for CWL 13). For the majority of receptors, cumulative impact is dominated by noise from CWL 11/12, and further sound from CWL13 has little effect. For the most impacted receptor from CWL 13 operations the predicted noise level increases somewhat but predicted impact is unchanged; an adverse but not significant adverse impact. The likelihood of infrequent testing overlapping to give substantial negative impact is considered low, so we accept that the proposal not to co-ordinate testing is reasonable, though noting that we regard BAT as to co-ordinate testing where assessment shows this to be necessary.

Taking into account the likelihood and duration of emergency operation, we are satisfied that emergency operation of CWL13 alone presents a low risk of causing a significant adverse impact, and actual impacts are likely to be lower. If emergency operation of CWL13 with CWL11/12 occurs, adverse and significant adverse impact is likely at a number of receptors, for both day and night time operation, but such operation is an unlikely event. While we recognise that emergency operation of the data centres could result in a significant adverse noise effect, we do not consider such an effect is likely in any given year, given the low probability of emergency operation. Also, at the majority of receptors the CWL11/12 site is the dominant noise source; and we do not consider that the noise risk increases significantly from the addition of CWL 13. The CWL 13 permit contains provision for the review of impacts./controls in the event that emergency operation risk, frequency or duration changes significantly on that which was evaluated in the permit application and we are therefore satisfied with the assessment and controls proposed.

Improvement Condition actions for noise impact

It is noted that the above impact modelling and conclusions are based upon the emissions information provided by the applicant, including significant source reduction from noise attenuation, and the usual uncertainties associated with predictive

modelling. We have accepted the information provided, and consider it generally robust. However, we have included an improvement condition (IC3) for the Operator to confirm that the noise impact at receptors for the as-built facility are in line with the application predictions, and to propose further actions if necessary if there is discrepancy. Given the low likelihood of emergency operation we expect this noise survey to be during engine testing only, but data obtained may inform/update emergency modelling predictions.

Water emissions and assessment

No process emissions will be discharged to water, sewer or groundwater. A foul sewer connection for the data centre (amenity facilities) is noted on the site plan but is not subject to EPR regulation.

Point source emissions to water from the Installation are limited to uncontaminated surface water runoff from within the Installation boundary. Surface water runoff will be discharged into the wider business park drainage system via the site's surface water drainage system. There will be two emission points from the CWL13 surface water drainage system (W1 and W2, identified on the site plan in the permit and being on the South and North corners of the installation respectively). There will be an onsite isolation control valve within the facility's drainage system to prevent release in the event of contamination. Outside the proposed Installation boundary, within the wider business park drainage system, there are additional interceptors.

Containment measures for installation activities are described in the next section, but 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. Emissions limits nor testing are required for discharge of uncontaminated surface water.

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. Procedural and engineering measures to achieve this, by preventing accidental releases, were described in detail in the application. Engine fluids will have adequate primary and secondary containment, including appropriate additional measures such as drip trays (permanent or movable as appropriate) for all fluid fill points, supervised deliveries,

accessible spill kits and site security to prevent unauthorised activity. Limited consumable fluid stocks and waste (oil and antifreeze) will have adequate containment and security.

Engines are in self-contained units and are set on concrete bases, but sealed drainage is not required or provided as all fluids (fuel, oil, adblue, coolant) have adequate primary and secondary containment. The largest risk (by volume) is from the fuel. Each engine has an integrally bundled (110% of capacity) above ground “belly” tank with no external pipework. Road tanker fuel deliveries will be to one of 6 tanker bays. There will be flexible hose connection to the generator fuel tanks, with fixed drip trays beneath the fill points. The tanker bays will have sealed surface and dedicated drainage with an alarmed oil-interceptor.

We consider the description and controls are satisfactory and that accidental contamination of ground / groundwater / surface water is unlikely.

Other environmental risks/impacts

Other environmental risks such as odour, fugitive emissions, pests, global warming potential were screened for consideration, but were not regarded as key determination issues. We are satisfied that other risks/impacts arising will be adequately controlled.

Impact on National Site Network, SSSIs, and non-statutory ecologically designated sites

National Site Network (SAC, SPA, Ramsar)

The application is within the relevant distance criteria (10km – *the enhanced screening distance for combustion sources >50MW was not considered relevant for backup plant of this type*) of the following National Site Network designated sites which are protected under the Conservation of Habitats and Species Regulations 2017:

- Severn Estuary SAC, SPA and Ramsar (approximately 2.6 km to the South East of the Installation)
- River Usk SAC (approximately 3.5km to the East of the Installation)

A full assessment of the application and its potential to affect the interest features of the designated site has been carried out as part of the permitting process.

Assessment has included potential effects of existing permitted CWL11/12 operating as well as new CWL13.

Appropriate assessment:

In light of the conclusions of an appropriate assessment, and taking account of the advice received from protected sites advisors (form 2 response), it has been established that the project will not adversely affect the integrity of any National Site Network 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 and 5 of OGN 200 form 1 and available on the [public register](#)).

SSSI Assessment

The application is within the relevant distance criteria (2km – *the enhanced screening distance for combustion sources >50MW was not considered relevant for backup plant of this type*) of the following site of special scientific interest (SSSI):

- Gwent Levels – St Brides (about 260m 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 new installation is not likely to damage features of the SSSI.

Non-statutory Sites Assessment.

The following other habitats sites have been identified by the applicant within 1 km of the installation:

- LG Duffryn Site 1 and Duffryn Pond (approx. 60m to the south of the installation)
- LG Duffryn Site 2 (approx. 150m to the south of the installation)
- Celtic Springs (approx. 430m north-west of the installation)
- Various discrete areas of ancient woodland (closest being 640m north of the installation)

The Environment Act 1995 provides legal protection; it is on this basis that we assess impact from permitted facilities on non-statutory 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 only relevant emitted pollutant with possible habitats impact was NO₂, as compared with Environmental Standards (ES) for NO₂, 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. Negligible impact of SO₂ is disregarded given the very low emissions levels as described above.

We are satisfied that planned testing and emergency operation of CWL13 alone is unlikely to cause significant pollution at the most impacted non-statutory protected sites as relevant ES are not predicted to be breached. We are satisfied that emergency operation of CWL13, along with CWL11/12 is not likely to cause significant pollution at the most impacted non-statutory protected sites, given the low probability (frequency and duration) of any such event. Numerical predictions by the Applicant and other further detail is given in appendix 1.

Permit Conditions

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. The section below explains certain conditions/sections which are not already addressed above.

Use of conditions other than those from the template

Based on the information in the application, we consider that we need to impose conditions other than those in our permit template, which was developed in consultation with industry having regard to the relevant legislation.

Condition 1.5.1 requires that in the event of an incident, the Operator shall notify co-located installations as well as Natural Resources Wales. The permit condition is based on our standard condition for “multi-operator” installations. This is not a multi-operator site but two adjacent installations, which may have a simultaneous effect on air quality if both operate in emergency mode. The requirement for the two sites to co-operate (e.g. in delivering AQMP) has already been noted above.

Reporting

We have specified reporting in the permit to cover required emissions monitoring and key performance indicators, such as hours of operation of the engines in testing and emergency backup mode. The requirements largely match those set for other Data Centres in Wales (i.e. CWL11/12) and are implemented so that we can ensure site performance meets requirements of the permit and described in the application.

Improvement conditions

Based on the information on the application, we consider that we need to impose improvement conditions. Details of the three improvement conditions used can be found at Annex 3. An explanation for their inclusion is given in the relevant sections above.

Incorporating the application

We have specified that the applicant must operate the permit in accordance with descriptions in the application, including all additional information received as part of the determination process. These descriptions are specified in the Operating Techniques table S1.2 in the permit.

OPRA

The OPRA permit application score at permit issue is 165. The subsistence OPRA score is 155.

ANNEX 1: Air Quality Modelling Technical Summary

Further summary of air quality modelling undertaken

This Annex concerns dispersion modelling of emissions to air from the engine exhaust stacks A1-A60 and the resultant impact on local air quality. The data centre is not situated in an Air Quality Management Area (AQMA) and there are no AQMAs within 2 km of the site.

The Applicant 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 BREEZE AERMOD (V10.0.0.15) which is a widely accepted computer model used in regulatory dispersion modelling. The modelling provided by the Applicant has been subject to detailed audit by NRW specialists. It is summarised in the application report Appendix D "CWL13 Permit Application – Air Quality Assessment" (AQA), August 2022. The impact on protected ecological sites is considered separately below, but is on the basis of the same underlying dispersion modelling.

The model used 5 years of meteorological data collected from the meteorological station at Cardiff Airport between 2011 and 2015. The Applicant justified their decision of the selected years on the basis of comparability with modelling already submitted for CWL11/12. The impact of the nearby buildings and terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

The air impact assessment, and the underlying dispersion modelling, were on this basis:

- It was assumed that the pollutant emission rates would be as specified in the application and by the equipment suppliers/manufacturers (concentrations and flows), with appropriate corrections / conversions and assumptions regarding emissions characteristics.
- The assessment considered the following substances, primarily with reference to short term (hourly or daily) Environmental Quality Standards (EQS), but also for long term (annual) EQS:

- Oxides of nitrogen (NO_x), expressed as NO_x and NO₂ – the principal pollutants of concern in the assessments
 - Carbon monoxide (CO)
 - Sulphur dioxide (SO₂)
 - Particulates / Dust (as PM₁₀ and PM_{2.5})
 - Hydrocarbons, also referred to as Volatile Organic Carbon (VOC) or Total Organic Carbon (TOC) and assessed “as benzene” – not because benzene is expected in the exhaust, but this is a specific VOC with a very low EQS, thereby representing a precautionary impact assessment.
- 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. The application describes further post-processing of the modelled results, for example in calculating annual mean impacts from emergency operation.
 - The modelling for unplanned emergency operation assumed that all engines on the installation were operated 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 EQS as detailed below and contained in statutory guidance.
 - Impact assessment also took into account cumulative impact of concurrent running with the already permitted CWL11/12 installation, recognising that testing may overlap, and that emergency operation could foreseeable be simultaneous. Modelling of the existing site was on the same basis, except that some load shedding on CWL11/12 was taken into consideration as relevant to the configuration of that installation.

We are in agreement with this 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. We are satisfied that the results presented within the applicant's air quality assessment report can be used in evaluating air quality environmental impact for permit determination. While no modelling has specifically been undertaken specifically for

break-fix testing, we consider it another form of individual engine testing, with similar impacts to those modelled for planned testing

Overview of impact results for pollutants other than NO₂

For all pollutants assessed for human health impacts other than NO_x (CO, particulate matter, VOC as benzene, SO₂), the Applicant has satisfactorily demonstrated that impacts of planned and reasonably foreseeable emergency operational scenario would either be insignificant or that breach of the relevant EQS is unlikely as Predicted Environmental Concentration (PEC) is below the EQS, taking into account the CWL13 emissions and background pollution. For emissions to be considered insignificant, the Process Contribution (PC) is less than 10% of the short-term, less than 1% of the long-term EQS). Full details of the impacts characterised are given in the applicant's AQA referenced above.

Impact results for NO₂ from planned testing – CWL13 alone

The pollutant impact of greatest potential concern for human health impact is oxides of nitrogen (NO_x or NO₂). The short-term EQS for Nitrogen Dioxide is an hourly limit value of 200 µg/m³, with up to 18 one-hour exceedances allowable per year. The long-term limit value is 40 µg/m³. For NO_x the Applicant has shown that individual testing impact is insignificant, as it is less than 10% of the short-term EQS at receptors. The highest calculated impact at non-residential receptor was 17.5 µg/m³ (or 8.75% of EQS), and at sensitive residential receptors lower. Consideration of PEC is not strictly required but confirms that the EQS is unlikely to be breached from single engine testing. Screening calculations are presented which indicate that the annual NO_x impact at sensitive human receptors is also insignificant (<1% of the EQS).

The applicant's modelling of CWL 13 cell testing of 6 engines together shows that impacts cannot automatically be considered insignificant for the short-term NO_x EQS, but consideration of the PEC indicates that the EQS is unlikely to be breached. The maximum PC at receptors is 25.5 µg/m³ or 12.75% of the short-term EQS, PEC is 65.5 µg/m³ 32.75% of the EQS and indicating that breach of the standard is very unlikely. As for single engine testing, screening calculations are presented which indicate that the annual NO_x impact at receptors of cell testing is also insignificant (<1% of the EQS).

Impact results for NO₂ from planned testing – CWL13 with CWL11/12

The applicant has also considered potential cumulative impacts of testing at existing installation CWL11/12 and the new CWL13 installation together. This is presented in Appendix C of the Air Quality Assessment. This analysis does indicate that maximum hourly average NO₂ may increase at sensitive human receptors as a result of simultaneous testing at both sites (+11 µg/m³ maximum for cell testing, +8 µg/m³ for single engine testing). However, this assessment also indicates that no cumulative testing scenario is likely (on the basis of PEC) to breach the EQS – with the highest modelled impact being 155 µg/m³ PC, 195 µg/m³ PEC.

The Applicant therefore proposes that co-ordination of testing regimes between the two installations is not required. On this case-specific basis, and with the justification provided, we accept that this is the case. However, as per the guidance for data centres, we generally regard that co-ordination of testing may be BAT, unless justified on a case specific basis. It is noted that in fact for some receptors, maximum impact is predicted to decrease, as the new CWL13 building affects dispersion from CWL11/12, reducing maximum predicted concentrations from this existing facility more than CWL13 engines add to the NO_x.

Impact results for NO₂ from emergency operation – CWL13 alone

For emergency operation of the data centre backup engines, the Applicant's modelling does indicate the potential for the NO_x short-term EQS to be breached, if the engines operated continually. However, this is not the expected mode of operation. Over 5 years of modelled results, the maximum NO₂ PEC at receptors was 696 µg/m³, considerably above the 200 µg/m³ EQS. The maximum total number of hours in the year at which the EQS was exceeded was calculated to be 2714 hours at Imperial Courtyard, adjacent to the site, and 309 hours at a sensitive residential receptor.

The Applicant has undertaken a statistical analysis (hypergeometric mean) of the probability of a breach of the EQS (>18 individual 1-hour exceedances in the year, which is permissible), based on operation in emergency mode for 24 hours continually. They report a probability of <0.0001% that the EQS would be breached by operation of CWL 13 only in emergency backup mode. The basis of this calculation is described

in our [guidance for Specified Generators](#), and although not directly applicable to this facility, is a legitimate way of quantifying the risk posed.

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 breached. However, because the likelihood of occurrence is low as expressed by the statistical calculation, we do not consider that the ES is likely to be breached. The maximum impacts described (highest concentrations and exceedance hours) are on the basis of engines operating all hours of the modelled scenario, whereas operation in emergency mode for an hour or two a year is considered unlikely, and a 24 hour outage considered very unlikely.

Owing to the low probability but potentially high impact of data centre backup engine operation, the EQS is not the only relevant assessment criteria. 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 NO₂ levels at sensitive receptors in this situation may not only exceed the ES of 200 µg/m³ for short durations but may be significantly higher. In accordance with our adopted guidance for Data Centres (and used for CWL11/12), the approach in this case is to consider another 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 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 NO₂ the AEGL-1 is the same (940 µg/m³) 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/m³ for an 8 hour exposure, to a maximum of 38,000 µg/m³ 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/m³.

From the information already presented above, and further data in the application we are satisfied that the AEGL-1 (and workplace exposure limit) is unlikely to be breached by CWL 13 operation alone, including normal background NO_x levels. The maximum hourly NO_x PEC from CWL13 at receptors was 696 µg/m³, considerably below the AEGL-1 of 940 µg/m³.

Impact results for NO₂ from emergency operation – CWL13 with CWL11/12.
The Applicant has modelled the cumulative impact of CWL 13 emergency operation with existing installation CWL11/12. It is evident that the main contribution to the predicted maximum hourly NO₂ concentrations at receptors are due to emissions from CWL 11/12, with the addition of CWL13 installation making an incremental increase, which is different depending on receptor location. The full data is given in Table E-1 and E-2 of the application AQA - Appendix E. It is summarised in Table 4-3 of the application AQA but this does not indicate the location of the impacts reported.

The maximum predicted environmental concentration of NO₂ from operation of CWL13, 11&12 at sensitive human receptors is at receptor 7 (Sir Briggs Avenue) and remains unchanged at 5987 µg/m³. The biggest predicted increase in maximum concentration from addition of CWL13 to existing CWL11/12 is at Receptor 4 – Teddies Nursery, increasing from 4727 µg/m³ to 4988 µg/m³ – an increase of 261 µg/m³ but still well below the AEGL-1 despite being considerably above the EQS.

The Applicant has described the change in impact in terms of the number of hours per modelled year that the hourly NO₂ would exceed the EQS of 200 µg/m³. For CWL11/12 only, exceedance hours at receptors range from 551-3618 hours of the year (if the engines ran every hour of the modelled year), and for CWL11/12 and CWL13, this range increases to 647-5036 hours of the year. At a single receptor, the

largest predicted increase in hours exceeding 200 µg/m³ as a result of CWL13 operation was 1646 hours (Imperial Courtyard, non-residential receptor), and at a sensitive residential receptor (Edmundsbury road) the increase was 445 hours to 2834 hours. However this is not the most impacted receptor (Pencarn Avenue) where impacts are dominated by CWL11/12 and maximum exceedance hours for both sites operating are 3241 hours, an increase of 273 hours (<10%) as a result of the addition of CWL13 impact.

While the figures can be presented in a variety of different ways, it is clear that if the engines were to operate for a significant number of hours per year, there would be a significant risk of the EQS being breached, with this risk increasing as a result of CWL13. However, as already explained, this is not an expected mode of operation. The Applicant has completed hypergeometric mean statistical analysis of the likelihood of a breach of the NO₂ EQS as a result of 24-hours continual operation of the engines to provide backup power. While for CWL 13 alone the probability of breach was <0.001%, the combined probability with CWL 11/12 engines is reported at 5.7%. i.e. in a given year, there is a 5.7% risk of the NO_x EQS being breached if (and only if) the data centre operates for 24 hours continually – in itself an unlikely scenario. The risk of >18 exceedances from cumulative 24h of non-continual emergency operation through the year is 2.3%. We are satisfied that, taking a low likelihood of emergency operation, with a limited risk of the breach of the EQS from such an operation, the permitting of CWL 13 to operate in addition to CWL 11/12 is acceptable, and poses very limited additional risk to the EQS.

The Applicant has reported the change in number of breaches of the AEGL-1 standard for the impacts of CWL13 in addition to CWL11/12 only. Again this assumes the engines run continually for every hour of the modelled year. The minimum number of AEGL-1 breaches at receptors is for 2013 meteorological data, with 72 hours >AEGL-1 for CWL11/12 only, and rising to 81 hours >AEGL-1 with CWL13 as well. The maximum number of AEGL-1 breaches at receptors is modelled for 2011 meteorological data, changing from 2122 hours for CWL11/12 only to 2128 hours for CWL13 as well. It is noted that the max/min are reported for all receptors, so the change in exceedance at individual receptors may be greater. However overall CWL13 addition makes just a few hours difference (around. 10 hours) to a CWL11/12

AEGL-1 annual exceedance of 100's-1000's of hours . Figure 4-3 and 4-4 of the application AQA, illustrate that the number and location of exceedances of AEGL-1 from CWL11/12 is changed minimally by further addition of CWL13.

Detailed conclusions

Overall we are satisfied that neither planned testing nor emergency operation of the CWL 13 is likely to breach the any air quality EQS. Particular scrutiny has been applied regarding the NO₂ hourly average EQS of 200 µg/m³. It is possible that emergency operation of the facility could result in breach of the standard, but it is considered very unlikely that more than the 18 permissible exceedances per year would occur. This decision is made on the basis of the air dispersion modelling, statistical analysis, and information provided on the expected frequency and duration of emergency operation. CWL 13 alone is unlikely to breach the AEGL-1 for rare exposure to airborne chemicals.

Recognising that CWL13 is close to the existing CWL11/12 data centre installation, it is important to consider combined effects as these are not captured by conventional “background” pollution estimates. From the data presented, we are satisfied that routine testing is unlikely to result in any EQS breach, and it is not necessary to co-ordinate testing between the sites, though this could change if further backup power provision is installed in the locality. It is noted that the contribution of CWL 13 is an incremental change in impact on the existing CWL 11/12 installation, which dominate effects. While operation of the two installations in backup mode could result in breach of the NO₂ EQS and AEGL-1, we consider the probability unlikely, and that addition of CWL 13 does not significantly increase the pre-existing risk. We are satisfied that conditions in the permit adequately control the risk of extended emergency operation if very high impacts occur, and provide for revision/improvement to the installation(s) if necessary.

Conclusion and Improvement Condition actions for air quality impact on human receptors

Key overall conclusions and improvement conditions are summarised in the main part of this decision document.

Impact results for protected local wildlife sites

Potentially impacted local wildlife sites are identified above in the main body of this document. The most potentially impacted receptor is LG Duffryn / Duffryn pond, so assessment below focuses on this receptor. The only relevant emitted pollutant with possible habitats impact was NO₂, as compared with Environmental Standards (ES) for NO₂, 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. Negligible impact of SO₂ is disregarded given the very low emissions levels as described above.

The short-term ecological ES for NO₂ is 75 µg/m³ as a 24-hour average. The long-term ecological ES for NO₂ is 30 µg/m³ as an annual average. These are the same for all protected ecological sites. Deposition critical loads are discussed below.

Planned testing

The application indicates that the ES is not predicted to be breached at the LG Duffryn and Duffryn Pond sites as a result of planned engine testing. The applicant has calculated that the maximum 24 hour mean from CWL 13 is 6 µg/m³. This is well below the 24 hour EQS of 75 µg/m³, and so we accept that operation is unlikely to cause significant pollution. Such impact would be considered insignificant as it is <10% of the ST EQS. The contribution of planned testing to long-term (annual) ES for NO_x is considered insignificant at the protected sites (≤0.01 µg/m³, <1% contribution).

As the annual average contribution of NO₂ (and SO₂) from the proposed engines is 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 emissions. Screening calculations indicate that compared with precautionary deposition loads of 3kg N/ha/yr and 0.001 K_{eq}/ha/yr (acid), impact of operation is insignificant (<1%).

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 would not be above the short term ES ($75 \mu\text{g}/\text{m}^3$), at up to $52 \mu\text{g}/\text{m}^3$ as a daily average based on the engines running for 1 hour. Normally we would accept that this would be unlikely to cause significant pollution at a local wildlife site. Given the probability of operation of CWL 13 at the same time as CWL11/12, the Applicant has considered the cumulative impact, and reports that the standard may be breached, increasing from $392 \mu\text{g}/\text{m}^3$ (CWL 11/12 only) to $393 \mu\text{g}/\text{m}^3$ for CWL11/12 + CWL13. We do not consider this increase significant, noting that the risk of any breach is low for very infrequent emergency operation. We are satisfied that the proposed CWL 13 installation is unlikely to cause significant NO_2 pollution in respect of these non-statutory sites on the basis of low likelihood of operation, and minimal change in impact compared to the extant background, i.e. already permitted CWL 11/12 .

Similar screening calculations for those described above for planned testing indicate that the impact of reasonably foreseeable emergency operation on annual acid / Nitrogen deposition would be insignificant.

ANNEX 2: Noise Impact Assessment Technical Summary

Further summary of noise modelling undertaken

The focus of NIA impacts is on residential receptors (a different set of modelled receptors from the AQA), with one non-residential receptor (Teddies Nursery) also considered. It used background sound levels from 2018 and 2019 monitoring surveys, an approach which we accept as it reduces the risk of background sound creep (same background data as CWL11/12 report).

Noise modelling is based on noise measurements e.g. of background and industrial sources. We are satisfied with the methodology and equipment used (including calibration data) for field measurements. The Applicant's report details all relevant approaches/parameters (e.g. application of acoustic penalties) and we accept the approach described.

Overview of noise impact results

We are satisfied that planned testing of CWL13 alone is unlikely to result in an adverse impact or significant adverse impact at sensitive receptors. The maximum reported impact from individual testing is +1.9 dB (15m test) and + 0.7 dB (2 h test) (Powis Close). The maximum reported impact from cell testing is +1.3 dB (15m test, Powis close).

The Applicant has evaluated the combined effects of testing of CWL 11/12 and CWL 13 and concluded that testing does not need to be co-ordinated between the two installations (noting the existing restrictions on testing within each installation as summarised above for CWL 13). For the majority of receptors, cumulative impact is dominated by noise from CWL 11/12, and further sound from CWL13 has little effect. For the most impacted receptor from CWL 13 operations (Powis Close), addition of sound from this installation increases predicted noise at receptors by up to 2.7 dB, from 35 dB to 37.7 dB but the predicted impact is unchanged; an adverse but not significant adverse impact. The likelihood of infrequent testing overlapping to give substantial negative impact is considered low, so we accept that the proposal not to

co-ordinate testing is reasonable, though noting that we regard BAT as to co-ordinate testing where assessment shows this to be necessary.

Taking into account the likelihood and duration of emergency operation, we are satisfied that emergency operation of CWL13 alone presents a low risk of causing a significant adverse impact, and actual impacts are likely to be lower. The maximum reported impact from emergency testing (day and night) is +9.0dB, which is a likely indication of adverse impact, and possible indication of significant adverse impact. Given that the numeric assessment criteria is applied to continuously operating facilities (whereas in this case, not expected to run in emergency mode from year-to-year), the real risk of impact from infrequent operation is correspondingly reduced.

For emergency operation of CWL13 with CWL11/12, adverse and significant adverse impact is likely at a number of receptors, for both day and night time operation. However, at the majority of receptors the CWL11/12 site is the dominant noise source; the addition of CWL13 means that the modelled impact increases from low impact to adverse impact at 1 receptor on Edmundsbury Road and from adverse to significant adverse impact at receptors on Powis Close. Nevertheless, the applicant states that *“the CWL13 main building provides screening of noise from CWL11/12, and numerically the cumulative major impact is smaller than the equivalent major impact from CWL11/12 without the screening effect of the CWL13 building.”* Examination of the modelling submitted for CWL11/12 confirms this, and it is noted that the maximum absolute noise rating level at Powis Close during emergency operation as a result of construction of CWL 13 (installation and data centre building) is predicted to go down from 54 dB ($L_{Aeq, t}$) to 45 dB, effectively a reduction in impact. Taking this into consideration, along with the likelihood of occurrence of emergency operation as described already for CWL 13 alone, while we recognise that emergency operation of the data centres could result in a significant adverse noise effect, we do not consider such an effect is likely in any given year, given the low probability of emergency operation.

ANNEX 3: Improvement Conditions

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
IC1	The operator shall develop and submit an Air Quality Management Plan (AQMP) for CWL13 activities in conjunction with the Local Authority which identifies the emergency operating conditions (grid failure) when Local Air Quality may be adversely impacted by emissions to air from the installation and other co-located backup power facilities. This shall include but not be limited to the following considerations: - immediate notification of all emergency operations of the CWL13 engines to the Natural Resources Wales emergency number (0300 065 3000) irrespective of AQMP risk categorisation. Agreed frequency/detail of subsequent updates may be based both on regulator response and AQMP categorisation. - notification of Natural Resources Wales via the incident hotline that the outage should be regarded as a potential air quality incident for possible management by the multi-agency Wales Air Quality Cell, if a CWL 13 whole site outage occurs simultaneously with other data centre outages in the locality, and has lasted, or is expected to last for more than 4 hours (or expected duration is unknown). - co-ordination and co-operation arrangements with operator(s) of other co-located backup facilities which may be operating at the same time. - Modelled/measured total potential impacts at individual receptors of all backup units which are operating in the locality. - timescales for response measures and responsibility for implementation. - how local conditions during a grid failure might influence the response required, for example meteorological conditions, time of day. - contingency for how the response will be carried out in the event scenario i.e. loss of power. - 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. - Assessment of the need for communication of the plan in advance 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. - Assessment of 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.. - timescales for continued review of the management plan. The agreed AQMP shall be submitted to Natural Resources Wales for approval.	Revised AQMP to be provided to Natural Resources Wales by 07/12/23, or as otherwise agreed in writing with Natural Resources Wales

Table S1.3 Improvement programme requirements

Reference	Requirement	Date
IC2	The Operator shall undertake verification work to demonstrate that the engine exhaust emission levels do not exceed those outlined in the application air quality assessment for oxides of nitrogen (NO_x as NO₂) and for ammonia (NH₃) A detailed plan of the verification work to be carried out shall be submitted to NRW for approval prior to its commencement. A written report of the work and its results shall be submitted to Natural Resources Wales for approval. This shall: - demonstrate the performance stated in the application, that there is no ammonia slip in emissions, following the ammonia slip catalyst. - demonstrate that NO_x emissions performance stated in the application (190 mg/m³ @ reference conditions 15% oxygen) is achieved for all operational scenarios, including short duration operation of 10-15 minutes (as an average over that operating period from cold start-up). - Cover performance for any fuels utilised by the engines on site (expected to be at least Hydrotreated Vegetable Oil, and may also include diesel if engines have been run on this fuel). - If verified emission levels are higher than those predicted in the application, include an assessment of the most suitable techniques to improve performance to achieve those levels, an estimate of the cost and a proposed timetable for their implementation. It is anticipated that the verification will include measurements of emissions from installed engines, in which case such measurements shall meet the MCERTs standard. If verification is possible by other means (e.g. by using manufacturers data) then this should be justified in the verification plan referred to above.	Verification and reporting to be completed within 12 months of permit issue.
IC3	The Operator shall undertake noise monitoring at sources and receptors for representative engine testing/maintenance scenarios to demonstrate that the maximum sound pressure levels do not exceed those outlined in the application noise impact assessment. A detailed plan of the noise monitoring to be carried out shall be submitted to NRW for approval prior to the commencement of noise monitoring. An addendum to the existing noise impact assessment for the site shall be submitted to Natural Resources Wales for approval. This shall: - Meet the BS4142:2014 + A1:2019 standards. - Reference the Welsh Government Noise and soundscape action plan 2018-23. - Include 1/3rd octave and narrow band (FFT) measurements to identify any tonal elements or low frequency noise. - Update noise impact assessment for emergency operation of the site, if updated monitoring leads to a change in source terms. - make reference to the predictions and noise level outlined in the application noise impact assessment. - If rating levels measured are higher than those predicted, include an assessment of the most suitable additional abatement techniques, an estimate of the cost and a proposed timetable for their installation.	Updated Noise Impact Assessment within 12 months of permit issue

Table S1.3 Improvement programme requirements

Reference	Requirement	Date
IC4	In the event that one or more of the following occur: 1. emergency operation of 89 MWth or more of the site engines for more than 2 hours of continuous operation, 2. emergency operation of 89 MWth or more of the site engines for more than 18 hours cumulative for any calendar year, 3. 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, with regard for other simultaneous backup power generation in the locality. 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. 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 criteria in IC4 being met or as otherwise agreed in writing with Natural Resources Wales

ANNEX 4: Consultation Responses

A) Advertising and Consultation on the Application

The Application has been advertised and consulted upon as detailed above. The consultation responses and a summary of how we have taken these into account in reaching our decision is given 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 Environmental Public Health Service Wales (“Public Health Wales”) (consultation on duly made application)	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Potential for cumulative negative noise and air quality impacts from CWL13 application and previously permitted CWL11/12 – both from planned testing and particularly from emergency operation together	As detailed in the application and decision document CWL13 installation does add incremental increase to impact/risk. However owing to the BAT-minimised air quality (NO _x) and noise impacts from CWL13, we are satisfied that the proposals do not constitute a significant additional risk from emergency operation, and that as proposed by the operator, impacts from testing are sufficiently low that co-ordination of testing regimes between the two installations is not required.
Consideration of non-residential receptors adjacent to the installation	As detailed in the application and this decision document, non-residential receptors are included in air quality modelling, but not noise, in accordance with permitting guidance. We are satisfied that as described, impacts at receptors meet permitting statutory guidance requirements. The HSE have been consulted on the application and are responsible for workplace exposure regulation.
Requirement for operator to notify NRW immediately of all emergency engine operations, and for NRW to consider management via an air	Notification addressed in the permit – all emergency engine operations are notifiable to the incident hotline. NRW will take a decision on

quality cell with relevant statutory partners.	appropriate response. However, it is noted that the impact of CWL13 alone would not be expected to justify an air quality cell response.
An AQMP and Noise Management Plan (NMP) should be in place for CWL13 and approved by NRW to limit the impacts on local receptors for testing and emergency operation. It should co-ordinate response with other co-located sources (currently CWL11/12) The AQMP plan should meet/follow Environment Agency guidance	As noted in this Decision document (DD) an AQMP is required under Improvement Condition IC1 including <i>“co-ordination and co-operation arrangements with operator(s) of other co-located backup facilities which may be operating at the same time”</i>. The IC identifies key requirements which are indicated in Environment Agency guidance As also noted in the DD we accept the Applicant’s justification that co-ordination of planned testing is not required, owing to the BAT-minimised air quality (NO_x) and noise impacts from CWL13. Owing to the attenuation in place, we do not consider an NMP to be required but IC 3 requires verification of application modelled noise performance / attenuation during initial operation. Standard permit conditions will require these measures to be maintained through the life of the permit. However, as described in this DD, the CWL13 installation makes an incremental difference to the impacts from CWL11/12 – who therefore bear the majority of responsibility for AQMP and appropriate controls as CWL13 has relatively limited ability in most scenarios to significantly impact on emissions. The separately permitted CWL11/12 has Improvement Conditions in place to further develop their AQMP along the lines described.
The AQMP should ensure preferential use of lower emission fuels and emission abatement including SCR. Notes on the mixed information regarding HVO effect in reducing emissions.	The application specifies expected emission performance (190mg/m ³ NO _x @ standard conditions, 15% O ₂), irrespective of fuel use and reliant on SCR (and ASC). Improvement Condition IC2 requires

	verification of this performance. Any uncertainty around HVO performance is at the risk of the operator as the emissions performance standard is clearly specified.
Containment plan for liquid fuels	In place as described (and accepted) in this decision document
Fire management plan	Not required for installations of this type. Nevertheless, the Applicant has confirmed in face-to-face meetings that extensive fire prevention measures are in place for the whole facility, including the engines.
Request to be updated on any developments	The consultee will be notified of consultation on our draft decision.

Response Received from Newport City Council Environmental Health (consultation on duly made application)	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Need for involvement / consultation between regulators – NRW and NCC	Statutory consultation on the application and draft decision and associated communications, requirement for the operator to co-ordinate with local authority on AQMP content.
Use of SCR for NO _x reduction	Proposed by Applicant so integral to CWL 13 application.
Design sustainability/climate change and alternative backup power possibilities	Determination must be of the submitted application on its merits. Note that non-fossil HVO is proposed as an alternative to diesel.
Need for co-ordination and co-operation between different data centre installations in the locality for testing and emergency response.	The permit contains a bespoke notification requirement for co-located installations. The AQMP requires all local sources to be considered in emergency operation. As documented in this decision document, owing to the BAT-minimised impacts from CWL13, we are satisfied with the proposal by the operator that testing does not need to be co-ordinated with CWL11/12.
Need for ambient air monitoring in emergency operation	Owing to the BAT-minimised air quality (NO _x) impacts from CWL13, we are satisfied that this facility does not justify ambient air monitoring. It

	is noted that such monitoring is an improvement condition for CWL11/12 installation owing to its considerably higher magnitude impact.
Wider air quality neutral, carbon neutral and green infrastructure objectives and wider consultation	Beyond the scope of EPR determination – likely more relevant to planning consideration. NCC welcome to distribute statutory/public consultations further if required.
Land and site condition report	Application details accepted as detailed in this decision document.

There were no consultation responses when our draft decision was advertised.

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

- None received -

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