Environmental Permit Application

CWL01 & CWL02 Data Centre: Supporting Document

PREPARED FOR

MSFT MCIO Limited

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SIGNATURE PAGE

Environmental Permit Application

CWL01 & CWL02 Data Centre: Supporting Document

0657169

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
BAT	Best Available Technique
BREF	Best Available Techniques Reference document
Breach, breaching, breached	Used here when the predicted ambient concentration of a pollutant at a receptor would not comply with the air quality standard. For example, if the 1-hour mean NO_2 standard is predicted to be exceeded 20 times at a receptor, a breach of the NO_2 1-hour mean is therefore predicted as there would be more than the 18 allowed exceedances of this standard.
CO	Carbon monoxide
EMS	Environmental Management System
EP	Environmental Permit

Acronyms	Description
EPR	Environmental Permitting Regulations
Exceed, exceedance, exceeded	Used here when a predicted concentration is above an air quality standard threshold. For example, a 1 – hour mean NO_2 predicted environmental contribution of 220 µg/m^3 would exceed the 200 µg/m^3 NO_2 air quality standard
KWe	Electrical power in kilowatts
HV	High Voltage
IED	Industrial Emissions Directive
ISO	International Standards Organisation
Km	Kilometre
l	Litre
m	Meter
MCP	Medium Combustive Plant
MCPD	Medium Combustive Plant Directive
MW_e	Megawatt electric
MW_{th}	Megawatt thermal
NO_x	Oxides of Nitrogen
NRW	Natural Resources Wales
PM_{10}	Particulate matter of diameter below of equal to 10 µm
PUE	Power Usage Effectiveness
SO_2	Sulphur Dioxide
t	Metric tonne
TGN	Technical Guidance Note
UPS	Uninterruptable Power Supply
WWTP	Waste Water Treatment Plant

APPLICATION CHECKLIST

Requirement	Topic	Location in Report
Form B2 Question 5A	Provide a Plan for the site	**Figure 2.2**
Form B3 Question 1A	Provide details on the proposed activities	**Section 1.2**
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Form B3 Question 6E	Describe how waste production is avoided	**Section 7**
Form B3 Question 7C	Do any of the MCPs meet the criteria of a Part B activity?	**Section 5**

EXECUTIVE SUMMARY

MSFT MCIO Limited (Microsoft) is proposing to construct and operate a new data centre campus, comprising two data centre buildings CWL01 and CWL02, collectively called the Newport Campus ("the Site"). The Site will be located on the Former Quinn Radiator Manufacturing Site, Imperial Park Business Park, Celtic Way, Duffryn, Newport, NP10 8BE.

The two component data centre buildings ("data halls" or "server rooms") are warehouse-style constructions, which will each contain data storage, internal and external ancillary equipment, including 28 diesel fuelled back-up generators (20 generators at the CWL01 data centre and 8 generators are planned to be installed at the CWL02 data centre).

In addition, there will be two administrative building generators for the provision of emergency back-up generation to fulfil the Site's non-data hall energy demand (one installed to CWL01 and another to CWL02) and one generator for the provision of emergency back-up generation to power the Site's water treatment plan, located to the south of CWL01t[1].

Generators at the Site will only operate in the event of a loss of power from the mains incoming supply, and during routine maintenance testing to check their correct operation.

There will also be two small diesel fuelled fire pumps, which are expected to have a rating of <1 MWth input each.

The main commercial activity of the Site will be data storage, however, under Schedule 1, Part 2 of the *Environmental Permitting (England and Wales) Regulations 2016* (as amended) "the Permitting Regulations," the activity that will require an Environmental Permit (EP) is the combustion of fuel in appliances with an aggregated thermal input of more than 50 megawatts (MWth).

The aggregated MWth input for all 31 back-up generators and the two diesel fuelled fire pumps will be c. 236 MWth, thus an EP is required for the Site. All 31 back-up generators will be installed with Selective Catalytic Reduction (SCR) abatement systems.

Microsoft has selected diesel generators as they are considered to be the best available technique for the purpose of emergency power generation at data centres. A review of operating techniques and the potential effects on the environment are included in this application. The diesel generators could also be converted to run on Hydrotreated Vegetable Oil (HVO), without engine modification. Should this occur, at a later date, Microsoft would notify NRW if and once the conversion is complete.

The primary aim of the Permitting Regulations for this type of installation is to consider the potential impacts of the release of pollutant emissions to air from the diesel

[1] The water treatment plant is for the treatment of water used in server room cooling and nothing associated with the operation of the generators.

generators. Emissions to air will occur routinely as part of the engines testing regime, as well as in actual emergency operation, in the unlikely event this occurs.

An air quality impact assessment has been carried out using air dispersion modelling to assess the potential for impacts from operation of the proposed diesel generators on human health and ecological receptors. Short-term and long-term impacts were assessed considering the Site's diesel generator testing regime and two emergency scenarios in which all generators are required to run for 1 hour or 72 hours. Impacts at human health receptors were assessed for NO_2, NH_3 and PM_{10} and local protected conservation areas were assessed for NO_x and NH_3. The assessment uses diesel as the fuel type as a worst case scenario.

Based on the assessment, the modelled impacts of emissions for the proposed testing regime on site are not expected to result in an adverse impact on air quality on human health receptors or on protected ecological areas for any of the pollutants. This is the same for the emergency 1 hour scenario. The modelled impacts from the emergency 72-hour scenario showed no adverse impacts on air quality at human health receptors or most of the ecological receptors however a potentially significant effect was noted at Gwent Levels: St Brides SSSI for the NO_x 24 hour standard and for nutrient nitrogen deposition. As the modelled 72-hour outage emergency scenarios is highly unlikely to arise in reality, the potential for significant impacts from emergency operations at the site are considered improbable.

An assessment of potential noise effects associated with the proposed Development has been carried out. Predicted noise effects from three operational scenarios have been assessed; noise due to the normal operation of the Proposed Development, noise from generator testing (worst-case), and noise during an emergency scenario (main power supply failure).

Modelled noise effects from all scenarios have been found to be within the acceptable criteria and result in 'low impact, depending on the context' in terms of BS 4142 at all receptors. The predicted external rating levels do not exceed more than 5 dB below the background during day and night in the normal operation and generator testing scenarios at all receptors as per the criteria agreed with Newport City Council (NCC).

Using information provided by Microsoft, Environmental Resources Management Limited (ERM) has prepared this EP application on behalf of Microsoft.

1. ENVIRONMENTAL PERMIT APPLICATION

The following application and supporting information for the Newport Campus ("the Site), which comprises the CWL01 and CWL02 data centres (located at Former Quinn Radiator Manufacturing Site, Imperial Park Business Park, Celtic Way, Duffryn, Newport, NP10 8BE), has been prepared by Environmental Resources Management Limited (ERM) on behalf of MSFT MCIO Limited (Microsoft).

The supporting information document is based on the description of the proposed data centre provided by Microsoft, publicly available environmental data and results of the detailed air quality dispersion and noise impact modelling undertaken by ERM.

1.1 REASON FOR APPLICATION

Microsoft is proposing to construct and operate a new data centre campus, comprising two data centre buildings CWL01 and CWL02, collectively called the Newport Campus. The Site will be located on the Former Quinn Radiator Manufacturing Site, Imperial Park Business Park, Celtic Way, Duffryn, Newport, NP10 8BE. The two component data centre buildings are warehouse-style constructions, which will each contain data storage, internal and external ancillary equipment, including 28 diesel fuelled back-up generators. The back-up generators provide power to the data centre only in the event of grid supply failure. Microsoft proposes to install 20 generators at the CWL01 data centre and 8 generators are planned to be installed at the CWL02 data centre of the Site.

At the Site there will also be two administrative building generators for the provision of emergency back-up generation to fulfil the Site's non-data hall (server room) energy demand and one generator for the provision of emergency back-up generation to power the Site's water treatment plant. The administrative building generators and water treatment plant generators will only operate in the event of a loss of power from the mains incoming supply. There will also be two small diesel fuelled fire pumps (one as a standby to the other) that are expected to have a rated input of <1MWth each.

1.2 LISTED ACTIVITIES

According to Schedule 1, Part 2 of the Environmental Permitting (England and Wales) Regulations 2016 (as amended), "EPR 2016," the activity that will require an Environmental Permit (EP) will be the combustion of diesel in appliances with an aggregated thermal input of more than 50 megawatts (MWth) – see **Table 1.1** for a summary of the onsite combustion plant that will contribute to this aggregated thermal input that requires permitting under EPR.

TABLE 1.1: LISTED ACTIVITIES

Listed Activities	Descriptions	Limits
Section 1.1 Part A(1)(a)	Combustion of diesel fuel in electrical generators of varying capacities but with an aggregated thermal input of	From receipt of raw materials (diesel or HVO) to combustion in emergency standby generators

Listed Activities	Descriptions	Limits
"Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts"	>50MWth (total thermal input of the Site's 28 emergency back-up diesel generators, two administrative building generators, water treatment plant generator and two diesel fuelled fire pumps is c. 236 MW_{th})	for electricity production to dispatch of waste Electricity produced at the installation cannot be exported to the National Grid

1.3 DIRECTLY ASSOCIATED ACTIVITIES

Schedule 1, Part 1 (2) of the Permitting Regulations defines a 'directly associated activity' as an operation which:

- has a technical connection with the activity;
- is carried out on the same site as the activity; and
- could have an effect on pollution.

Table 1.2 sets out the activities that are directly associated with the activity listed in **Table 1.1** above, i.e. combustion of diesel fuels in electrical generators.

TABLE 1.2: DIRECTLY ASSOCIATED ACTIVITIES

Directly Associated Activity	Descriptions	Limits
Storage and use of diesel and Ad Blue	Receipt of diesel and Adblue into tanks and subsequent consumption by generators.	From receipt of materials to use within the facility
Surface water drainage	Discharge of uncontaminated surface water run-off (from the roof and external areas) to surface water drains via sustainable urban drainage systems (SuDS).	Input to site drainage system until discharge to surface water drain via SuDS.

1.4 CONSULTATION

On behalf of MSFT, ERM approached NRW to confirm the scope of the application via the pre-application service. At that time NRW's permitting team were unable to we're unable to offer their services for pre-application discussions due to a strain on resources.

ERM sent NRW a summary of the Proposed Development with a background and summary of the proposed permits to be applied for, with the last correspondence on 27th October 2023. No comments were received from NRW.

1.5 DETAILS OF COMPANY DIRECTORS

The directors for MSFT MCIO Limited listed at Companies House at the time of this application are named below.

- Ms Claire Louise Barclay, Director, born April 1970.
- Mr Benjamin Owen Orndorff, Director, born September 1971.
- Mr Keith Ranger Dolliver, Director (USA), born January 1963.

The company registration number listed on Companies House for Microsoft is 09616816.

2. SITE DESCRIPTION

2.1 SITE LOCATION

The location of the Site is detailed in **Table 2.1** below.

TABLE 2.1: LOCATION OF THE DATA CENTRES

Site	Address	Co-ordinates
CWL01	Former Quinn Radiator Manufacturing Site, Imperial Park Business Park, Celtic Way, Duffryn. Newport, NP10 8BE	327963, 184180
CWL02	Former Quinn Radiator Manufacturing Site, Imperial Park Business Park, Celtic Way, Duffryn. Newport, NP10 8BE	327734, 184068

The location of the Site is shown in **Figure 2.1** and **Figure 2.2** shows the installation boundary.

2.2 SITE CONDITION

A Site Condition Report has been produced and provides the soil and groundwater baseline conditions of the Site. The Site Condition Report is presented in **Appendix D**.

2.3 SITE CONTEXT

CWL01 and CWL02 will be located on land to the west of Celtic Way within the Imperial Park Business Area, which surrounds the Site to the north, and east. Agricultural land is present to the south and west. The proposed CWL01 and CWL02 data centres are located approximately 200 m to the south of a Vantage data centre. The nearest residential receptor is located on Church Crescent approximately 220 m to the northwest of the Site.

The residential area to the northwest extends approximately 400 m, beyond which the land use becomes rural in nature. The M4 is located approximately 430 m to the north and runs east to west.

To the east, the trading estate extends for another 600 m beyond the Site, before the land use becomes residential, interspersed with recreational and agricultural spaces.

A Ramsar Site is located approximately 2.8 km to the east and is associated with the Severn Estuary. The Gwent Levels – Rumney and Peterstone Site of Special Scientific Interest (SSSI) is located approximately 195 m to the south. The nearest Special Area of Conservation (SAC) and Special Protection Area (SPA) are located at the Severn Estuary which is located approximately 2.9 km to the east.

A watercourse named the Nant-y-moor Reen runs southward past the western edge of the site. This joins the Percoed Reen located approximately 610 m to the south and flows to the west, where it joins the Broadway Reen which flows south into the Bristol Channel.

The Site does not lie groundwater Source Protection Zone (SPZ).

The context of CWL01 and CWL02 are shown graphically in **Figure 2.3** *(*Land Use and Protected Sites), **Figure 2.4** (Water bodies and Groundwater), and **Figure 2.5** (Sensitive Built Receptors).

FIGURE 2.1: SITE LOCATION PLAN

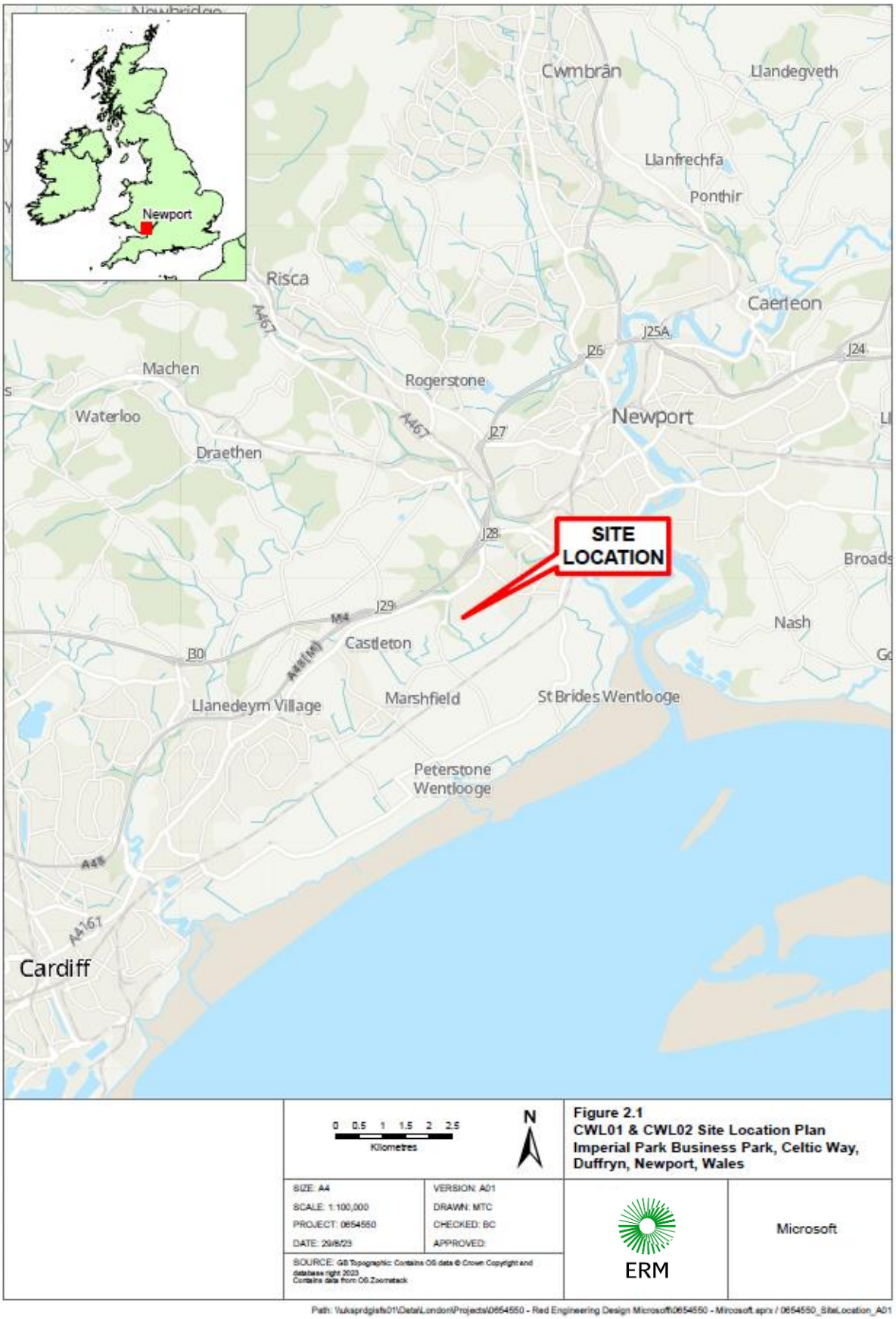


FIGURE 2.2: SITE BOUNDARY PLAN

FIGURE 2.3 LAND USE AND PROTECTED SITES

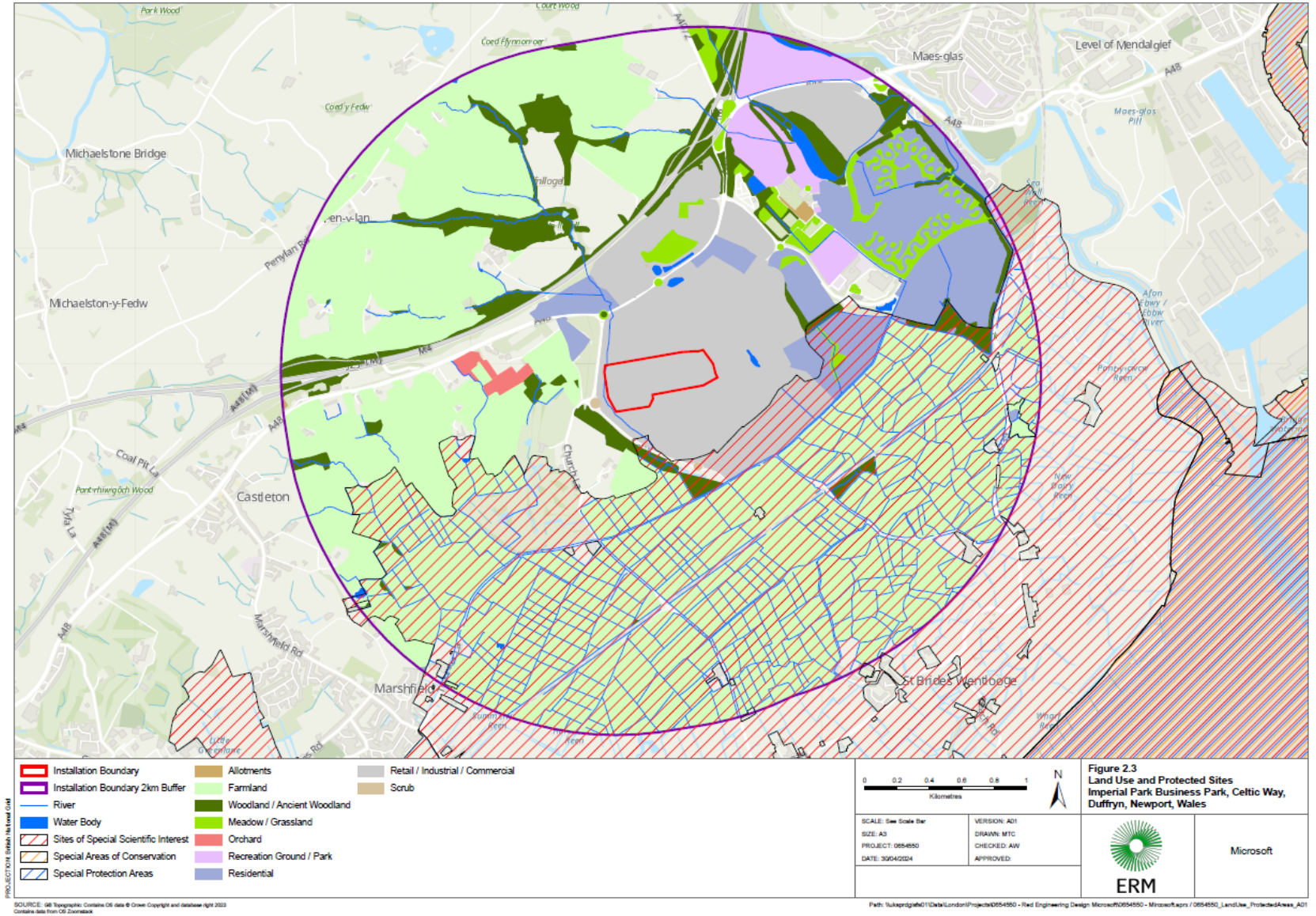


FIGURE 2.4 WATER BODIES AND GROUNDWATER

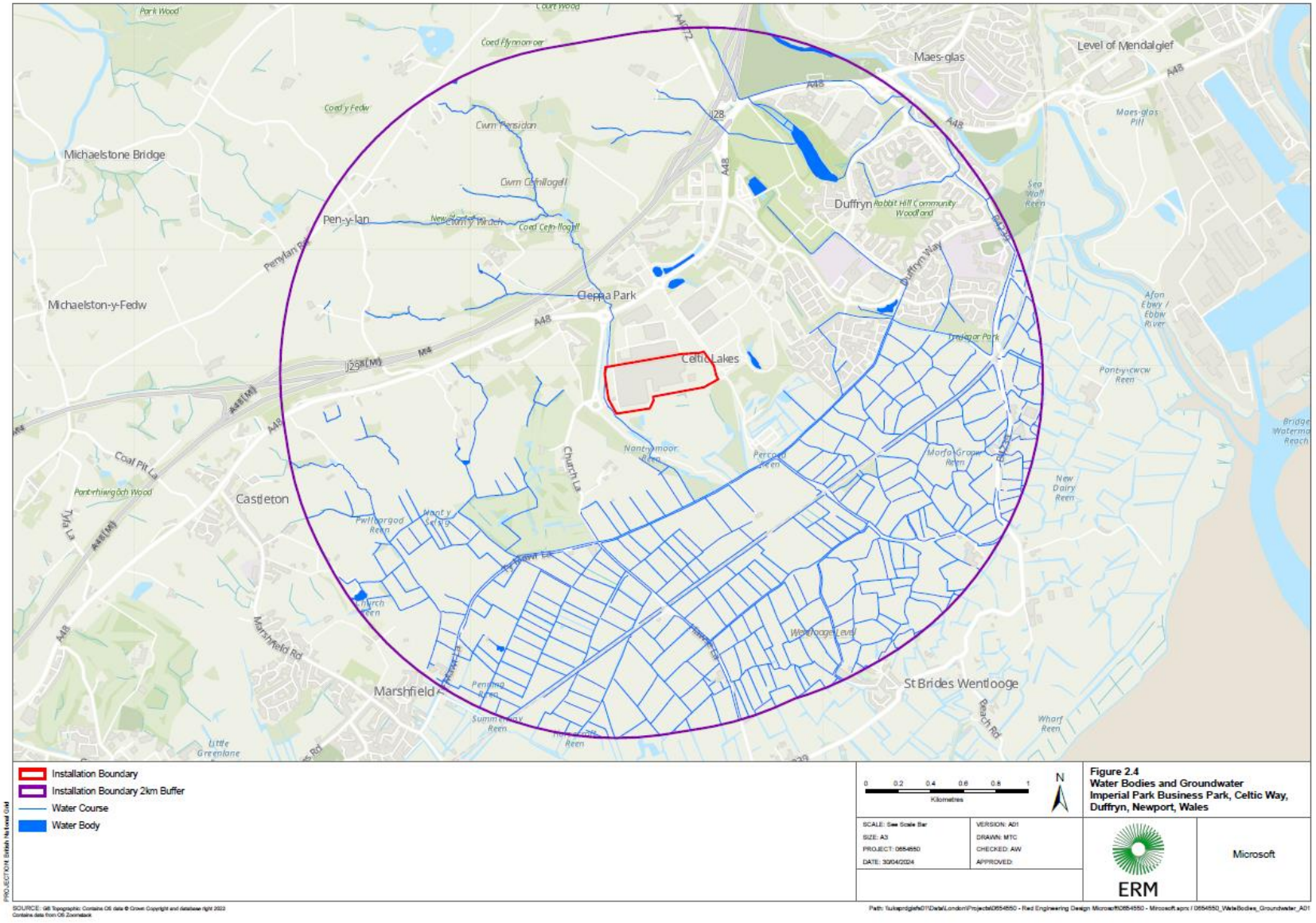
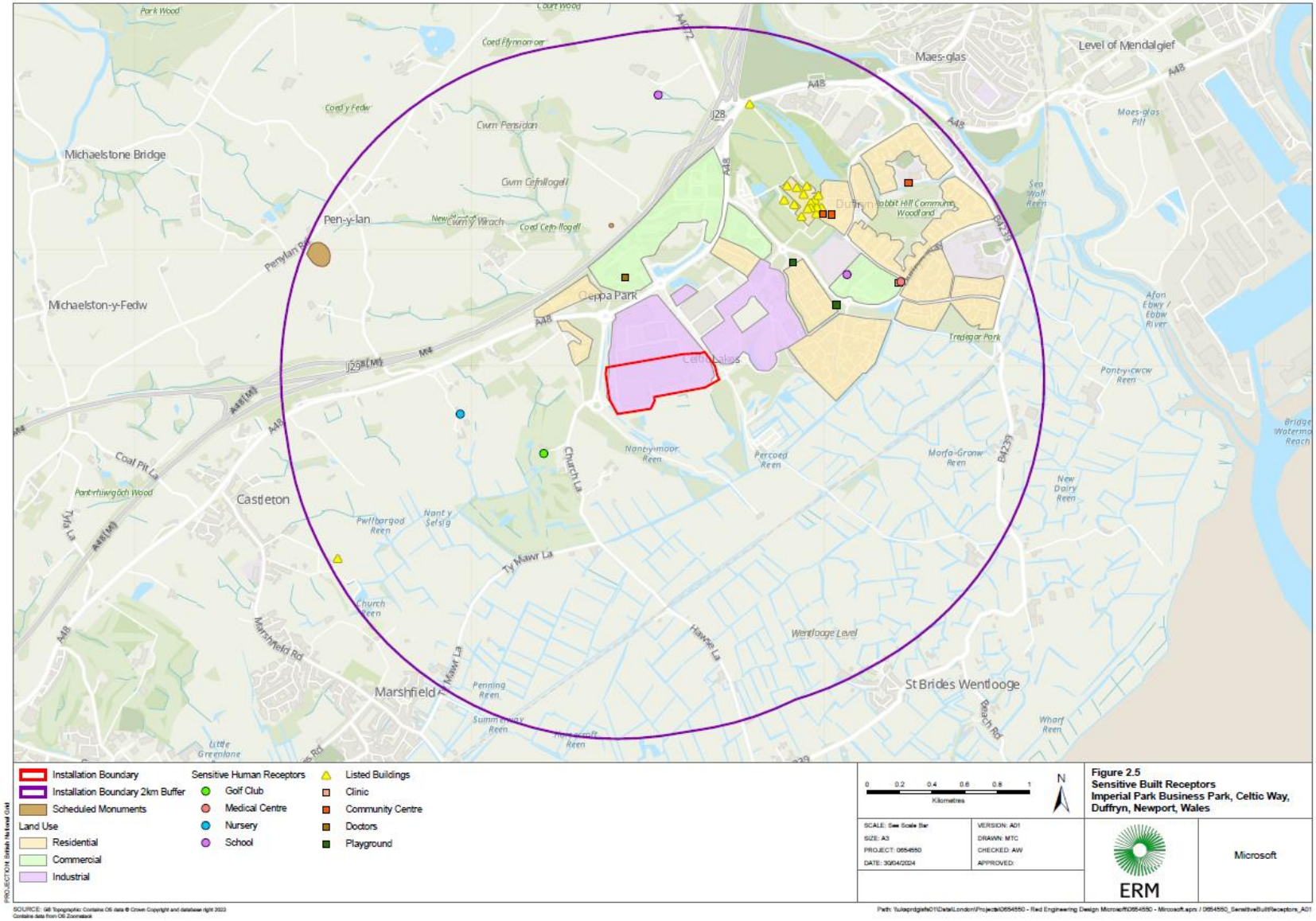


FIGURE 2.5 SENSITIVE BUILT RECEPTORS



3. SITE ACTIVITY

3.1 OVERALL SITE ACTIVITY

The overall commercial activity for the Site will be data storage. The proposed CWL01 and CWL02 data centre buildings are warehouse-style constructions, which will each contain data storage, internal and external ancillary equipment, including 31 diesel fuelled back-up generators. 28 of the back-up generators provide power to the data centre only in the event of grid supply failure and will be routinely tested to check their proper operation as per the test schedule in Table 3.3. All of the generators may also be operated for additional planned maintenance of which NRW will be informed of in advance. The two administrative building generators are used for the provision of for the provision of emergency back-up generation to fulfil the Site's non-data hall (server room) energy demand and one generator for the provision of emergency back-up generation to power the Site's water treatment plant. The administrative building generators and water treatment plant generators will only operate in the event of a loss of power from the mains incoming supply, and during routine maintenance testing to check their correct operation. There will also be two small diesel fuelled fire pumps, which are expected to have a rating of <1 MWth input each.

As the Site is being solely permitted for its combustion activities, this application focuses primarily on those operations. The activities related to the operation of the data centre itself (i.e. electronic equipment, cooling, etc.) are not included as they are not a listed activity as per EPR 2016. Each data centre will have the means of back-up power supply consisting of battery Uninterruptable Power Supplies (UPS) capable of maintaining data centre operations for several minutes before using the on-site generators for electrical power supply.

Layout drawings for the Site, including locations of generators, fuel storage and the wastewater treatment plant, are shown in Figure 3.1.

3.2 BACKUP GENERATORS

The site will be served by two incoming power supplies. A day one supply of 13 MVa will be provided by Scottish and Southern Energy (SSE), which will reuse the existing capacity of the 11kV supply. SSE has confirmed that this supply has capacity and will not add any additional pressure onto the local network. The day two supply will be a new supply from National Grid/SSE and fed from the Imperial Park substation. The day two supply will be at the 132 kV level and will provide approximately 92 MVa of capacity to the site. This connection will be a new supply and will be provided at the HV 132 kV level.

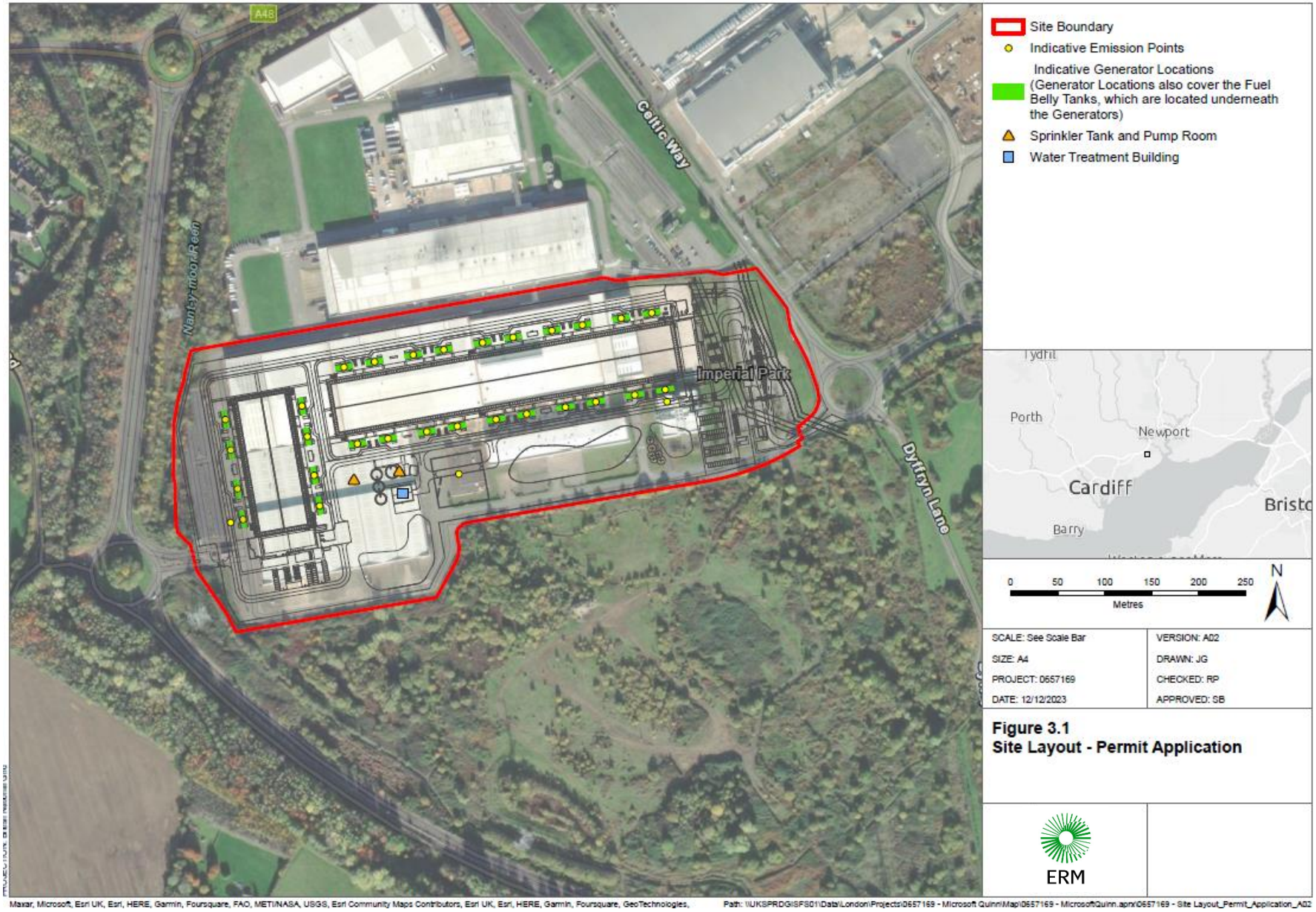
The data centres will be protected from short term brown-outs or black-outs by uninterruptable power supplies (UPS). These buffer small fluctuations in electrical supply. If the UPS detects power failure or extended reduced power, some, or all of the generators within the data centre will start automatically to begin generating sufficient electricity to match the load required by the data centre. The UPS can supply power for several minutes but ordinarily the generators would kick in well before this time elapses.

Details of the 28 new emergency back-up generators to be installed at the data centre are shown in Table 3.1. Included in this table are the other ancillary combustion plants including the two administrative building generators, water treatment plant generator and diesel fuelled fire pump.

TABLE 3.1: NEW GENERATORS TO BE INSTALLED ON THE SITE

Site	Engine / Purpose	Number of Generators	Individual Generator Output Rating (MVA)	Individual Generator Output ($MW_{e)}$	Individual Generator Input (MW_{th})	Total Input (MW_{th})
CWL01	CAT C175-20 (EM1361_07) / Emergency backup power for data centre	20	3.6	2.9	8.3	166.0
CWL02	CAT C175-20 (EM1361_07) / Emergency backup power for data centre	8	3.6	2.9	8.3	66.4
CWL01/02	CAT C18 (DM9822) / Emergency backup power to the administrative buildings	2	---	---	1.35	2.7
CWL01/02	CAT C13 (EM0425) / Emergency backup power to the water treatment plant	1	---	---	0.83	0.83
CWL01/02	Engine specifications will be known closer to construction / Firewater pump	2	Currently not available	Currently not available	Expected <1 each	Expected <1 each
Total		33				236.0

FIGURE 3.1: SITE LAYOUT DRAWING



3.3 SCR INSTALLATION

Microsoft is proposing to install SCR systems to the 28 generators serving the CWL01 and CWL02 data centres. The two administrative building generators and one water treatment plant generator will also be SCR abated. The reason for electing SCR systems to be installed to the generators is based on pre-application advise from the Local Authority, Newport City Council, during which Microsoft were advised that NO_x emissions from back-up generators should be abated due to their inherently high emission profiles, particularly of NO_x.

SCR is identified as BAT as per the most recent Data Centre FAQ Headline Approach, DRAFT version 21.0 to TechUK for Discussion 15/11/22 (Data Centre FAQ[2]) and LCP BREF – please refer to **Section 5** for the BAT assessment.

SCR works by reducing NO_x emissions by combining exhaust gases with Ad Blue (urea) and passing it over a catalyst. A chemical reaction occurs converting nitrogen oxides into nitrogen. Generators utilising the SCR system will have associated storage tanks for Ad Blue (see **Section 3.5.1** for further details on Ad Blue storage). **Table 3.2** shows the expected NO_x emission reduction performance of the selected SCR systems, as confirmed by the SCR supplier.

TABLE 3.2: EXPECTED SCR PERFORMANCE AND ABATEMENT EFFICIENCY

Site	Generators make/model	Unabated NOx emission rate (g/s)	SCR abated NOx emission (g/s) rate in accordance with original engine test conditions [1 hour, taking into account SCR warm-up]
CWL01	CAT C175-20 (EM1361_07)	11.5	2.349
CWL02	CAT C18 (DM9822, administrative building)	3.84	1.076
CWL02	CAT C175-20 (EM1361_07)	11.5	2.349
	CAT C18 (DM9822, administrative building)	3.84	1.076
Water Treatment Plant	CAT C13 (EM0425)	0.954	0.267

[2] In the absence of NRW's own specific guidance on data centre permitting, the EA's relevant sector and industry guidance has been considered. This guidance recognises SCR as to be BAT for the abatement of NO_x.

3.4 TESTING REGIME

All generators will be tested regularly to demonstrate that they can fulfil their back-up supply requirements. Microsoft has confirmed that the 28 emergency backup diesel generators, two administrative building generators and one water treatment plant generator will follow the same test regime. The testing regime is presented in **Table 3.3**. Scheduling of the test runs accounts for the potential effect on local air quality and has been designed to reduce any emissions resulting generator operations.

The test regime shown in Table 3.3 has been considered by the detailed air quality assessment conducted by ERM. Further details on the assessment of air quality impacts from the testing regime can be found in Section 11.

TABLE 3.3: TESTING REGIME FOR CWL01 AND CWL02

Type of test/ Frequency	Indicative Duration	Scheduling	Load
Monthly	15 minutes	Generators will be tested individually	No load (assessed at 30%)
Quarterly (three times year)	30 minutes	Generators will be tested individually	70% maximum
Annually	1 hour	Generators will be tested individually	100% maximum
Annually – power interruption test	1.5 hours	Generators will be tested individually	60% maximum
Every 5 years – USS Switchgear test	1.5 hours	Multiple generators at a time (assessed as all generators at the same time as worst-case scenario)	Variable (assessed at 60%)
Every 5 years – UPM Switchgear test	1.5 hours	Multiple generators at a time (assessed as all generators at the same time as worst-case scenario)	Variable (assessed at 60%)

3.5 FUEL STORAGE

Oil and fuel present onsite will be stored in belly tanks located underneath each of the 28 emergency back-up generators associated with the data centres. Each of these tanks are integrally bunded and has a capacity of 40,000 l. The two administrative building generators also have diesel belly tanks, these are sized 6,050 l. The water treatment generator has a standalone tank sized 4,000 l. The two diesel fuelled fire pumps will also have storage tank associated with them. The Site's aggregated fuel storage capacity is c. 1,136,100 l.

All bulk storage tanks for fuel are subject to the appropriate bunding and secondary containment as set out in the *CIRIA 736 (Containment systems for the prevention of pollution:*

Secondary, tertiary and other measures for industrial and commercial premises)[3] and the *Guidance on the Water Resources (Control of Pollution) (Oil Storage) (Wales) Regulations 2016*[4]. Where appropriate, bunds are installed that have 110% containment capacity of the primary container.

All belly tanks are fueled directly via remote filling points, which are located within bunded areas with isolated drainage.

Ahead of operation of the Site, Microsoft will develop Site specific fuel filling and emergency spill response procedures. For reference, a diesel filling procedure is defined and set out in Appendix A**,** this is an example procedure for another operational Microsoft data centre. Microsoft will also prepare an emergency response procedure in the event of a release of oil or diesel, and processes for the planning for such eventualities and to audit the response in case such an event occurs. An example spill procedure from another site is provided in Appendix B**,** for reference.

3.5.1 AD BLUE STORAGE

The SCR systems will utilise a series of above ground Ad Blue storage tanks, there will be 28 tanks associated with each generator, each sized c. 2,200 l useable. All bulk Ad Blue storage tanks will have suitable secondary containment installed including bunds with 110% containment capacity of the primary tanks, as appropriate.

The Site operatives will monitor the Ad Blue levels daily and visual inspections will be carried out when appropriate. The urea tanks are complete with a contents gauge, overfill and bund leak alarm.

When Ad Blue is delivered to Site, Microsoft expects contractors to be equipped with spill response equipment and to follow their own response plans. Any handling and storage of Ad Blue on Site will be maintained by Microsoft in accordance with the material safety data sheet (MSDS), see Appendix F for more information.

[3] CIRIA C732, available online here for free download: Item Detail (ciria.org)
[4] Guidance on the Water Resources (Control of Pollution) (Oil Storage) (Wales) Regulations 2016, available online here: oil-storage-regulations.pdf (gov.wales)

4. EMISSIONS

4.1 INTRODUCTION

The principal emissions from the Site will be the emissions to air from maintenance testing of the emergency back-up generators and fire pump. Actual emergency running of the generators is expected to be infrequent and routine testing is limited to the schedule outlined in **Table 3.3**.

4.2 EMISSIONS TO AIR

4.2.1 POINT SOURCE EMISSIONS TO AIR

The point source emissions to air from the data centres will be from the exhaust stacks associated with the generators. These point source emissions are identified in **Table 4.1** and the locations of each emission point are shown in **Figure 3.1.**

Air dispersion modelling has been undertaken by ERM to estimate how emissions from the generators may disperse in the surrounding environment, and to understand the significance of those emissions. More details can be found in **Section 11** and the air quality impact assessment report in **Appendix C.**

TABLE 4.1: POINT SOURCE EMISSIONS TO AIR

Data Centre	Emission Point ID	Emission Source	Use	Parameter	Limits
CWL01	CWL01_01 to CWL01_20	CAT C175-20 (EM1361_07)	Emergency back-up generation	NO_x, SO_2, CO, Particulates and ammonia	No limits set, backup generation only
CWL02	CWL02_01 to CWL02_08	CAT C175-20 (EM1361_07)	Emergency back-up generation	NO_x, SO_2, CO, Particulates and ammonia	No limits set, backup generation only
CWL01/02	CWL01_21 CWL02_09	CAT C18 (DM9822)	Emergency back-up generation	NO_x, SO_2, CO, Particulates and ammonia	No limits set, backup generation only
CWL01/02	CWL01/02_01	CAT C13 (EM0425)	Emergency back-up generation	NO_x, SO_2, CO, Particulates and ammonia	No limits set, backup generation only

Data Centre	Emission Point ID	Emission Source	Use	Parameter	Limits
CWL01/02	FP01 & 02	Two <1 MWth input fire pumps	Used to power fire pump in an emergency fire event	NO_x, SO_2, CO, Particulates	No limits set, backup generation only

4.2.2 FUGITIVE EMISSIONS TO AIR

There is a potential for localised fugitive emissions to air of hydrocarbon vapour from the diesel fuel storage tank breather vents.

4.3 EMISSIONS TO WATER

4.3.1 POINT SOURCE EMISSIONS TO SURFACE WATER

All surface water runoff from the Site is routed to a Sustainable Urban Drainage System (SuDS) which will remove relevant pollutants from the surface water runoff and discharge from the site. Once passed through the system, surface water runoff will discharge to the receiving environment – see Figure 4.1 for the indicative location of the discharge.

A monitoring station will be placed just upstream of the offsite discharge to monitor water quality and compliance with pollution control requirements.

Pinnacle Consulting Engineers Limited (Pinnacle) undertook a review of potential pollution risks on-site caused by surface water runoff to the SuDS system. Treatments used on-site include the use of permeable pavement; ponds to store surface drainage; and petrol interceptors, to filter out hydrocarbon contaminants. These mitigation measures are in place to maintain the total SuDS mitigation index (for each contaminant type) greater than or equal to their pollution hazard index. All SuDS features will be used for storage / treatment only to prevent contamination of local sensitive receptors due to the site's location in a SSSI and restrictions from Natural Resources Wales of infiltration in this zone.

4.3.2 FUGITIVE EMISSIONS TO SURFACE WATER

No material fugitive emissions to water are expected from the permitted activity.

The only anticipated, potentially significant fugitive emission to surface water from the permitted operation would be in the event of a leak or spill from the above ground fuel tanks or Ad Blue tanks.

The Site will develop emergency response procedures in place in the event of a release of oil, diesel, or Ad Blue, processes for the planning for such eventualities and checklists to audit the response in case such an event occurs. Example emergency procedures are provided in **Appendix B**.

All bulk fuel and Ad Blue storage tanks will be contained within bunds that can contain 110% of their maximum capacity. Any water that accumulates in external bunds is to be tested prior to discharge into rainwater drains. Any contaminated water will be removed using a vacuum

pump and recycled or disposed using an appropriate waste disposal company. The Site consists of hardstanding in good condition both inside and outside of the building.

EMISSIONS TO SEWER

4.3.3 FUGITIVE EMISSIONS TO SEWER

No fugitive emissions to sewer are expected from the permitted activity.

The only anticipated, fugitive emission to sewer from the permitted operation would be in the event of a leak or spill from above ground fuel tanks or Ad Blue tanks entering the foul drainage system.

The drainage plans are presented in Appendix E. The tanks will be equipped with leak detection systems, secondary containment and will be inspected daily.

4.4 EMISSIONS TO LAND AND GROUNDWATER

4.4.1 POINT SOURCE EMISSIONS TO LAND AND GROUNDWATER

There are no point source emissions to land and groundwater expected as part of this permit application.

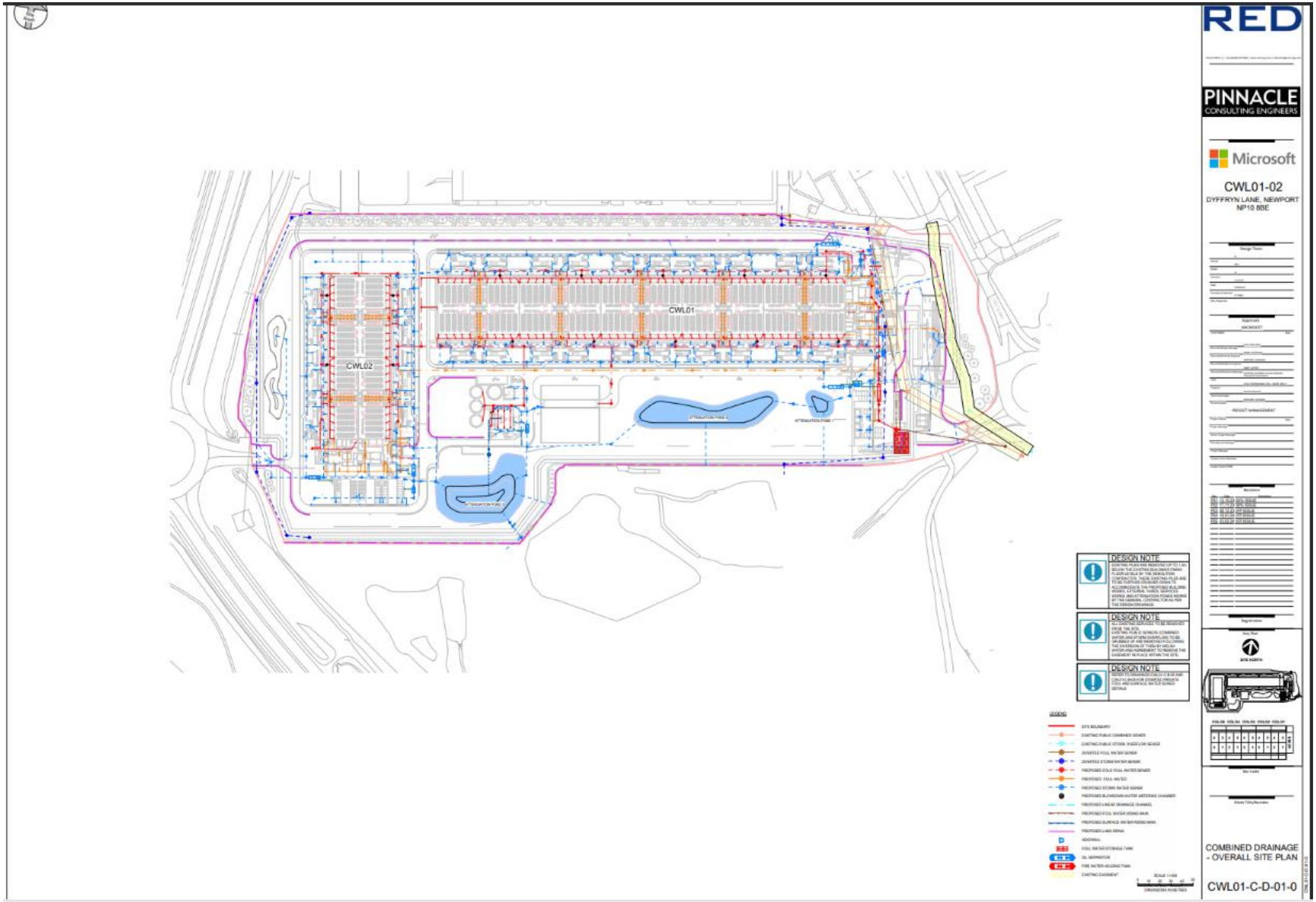
4.4.2 FUGITIVE EMISSIONS TO LAND AND GROUNDWATER

The key potential for any fugitive emissions to land and groundwater would be in the event of a leak or spill from the on-site above ground fuel and Ad Blue storage tanks. Microsoft will prepare site specific emergency response procedure in place in the event of a release of oil or diesel, and processes for the planning for such eventualities and to audit the response in case such an event occurs. Example procedures are provided in **Appendix B**, for reference.

Refer to **Section 3.5** and **Section 3.5.1** for further details on the bulk storage tanks and associated containment measures to abate fugitive emissions from these systems to land and groundwater.

All surface water runoff from the Site is routed to a Sustainable Urban Drainage System (SUDS) – see description provided in **Section 4.3.1.** Microsoft considers the use of the SUDS system means there is low risk of fugitive emissions to land and groundwater.

FIGURE 4.1 - SITE DRAINAGE



5. OPERATING TECHNIQUES

5.1 APPLICABLE TECHNICAL STANDARDS

To demonstrate that the site will operate using Best Available Techniques (BAT) for the relevant permitted activities proposed at the site, a review of the European Commission's relevant BAT Reference Documents (BREFs) has been carried out. In addition the relevant sector Technical Guidance Notes (TGN) and industry guidance has also been reviewed. The documents reviewed are:

- Data Centre FAQ, 15/11/2022-DRAFT version 21.0 to TechUK for Discussion presented in Table 5.1;
- Best Available Techniques (BAT) Reference Document for Large Combustion (LCP) plants, 2017 presented in Table 5.3;

At present, the Data Centre FAQ, dated November 2022, is not an official release, but forms the basis for discussion of a common methodology and liaison with individual operators and their industry association. For this application and the selected abatement, this guidance is considered to represent the current EA position of BAT for data centre back-up generation systems. In the absence of NRW's own published data centre guidance, it is Microsoft's expectation that this guidance is considered applicable in Wales.

It is noted that the Site does not contain any Large Combustion Plants (LCP) under the meaning of Chapter III of the Industrial Emissions Directive (2010/75/EU). The LCP BREF has therefore been reviewed for general measures appropriate to data centres.

The individual generators at the Site meet the definition of Medium Combustion Plant (MCP) under the meaning of the Medium Combustion Plant Directive (2015/2193/EU) (MCPD), being in the 1-50 MWth size range. The Medium Combustion Plant Directive states: *(19) In order to take account of certain specific circumstances where the application of emission limit values would lead to disproportionately high costs compared to the environmental benefits, Member States should be able to exempt medium combustion plants used in cases of emergency and operated during limited time periods from compliance with the emission limit values set out in this Directive.* For this reason, the generators are considered MCPs but do not have to comply with emission limit values due to their limited operating hours of less than 500 hours per year.

5.2 OPERATING TECHNIQUES REVIEW TABLES

Each of the documents considered above are presented in tabular form on the following pages. Best Available Techniques that are not considered applicable are greyed out.

TABLE 5.1: DATA CENTRE FAQ HEADLINE APPROACH, 2022

	EA Summary Requirement	Microsoft Response
1	We accept that oil fired diesel generators are presently the default technology for standby generators in data centres. However, the permit application still requires a BAT discussion detailing the choice of engine, the particular configuration and plant sizing meeting the standby arrangement (e.g. 2n). But TBC there are now site-specific issues where abatement (SCR) is now the default for new plant – see the details in the text.	The proposed CWL01 and CWL02 data centres will work to a 3n+1 standby arrangement, where n is the load requirement of the data centre. The 28 new engines associated with the data centre activities, will have emissions which meet the TA Luft 2g standard with SCR abatement. Dispersion modelling (see ***Section 11***), indicates that predicted impacts on air quality from the testing regime are not expected to exceed the air quality standards
2	Standby engine capacities are added together in MWth input at the quoted standby rating, being usually 110% of the continuous rating (if >=50MWth the site then needs an EA 1.1A Combustion Activity EPR permit).	The proposed capacity of the Site's generators is in excess of 50 MWth, therefore an S1.1 combustion activity EPR permit is required.
3	If precise MWth figures are unavailable and spec sheets or face-plates are unclear, the calculation for MWth derived from MVA output is based on: power factor 0.8 and an assumed poor conversion efficiency of 0.35 for MWth to MWe e.g. 3MVA = (3*0.8)/0.35 = 6.86MWth.	See **Table 3.1**. This methodology has been followed. The MWe outputs quoted are assumed to include power factor correction from MVA. MWth figures are not generally available from generator manufacturers. Where generators have a power rating of <5MW such as for the generators proposed for CWL01 and CWL02 an efficiency of 35% was used.
4	The sum of generator plant capacities is based only on MWth inputs of all plant regardless of the standby configuration. MWe output constraints such as realistic customer load or other practical output limiting factors do not constitute a limit to the MWth input as defined in the EA's guide RGN02.	As noted above, the proposed capacity is over 50 MWth, irrespective of calculation methods.

	EA Summary Requirement	Microsoft Response
5	Proximity of data centres with a company campus, adjacent, neighbouring or close-by buildings in urban locations (e.g. within a common trading estate but only separated by a road width or notional distance) may constitute a single site for determining the boundary of the installation as 'same site – same operator' as per RGN02 – see the details in the text	The CWL01 and CWL02 data centres will occupy separate buildings, however they will operate under a Site permit. The air quality assessment considers emissions from both data centres' generators.
6	Permits will include a maximum 500 hour 'emergency/standby operational limit' for any or all the plant producing on-site power under the limits of the combustion activity; and thereby emission limit values ELVs to air (and thus engine emissions monitoring) are not required within the permit.	See **Table 3.3** for testing durations. Rounding up the total duration of testing for the whole of CWL01 and CWL02 for all 28 generators equals approximately a total operational time of 168 hours per year (6 hours/per annum per generator). Emergency operation is expected to be infrequent and is not anticipated to exceed 500 hours.
7	Emergency hours' operation includes those unplanned hours required to come off grid to make emergency repair of electrical infrastructure associated but occurring only within the data centre itself.	Noted.
8	Each individual generator with its own discharge stack, can be maintained, tested and used in a planned way for up to 500 hours per calendar year each without ELVs (and hence no monitoring) under IED/MCPD. Though clearly the EA expects planned testing and generator operations to be organised to minimise occasions and durations (subject to client requirements). Ideally a target should seek to keep individual generator testing to below 50 hours/annum each. Accepting <50hours/gen/annum as a default upper limit for bespoke large data centres, the EA regards a BAT aspiration to aim for a more routine 1hour/month per generator.	Individual generator run times are expected to be under 50 hours per year. Each generator is expected to be tested for about 6 hours each per year as detailed in **Table 3.3**. The generators do not meet the definition of a specified generator under MCPD.
9	In summary 7, & 8 means the whole or part site can only operate as emergency plant up to 500 hours as an absolute limit for grid backup issues;	Noted. See **Table 3.3** for details of the maintenance testing regime and durations.

	EA Summary Requirement	Microsoft Response
	but that individual plant (at any load) with its own stack (or a stack with multiple plant) with justification can be operated for up to 500 hours (ideally <50) each as part of its non-emergency role under maintenance and testing.	
10	For the purposes of determining operating hours, data centre diesel generators are regarded as having a minimal start-up or shut-down times. Operational hours start on the first fuel ignition.	This has been assumed in the air quality assessment found in **Appendix C.**
11	Data Centre permits (unless they apply and justify it in a permit application) will expressly have a limit on the activity to exclude voluntary 'elective power operation' such as demand side response (i.e. on-site use) or grid operating reserve (STOR) (i.e. off-site export of electricity) and Frequency Control by Demand Management (FCDM) for grid support. This is primarily to differentiate data centres from 'diesel arrays or MCPD specified generators' that voluntarily operate within the balancing market, and importantly a clear way to demonstrate minimisation of emissions to air as 'Emergency plant'.	No voluntary elective power operation for on-site use, STOR or FCDM is proposed.
12	The default engine specification as a minimum for new plant to minimise the impacts of emissions to air (NOx) is 2g TA-Luft or EPA Tier 2 or equivalent standard A detailed cost benefit analysis (CBA) is otherwise needed existing, old plant justifying worse emission such as 4g TA-Luft plant or for example a justification under FCDM. TBC There are now site specific issues where abatement (SCR) is the default for new plant – see details in the text.	The proposed CWL01 and CWL02 data centres will work to a 3n+1 standby arrangement, where n is the load requirement of the data centre. The 28 emergency backup generators (excl. admin and water treatment generators), will have emissions which meet the TA Luft 2g standard with SCR abatement. Dispersion modelling (see Section 11), indicates that predicted impacts on air quality from the testing regime are not expected to exceed the air quality standards

	EA Summary Requirement	Microsoft Response
13	CBA for improved exhaust emissions, dispersion and mitigations from the plant is expected for the maintenance/testing and the emergency standby roles. We would be looking for improvements particularly if Local Air Quality (LAQ) modelling (under H1) indicates anything other than an insignificant contribution to short term local air quality for the 'planned' maintenance emissions of the plant.	An air dispersion model has been prepared to assess the impact of the Site's air emissions (**Section 11**). The detailed report is presented in **Appendix C.**
14	Retrofit abatement techniques for existing installations for engine emissions such as selective non-catalytic or catalytic reduction (SNCR or SCR) would not normally be expected for standby plant to mitigate the emissions for standby/emergency operation. BAT might include improved flue gas dispersion (e.g. stack modifications, increased height) or improved low NOx engine management controls or possibly fuel choice.	SCR systems are being proposed for the 28 data centre generators.
15	Operations and management procedures should reflect the outcomes of the air quality modelling by minimising the duration of testing, phasing engines into subgroups, avoiding whole site tests and planning off-grid maintenance days and most importantly times/days to avoid adding to "at risk" high ambient pollutant background levels.	The site operates to a test schedule that is designed to reduce potential for impact. See **Table 3.3**.
16	When AQ modelling the emissions from the engines, the certified technical standard provided by the manufacturer should be used (i.e. likely worst case emissions). However any 'fit for purpose' monitoring of the actual emissions from installed plant will be considered as evidence of the likely real impacts as part of the permitting decision process.	Anticipated 'worst case' emissions have been used for modelling.
17	The groundwater monitoring of fuel storage tanks and distribution pipework using GW boreholes is risk based for the site condition report (SCR) and IED 5-yearly monitoring. Should GW monitoring be required for underground tanks and/or the SCR, the boreholes should be positioned for whole site	Microsoft does not operate or plan to operate underground storage tanks for fuel oil and consider that their operational approach to prevention of releases to land minimises this risk to site condition.

	EA Summary Requirement	Microsoft Response
	surveillance (for the SCR) rather than as a very local control immediately around the buried fuel oil tanks (i.e. not be just an addition to double skinned tanks already protected by leak detection and hence ignoring distribution pipework etc.).	Details of the site condition report can be found in Appendix D.
18	5-yearly GW sampling & 10-yearly soil sampling under IED is normally not needed but still needs some justification.	5 yearly GW and 10 yearly repeat soil sampling is not considered warranted on the basis of the nature of the permitted operation and its low potential for emissions to land.
19	The permit application must assess and provide evidence of actual reliability data for the local electricity grid distribution (including data centre internal electrical design) for the EA to judge the realistic likelihood of the plant needing to operate for prolonged periods in an emergency mode (especially if emissions model so as to exceed short term air quality standards).	The Site is not expected to operate for a prolonged period in emergency mode. The extent of back-up power generation capacity and fuel storage reflects the Microsoft business model of providing customers with a very high assurance of continuity, not an expectation of loss of grid supply in practice. The site will be served by two incoming power supplies. A day one supply of 13 MVa will be provided by Scottish and Southern Energy (SSE), which will reuse the existing capacity of the 11 kV supply, SSE has confirmed that this supply has capacity and will not add any additional pressure onto the local network. The day two supply will be a new supply from National Grid/SSE and fed from the Imperial Park substation. The day two supply will be at the 132 kV level and will provide approximately 92 MVa of capacity to the site. This connection will be a new supply and will be provided at the HV 132 kV level. See **Section 3.2** for details of measures in place to protect against the need for emergency operation of the generators.
20	Optimising grid reliability within the site as part of general BAT to minimise emergency operating hours is required – evaluation is needed within the permit application on the Tier reliability standard under ISO27001 and Uptime.	Microsoft does not subscribe to Uptime Institute Tier levels, the equivalent is the IEEE Gold book for Failure rate Data. The design to Five-9's (99.999% availability of power from the utility supplier) does

	EA Summary Requirement	Microsoft Response
		not include for human error or downtime for maintenance and is a calculation from grid to rack level including the use of generators
21	Reporting of standby engine operational run hours and discussion of any electrical outages (planned or grid failures regardless of duration) required annually.	Microsoft notes that this is the expectation for annual reporting to NRW.
22	AQ modelling for permitting split into two parts: 1) for the routine planned testing regime , including scheduled on-load use supporting maintenance works like UPS or HV – if no other details are known the default is 50 hours/gen/year; Commissioning of significant new plant may be included or possibly assessed separately as a 'one off' under a permit 'pre-op condition A prolonged reasonable maximum full load outage (so accepting not all installed engines will run) which the default is assumed 72 hours. Looking at ambient AQ and potential areas for Acute exposure (AEGL).	The test regime, as defined in **Table 3.3**, has been considered in the AQ modelling assessment. Microsoft acknowledges that should any planned works that are additional to this test regime be required during the operational phase of the permit, then specific permission is to be sought from NRW for approval on a per-event basis. The AQ model also considers a 1-hour long emergency scenario in the unlikely event that the incoming power supply fails – this is considered a reasonable worst case.
23	Assuming AQ modelling, based on operating scenarios, indicates a local air quality risk then notification to the EA of unplanned (and pre-notification of planned) continuous grid outage exceeding 18 hours LAQM (or the otherwise assessed short term interval from modelling) is likely required under a permit schedule 5 notification.	Microsoft will notify NRW of any planned or unplanned interruptions to both the grid supplies relating to CWL01 and CWL02. In the event of emergency operations, the Site will develop an AQMP to assess the potential air quality impact from the prolonged operations of the generators.
24	The notification requirement stated in the permit should also indicate the actual number of generators that need to be operating above which the local air quality is at risk e.g. 'notification of continuous emergency operation exceeding 18 hours with 5 or more engines operating together is required' (i.e. model shows 4 or less engines unlikely to breach LAQ)	As above Microsoft will notify NRW of any planned or unplanned interruptions to both the grid supplies relating to CWL01 and CWL02. In the event of emergency operations, the Site will develop an AQMP to assess the potential air quality impact from the prolonged operations of the generators.

	EA Summary Requirement	Microsoft Response
25	Assuming AQ modelling, based on emergency outage operating scenarios, indicates a very significant risk to local air quality and identified receptors, the EA will ask the operator to have a written action plan to manage the issue for prolonged emergency running of the plant (including sensitive receptors list and mitigations, assessments and impacts evaluation against modelled risk conditions i.e. occurrence at periods of most concern in the year, possibly ambient air monitoring surveillance at very sensitive receptors). An AQ outage action plan is also likely required for sites which might operate in conjunction with other neighbouring large sites during an outage i.e. data centre hubs. A template AQMP is available.	An Air Quality Management Plan (AQMP) will be prepared and made available to NRW as requested by any relevant improvement conditions in the final EP once issued.
26	Due to the emphasis of the permit on electrical (and cooling) systems it is noted that the EA considers the F-Gas regulations as falling under the remit of the EPR permit (for notifications and management) where F-gases (or potentially any polluting potential substance) are used directly under the combustion aspects of the permitted activity (e.g. switchgear). It is important to notify the EA of any significant releases. Other uses of F-gases e.g. for server room cooling are not strictly under the EA permit but are regulated by the EA generally so it may still be prudent to make the EA aware of your F-gas releases.	The emergency electrical generation systems will not have gas cooling. Cooling gases are used exclusively for server room cooling.
27	The permit application should detail the likely quantities of waste engine oil generated annually – EWC 13 02 waste oils following servicing for example. Although unlikely to be huge, the Pollution inventory has a reporting threshold of 1 tonne for non-hazardous waste but technically no lower thresholds for hazardous waste oil.	Any waste that is generated from permitted activities will be stored and handled appropriately considering “duty of care.”

	EA Summary Requirement	Microsoft Response
28	The permit application is for the combustion plant and associated environmental concerns and not for the Data Centre itself. The applicant should be aware that the permitting process and application is accessible to the public so should have regard to 'Commercial in Confidence' and Critical National Infrastructure. In the first instance discuss particular concerns directly with the EA and/or exclude such priority information from the application but indicate that such is 'available on request'.	Noted.

TABLE 5.2: MEDIUM COMBUSTION PLANT AND SPECIFIED GENERATOR REGULATIONS GUIDANCE, UPDATED 27 MARCH 2023

Key Definitions and Scope		Comments
Excluded Generators	Excluded Generators are generators that are exempt from Schedule 25B of the Permitting Regulations. Excluded generators are not included when determining capacity of the permitted specified generator site. Excluded generators are those that meet the following condition – Are part of an IED installation under Chapter II or III. BAT applies to these installations so air quality is protected. It should be noted that a generator which is a Part B (1.1 or 5.1) or permitted Waste Facility (Small Waste Incineration Plant, SWIP) is not excluded. Have a defined nuclear safety role under a nuclear site licence issued by the Office for Nuclear Regulation. Emergency 'backup generators' (see definition below) that are not tested for more than 50 hours a year each. Data centres that use an on-site emergency backup generator when the transmission frequency is unstable are excluded. Are operated offshore	The Site's generators that will serve the data centres as emergency 'backup generators' are not individually tested for more than 50 hours a year each. The two administrative generators will also serve as emergency backup only and be tested for no more than 50 hours per year each.

Key Definitions and Scope		Comments
	Generators installed on a gas storage or unloading platform (as defined in Regulation 2 of the Offshore Combustion Installations (Pollution Prevention and Control) Regulations 2013.	
Backup Generator	Means a generator that is operated for the sole purpose of providing power at a site during an onsite emergency from the 1 January 2019. Balancing Services, and Demand Side Response operations, whether procured or not, such as Triad Avoidance or Fast Frequency Response are not on site emergencies and a generator that provides these services is not excluded.	The Site's generators that will serve the data centres as emergency 'backup generators' are not individually tested for more than 50 hours a year each.
Emergency Operation	There is no restriction on the total operating hours in the event of an onsite emergency. However operators should make best endeavours to reduce the period and frequency of emergencies. Similarly there is no restriction on the hours of operation by 'black start' backup generators.	The site will be served by two incoming power supplies. A day one supply of 13 MVa will be provided by Scottish and Southern Energy (SSE), which will reuse the existing capacity of the 11kV supply, SSE has confirmed that this supply has capacity and will not add any additional pressure onto the local network. The day two supply will be a new supply from National Grid/SSE and fed from the Imperial Park substation. The day two supply will be at the 132 kV level and will provide approximately 92 MVa of capacity to the site. This connection will be a new supply and will be provided at the HV 132 kV level. Off grid operation is anticipated to be limited due to the resilience provided by the multiple incoming power suppliers.
Testing Backup Generators	Operators must not carry out more than 50 hours testing a year for each backup generator. Operators must get agreement in writing from your regulator if you want to increase this limit. The regulator can exclude commissioning time within the written agreement. For each backup generator, operators must record the number of hours you test	The testing regime is described in **Section 3.4**. The Site's generators that will serve the data centres as emergency 'backup generators' are not individually tested for more than 50 hours a year each.

Key Definitions and Scope		Comments
	during the year. This is to demonstrate that you meet the exclusion criteria. If the limit of 50 hours testing a year is exceeded without written agreement the regulator will take appropriate enforcement action.	Microsoft will continue to record, for each generator/data-centre as applicable: ▪ Number of test/maintenance running hours per year; ▪ Number of emergency generation events and running hours – per year; and ▪ Quantity and type of backup generation fuel used over the period.
Best practices in testing Backup generators	Operators should aim to minimise the environmental impact from emissions to air wherever feasible when testing emergency backup generators. The regulators considers the following are best practice: With multiple backup engines, testing should be staggered. The period and frequency of testing should be kept to the minimum sufficient to demonstrate the reliability at the appropriate load. Testing should be scheduled to periods when ambient background NOx can be expected to be low i.e. not during peak traffic periods. It is considered appropriate to utilise the electricity generated during testing for onsite use. Good practice when installing backup generators include the careful placement away from sensitive receptors, exhaust flues terminating vertically without obstructions to increase dispersion and not below residents windows or venting onto car parks etc.	The testing regime is described in **Section 3.4.** The Site's generators that will serve the data centres as emergency 'backup generators' are not individually tested for more than 50 hours a year each.

TABLE 5.3: BEST AVAILABLE TECHNIQUES (BAT) REFERENCE DOCUMENT FOR LARGE COMBUSTION PLANTS, 2017

Section	Subsection	BAT #	BAT Text	Requirements	Comment
General BAT Conclusions	Environmental Management System EMS	BAT 1	In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates the features presented in the BREF.	See BREF for detailed requirements	Microsoft will update their EMS to include the new Sites. The EMS is aligned to the principles of ISO 14001 – see **Section 6.**
	Monitoring	BAT 2	BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load (1), according to EN standards, after the commissioning of the unit and after each modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	(1) In the case of CHP units, if for technical reasons the performance test cannot be carried out with the unit operated at full load for the heat supply, the test can be supplemented or substituted by a calculation using full load parameters	As the 31 new generators rated above 1 MWth will be considered individually to be medium combustion plant and for the purpose of emergency generation, they are only required to comply with the MCPD requirements for monitoring instead of LCP BREF.
	Monitoring process parameters for emissions to air and water	BAT 3		▪ Fuel gas - Flow - Oxygen content, temperature and pressure	Normal operating conditions for the data centre will be grid supply of electricity. As Other than Normal Operating Conditions (OTNOC) conditions will occur only in an

Section	Subsection	BAT #	BAT Text	Requirements	Comment
				- Water vapour content ▪ Waste water from flue-gas treatment	emergency situation, there is no opportunity to schedule monitoring. To monitor during testing regimes would extend the running period of engines, thus worsening any air quality impact they may have. Not required to monitor as MCP. See BAT2 above, i.e. is required to comply with MCPD requirements only.
	Monitoring of emissions to air	BAT 4	BAT is to monitor emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	▪ NH3 ▪ NO2 ▪ N2O ▪ CO ▪ SO2 ▪ SO3 ▪ Gaseous chlorides ▪ HF ▪ Dust ▪ Metals and metalloids ▪ Hg ▪ TVOC	As the 30 new generators rated >1 MWth input are each considered individually to be medium combustion plant and for the purpose of emergency generation, they are only required to comply with the MCPD requirements for monitoring instead of LCP BREF.

Section	Subsection	BAT #	BAT Text	Requirements	Comment
				▪ Formaldehyde ▪ CH4 ▪ PCDD/F	
	Monitoring emissions to water from flue-gas treatment	BAT 5			No flue-gas treatment
	General environmental and combustion performance	BAT 6	In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given below.	Techniques: ▪ Fuel blending and mixing ▪ Maintenance of the combustion system ▪ Advanced control system ▪ Good design of the combustion equipment ▪ Fuel choice	Microsoft has a preventative maintenance regime, which includes maintenance and good design of the combustion equipment to deliver the requirement of an emergency back-up generator.
	General environmental and combustion performance	BAT 7	In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NOx emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NOx ratio, homogeneous reagent distribution and optimum size of the reagent drops).		SCR systems will be used, see S**ection 3.3** for further details.

Section	Subsection	BAT #	BAT Text	Requirements	Comment
		BAT 8	In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	(No requirements specified)	Emissions reduction for the data centre will include the testing generators individually as much as possible and limiting monthly tests to 15 minutes per generator and quarterly tests to 30 minutes. Details of the testing regime can be found in **Table 3.3**.
		BAT 9	In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the following elements in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1):	Initial full characterisation of the fuel used including at least the parameters listed below and in accordance with EN standards. ISO, national or other international standards may be used provided they ensure the provision of data of an equivalent scientific quality; Regular testing of the fuel quality to check that it is consistent with the initial characterisation and according to the plant design specifications. The	Fuel will be ultra-low - sulphur diesel from commercial supply. Usage will be low due to normal operations for the data centres being powered by grid supply. As a result the fuel selected is optimal for the use intended, i.e. emergency supply.

Section	Subsection	BAT #	BAT Text	Requirements	Comment
				frequency of testing and the parameters chosen from the table below are based on the variability of the fuel and an assessment of the relevance of pollutant releases (e.g. concentration in fuel, flue-gas treatment employed); Subsequent adjustment of the plant settings as and when needed and practicable (e.g. integration of the fuel characterisation and control in the advanced control system.	
		BAT 10	In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases, that includes the following elements:	▪ Appropriate design of the systems considered relevant in causing OTNOC that may have an impact on emissions to air, water and/or soil (e.g. low-load design concepts for reducing the minimum start-up and	Normal operating condition for the data centres will be grid supply of electricity. In the event of emergency generation being required, the number of running hours

Section	Subsection	BAT #	BAT Text	Requirements	Comment
				shutdown loads for stable generation in gas turbines) ▪ Set-up and implementation of a specific preventive maintenance plan for these relevant systems; ▪ Review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary; ▪ Periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary	will be recorded and reported to NRW.
		BAT 11	BAT is to appropriately monitor emissions to air and/or to water during OTNOC	The monitoring can be carried out by direct measurement of emissions or by monitoring of surrogate parameters if this proves to be of equal or	Normal operating conditions for the data centres will be grid supply of electricity. As Other than Normal

Section	Subsection	BAT #	BAT Text	Requirements	Comment
				better scientific quality than the direct measurement of emissions. Emissions during start-up and shutdown (SU/SD) may be assessed based on a detailed emission measurement carried out for a typical SU/SD procedure at least once every year, and using the results of this measurement to estimate the emissions for each and every SU/SD throughout the year.	Operating Conditions (OTNOC) conditions occur in an emergency situation, there is no opportunity to schedule monitoring of emergency operations. Monitoring of the testing regime is as per BAT2 above, i.e. is required to comply with MCPD requirements only.
	Energy Efficiency	BAT 12	In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated ≥ 1 500 h/yr, BAT is to use an appropriate combination of the techniques given below	*Techniques* ■ Combustion optimisation ■ Optimisation of the working medium conditions ■ Optimisation of the steam cycle ■ Minimisation of energy consumption ■ Preheating of combustion air ■ Fuel preheating ■ Advanced control system	Not applicable. The engine/generator sets will provide backup generation only and do not run for >1,500 hr/yr.
	Water usage and emissions to water	BAT 13 - 15			Water usage on site is regularly reviewed to check efficient use.

Section	Subsection	BAT #	BAT Text	Requirements	Comment
				Feed-water preheating using recovered heat ▪ Heat recovery by cogeneration (CHP) ▪ CHP readiness ▪ Flue-gas condenser ▪ Heat accumulation ▪ Wet stack ▪ Cooling tow er discharge ▪ Fuel pre-drying ▪ Minimisation of heat losses ▪ Advanced materials ▪ Stream turbine upgrades ▪ Supercritical and ultra-supercritical steam conditions	
	Waste Management	BAT 16	In order to reduce the quantity of waste sent for disposal f rom the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking:	Techniques: ▪ Generation of gypsum as a by product ▪ Recycling or recovery of residues in the construction sector	Waste produced by the permitted activity will be managed by subcontractors. If left over a long period of time, the fuel in the storage tanks may

Section	Subsection	BAT #	BAT Text	Requirements	Comment
			(a) waste prevention, e.g. maximise the proportion of residues which arise as by-products; (b) waste preparation for reuse, e.g. according to the specific requested quality criteria; I waste recycling; (d) other waste recovery (e.g. energy recovery)	▪ Energy recovery by using waste in the fuel mix ▪ Preparation of spent catalyst for reuse	degrade. Once a year, a subcontractor will attend site and access each fuel tank analysing the quality of the fuel. Depending on the results, they will undertake fuel polishing improving its quality, taking any waste diesel off -site with them. Mineral lube oil is also brought and taken off site by the subcontractor changing the oil.
	Noise Emissions Flaring	BAT 17	In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below .	Techniques ▪ Operational measures ▪ Low -noise equipment ▪ Noise attenuation ▪ Noise-control equipment ▪ Appropriate location of equipment and buildings	See details in **Section 10**.
BAT conclusions for the combustion of solid fuels	BAT conclusions for the combustion of coal and/or lignite BAT Conclusions for the combustion of solid biomass and/or peat	BAT 18 – 23 BAT 24 – 27			Not applicable

Section	Subsection	BAT #	BAT Text	Requirements	Comment
BAT conclusions for the combustion of liquid fuels	HFO- and/or gas-oil-fired boilers	BAT 28 – 30			Not applicable
	HFO- and/or gas-oil-fired engines Energy efficiency	BAT 31	In order to increase the energy efficiency of HFO and/or gas oil combustion in reciprocating engines, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.	*Techniques* ▪ Combined cycle	The purpose of the diesel generators is for emergency supply only. There is no opportunity for combined cycle operation.
	HFO- and/or gas-oil-fired engines NOx, CO and volatile organic compound emissions to air	BAT 32	In order to prevent or reduce NOx emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.	*Techniques* ▪ Low -NOx combustion concept in diesel engines ▪ Exhaust-gas recirculation (EGR) ▪ Water/steam addition ▪ Selective catalytic reduction (SCR)	SCR systems will be used, see **Section 3.3** for further details
		BAT 33	In order to prevent or reduce emissions of CO and volatile organic compounds to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or both of the techniques given below.	*Techniques* ▪ Combustion optimisation ▪ Oxidation catalysts	The purpose of the diesel generators is for emergency supply only. Combustion is optimised for this purpose. As the engines are considered individually to be medium combustion plant and for the purposes of emergency generation, they are not

Section	Subsection	BAT #	BAT Text	Requirements	Comment
					required to comply with emission limits in the MCPD.
	HFO- and/or gas-oil-fired engines SOx, HCl and HF emissions to air	BAT 34	In order to prevent or reduce SOX, HCl and HF emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.	Techniques ▪ Fuel choice ▪ Duct sorbent injection (DSI) ▪ Wet flue-gas desulphurisation (wet FGD)	Ultra-low -sulphur fuels as a primary source. Ultra-low -sulphur diesel is specified for purchase. Actual annual purchase will be very low. As the engines are considered individually to be medium combustion plant and for the purpose of emergency generation, they are not required to comply with emission limits in the MCPD.
	HFO- and/or gas-oil-fired engines Dust and particulate bound metal emissions to air	BAT 35	In order to prevent or reduce dust and particulate-bound metal emissions from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.	Techniques ▪ Fuel choice ▪ Electrostatic precipitator (ESP) ▪ Bag filter	As the engines are considered individually to be medium combustion plant and for the purposes of emergency generation, they are not required to comply with emission limits in the MCPD.
	Gas-oil-fired gas turbines	BAT 36 – 40			Not applicable
10.4 BAT conclusions for the		BAT 40 – 54			Not applicable

Section	Subsection	BAT #	BAT Text	Requirements	Comment
combustion of gaseous fuel					
10.5 BAT conclusions for multi-fuel-fired plants		BAT 55 – 59			Not applicable
10.6 BAT conclusions for the co-incineration of waste		BAT – 0 - 75			Not applicable

6. ENVIRONMENTAL MANAGEMENT SYSTEMS

6.1 ISO 14001

Microsoft operates environmental management system (EMS) aligned to the principles of ISO 14001. The EMS will be reviewed and updated to include the Site once operational. Microsoft will also review and update their EMS so that it considers a Climate Change Risk Assessment (CCRA), as required by gov.uk online guidance[5].

6.2 SUMMARY OF MICROSOFT ENVIRONMENTAL MANAGEMENT SYSTEM

The following is a summary of the contents of the Microsoft EMS. Further detail on any aspect is available on request. As above, the EMS will be edited to include a CCRA once the Site is operational.

Contents

[5] Climate change: risk assessment and adaptation planning in your management system - GOV.UK (www.gov.uk)

7. WASTE MANAGEMENT

7.1 WASTE GENERATION

Minimal waste is expected to be generated because of this EP application. Waste generated from the permitted activities will be mainly waste lubricating oil and diesel fuel waste.

Waste oil will be generated in limited amounts during the maintenance of the diesel engines of the generators. The maintenance will be undertaken by an external subcontractor who collects and disposes of the waste oil under the appropriate Duty of Care requirements.

The SCR design is expected to use Ad Blue which will be used during operation. Waste will be generated from routine cleaning and disposal of expired Ad Blue. The Ad Blue will be taken offsite by the subcontractor and a waste transfer note obtained.

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

7.2 WASTE MINIMISATION

Waste generation will principally be from the unboxing of customer equipment and therefore waste minimisation efforts focus on the level of packaging of that equipment and a requirement for a tidy workplace to prevent the unnecessary generation of waste. The waste minimisation techniques mentioned above will be applied to CWL01 and CWL02.

7.3 WASTE STORAGE

Most waste arising from the proposed Site will be combustible packaging material, waste will be removed to appropriate storage areas in the perimeter of the data centre sites for onward collection by a licensed waste carrier.

Any hazardous waste arising across the Site will be segregated from non-hazardous waste and is stored depending on the nature of the waste in either a hazardous container, covered, caged or bunded.

8. RAW MATERIALS

The Site will use the raw materials detailed in **Table 8.1**. Typical consumption values are given but are only indicative, as all raw material usage is intermittent and variable year on year.

TABLE 8.1: RAW MATERIALS USAGE

Substance	Approximate Annual Consumption	Typical Storage Capacity	Use	Risk
Water	c. 9,500 m^3 rainwater harvested, c. 1,200 m^3 used for cooling	14,150 l	Water based evaporative cooling	None
Diesel (and/or HVO at a later date)	Annual consumption is variable Expected consumption rate of 818 l/hr per generator at 100% load	1,136,100 l	Generator fuel	Flammable liquid and vapour, toxic to aquatic life with long lasting effects
Mineral lube oil	Annual consumption is variable Expected rate of 0.56 l/hr per generator at 100% load	1,240 l	To lubricate the proposed generators	None
Ad Blue	Annual consumption is variable based on demand	61,600 l	Injection to exhaust stack of generators to reduce NOx emissions in synergy with a reaction catalyst.	Low. Some occupational exposure risks but not classified as a hazardous substance to health or the environment.

9. ENERGY

9.1 ENERGY USAGE

The data centres on the Site will be supplied by the national grid during normal operation. The Permitted activity, the emergency power generation from the diesel generators, consumes diesel to produce electricity. The quantity of diesel required will depend on the running time each year.

9.2 ENERGY EFFICIENCY

Microsoft uses the power usage effectiveness (PUE) metric to measure the energy efficiency of a data centre's infrastructure under normal operating conditions.

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

Target peak infrastructure PUE is <1.25 at the input to the IT load. Target annual average operating infrastructure PUE is <1.20 at the input to the IT load.

9.3 ENERGY MANAGEMENT SYSTEM

Microsoft operates an energy management system and will update this to include the new Site.

9.4 CLIMATE CHANGE AGREEMENT

The Site does not intend to enter into a Climate Change Agreement (CCA).

10. NOISE

A noise impact assessment has been undertaken for the operation of the Proposed Development.

The following standards are relevant to noise generated by the operation of the Proposed Development:

- BS 4142:2014+A1:2019: 'Methods for rating and assessing industrial and commercial sound';
- BS 8233: 2014: 'Guidance on sound insulation and noise reduction in buildings'; and
- ISO 9613-2:1996: 'Attenuation of Sound during Propagation Outdoors'.

Pre-application advice was provided by Newport City Council. This noted the need for a baseline noise survey in accordance with BS 4142, noise modelling to reflect the current design of the facility and to identify any potential noise impacts, and specification of noise mitigation to ensure that noise levels meet appropriate noise standards to avoid significant noise impacts.

The noise baseline methodology and monitoring locations were approved by NCC in June 2023 and monitoring was carried out at four locations between 8th and the 22nd August 2023.

Newport City Council also advised that their standard noise condition is:

"Noise emitted from plant and equipment located at the site shall be controlled such that the rating level, calculated in accordance with BS4142 2014, does not exceed a level of 5dB below the existing background level, with no tonal element to the plant.

Reason: To ensure that the amenities of occupiers of other premises in the vicinity are protected."

10.1 OPERATION

The noise and vibration assessment of the operational phase makes use of the following sources of information:

- Preliminary layout of external fixed plant and other noise sources;
- Equipment noise source data and information regarding assumed at-source mitigation measures;
- Preliminary design information regarding building construction (assumptions regarding absorption / transmission values are based on SoundPLAN software library data); and
- Preliminary layout and height information for the main on-site buildings.

An assessment of the proposed Development is undertaken for three scenarios of activity:

- Normal Operation: this scenario is the typical operation of the data centre powered by the national grid, consisting of the AHU intake and exhaust noise emissions from CWL01 & CWL02 buildings plus the substation noise from the three 150 kV transformers. Generators, and therefore, associated stacks and transformers do not operate during this scenario. Other external plant such as the Waste Treatment Plant (WTP) is enclosed within an external plant room therefore, noise emissions are not expected to be significant.
- Generator Testing: A regular (monthly) testing of the generators will be undertaken at the proposed Development, this will involve testing of the generators (with associated transformer, control unit, and stack etc.) over a single day. This scenario has been modelled by inputting noise emissions from the generators closest to respective NSRs (in addition to the normal operation of CWL01 & 02), therefore, demonstrating the worst-case noise levels at each receptor during the testing period.

Emergency Mode: This scenario simulates a complete power supply failure, in such case, all generators are running along with administrative building generator and transformer, as well, the generator and transformer for the WTP. This is the worst case which included normal noise emissions from the buildings plus all external generators, stacks, and transformers in operation.

It should be noted that only the normal operation scenario is the typical continuous noise profile of the proposed Development, the generator testing is temporary undertaken over a monthly basis while the emergency mode is worst-case that will only happen during the unlikely event of a power failure, which will be rectified thereafter as soon as possible.

Under "Normal Operation" Noise from the Development is 5 dB or more below the background levels during both day and night periods at all locations, resulting in 'no impact' in terms of BS 4142.

Under the "Generator Testing" scenario the rating levels do not exceed more than 5 dB below the background levels at all NSR during daytime. As generator testing will only be undertaken during the day noise impact during night-time is not relevant and as such a night-time assessment is not undertaken.

Under the "Emergency Mode" scenario, the rating levels exceed the background levels at Blacksmiths Way and The Stud Farm by 4 dB during the night only and Powis Close during

daytime by 1 dB and night-time by 4 dB. This scenario is based on a power failure emergency event and does not represent the typical operation of the proposed Development.

Therefore, no significant effects are anticipated from the proposed Development or from operation of the Development in the three assessed scenarios, when considering the context.

11. AIR QUALITY DETAILED MODELLING

The generators, which are all fuelled by diesel, will be tested periodically during the year, as part of the Microsoft standard engine testing regime as outlined in **Table 3.3**. In case of a failure of the national electricity grid, the generators would also be operated to supply power to the Site. The impacts from the Site emissions have been considered in relation to nearby receptors. The detailed air quality impact assessment is presented in **Appendix C**.

For human health, compliance with short-term PM_{10} and NO_2 standards, as well as long-term NO_2 standards were assessed.

11.1 TESTING REGIME – NO_X, NO_2, NO AND NH_3

Based on the air quality impact assessment performed, the testing regime for the generators at the Microsoft Newport Quinn data centre at Newport Imperial Park is not expected to result in a significant adverse impact on air quality.

11.2 EMERGENCY OPERATION – NO_X, NO_2, NO AND NH_3

Two emergency power generation scenarios were also modelled. In this case, exceedance of the hourly NO_2 standard for human health is not expected. There were no modelled exceedances of the 24-hour NO_x standard at most of the identified sensitive habitat areas. Only Gwent Levels: St Brides SSSI showed a potentially significant effect for 24-hour NO_x impacts and for nutrient nitrogen deposition and this was during the 72-hour emergency scenario.

The modelled emergency scenarios are expected to be unlikely to arise in practice. Total outage time up to 72 hours a year is even less likely and therefore the risk of breaching the 1-

hour NO_2 AQS is considered low. The likelihood of an outage occurring for a sufficient amount of time to breach the NO_x 24-hour standard at habitats is also considered low. As a result, the potential for significant impacts from emergency operations at the site is considered unlikely.

11.3 PM_{10} AND SO_2

It was also found that the PM_{10} emissions from the engines are not expected to breach the AQS for PM_{10}. SO_2 emissions were not assessed as the data centres use ultra-low-sulphur diesel.

12. SITE CONDITION REPORT

A Site Condition Report (SCR) has been produced for this permit application and has been included in **Appendix D**.

13. MONITORING

13.1 EMISSIONS TO AIR

NRW requires the following metrics in relation to the backup generation activity at each of the data centres:

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

An annual report and emissions inventory will be prepared as required for the Site's combustion plants.

It is anticipated that monitoring for NO_x and CO, in line with web guide 'Monitoring stack emissions: low risk MCPs and specified generators,' published 16 February 2021 will be required for the 31 new generators at CWL01 and CWL02. The monitoring frequency is expected to be every 1,500 hours of operation or once every five years (whichever comes first).

13.2 EMISSIONS TO SURFACE WATER

A monitoring station will be placed just upstream of the offsite discharge to monitor water quality and compliance with pollution control requirements.

14. ENVIRONMENTAL RISK ASSESSMENT

14.1 IDENTIFY AND CONSIDER RISKS FROM THE SITE

The environmental risk assessment for the Site has been assessed for this permit application. This has included identification of sources, pathways and receptors. The overall assessment of risk is the combination of probability and consequence. The risk assessment is presented in **Table 14.1**.

On behalf of the Environment Agency (EA), Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW) and Northern Ireland Environment Agency (NIEA), Atmospheric Dispersion Modelling Liaison Committee (ADMLC) is hosting the H1 risk assessment tool and accompanying guidance. The H1 risk assessment software tool can be used to assess the impact of hazardous pollutants released within discharges to surface waters and to small infiltration systems from the operation of installations and waste sites, point source water discharge activities and from stand-alone water discharge activities.The MS Excel file is supplied with this application via SharePoint, titled "H1 Tool v8 - CWL01&CWL02 - 2023". Detailed modelling of emissions to air is described in **Section 11** of this document.

14.2 CLIMATE CHANGE RISK ASSESSMENT

A climate change risk assessment will completed and included as part of Microsoft's updated EMS, which will be amended to include the Site.

TABLE 14.1: ENVIRONMENTAL RISK ASSESSMENT

Hazard	Operational scenario	Receptor	Pathway	Risk management techniques	Probability of exposure	Consequence	Overall risk
Emission to air (NOx, CO, SO_2, particulates and ammonia)	Testing	See detailed air quality modelling, **Section 11**	Dispersion through the air	Testing regime scheduled for minimum practicable impact - see detailed air quality modelling in **Appendix C**.	High	High	High
	Emergency operation	See detailed air quality modelling, **Section 11**	Dispersion through the air	The Site will have uninterruptable power supply (UPS) units installed designed for several minutes autonomy. Once UPS systems are depleted, generators will start to ramp on and run at the load of the building. SCR systems are to be installed to the generators to abate potential NOx impacts - - see detailed air quality modelling in **Appendix C** for further details.	Low	High	Medium
	In case of fire	See detailed air quality modelling, **Section 11**	Dispersion through the air	Fire detection and suppression systems are installed throughout the data centre buildings and alarms will be triggered in the event of a fire.	Low	Low	Low
Emission to water (bulk fuel storage)	Accidental	Local surface water course	Run-off from hardstanding and/or drainage routes and then to the surface water	Diesel belly tanks are fully bunded. Any water that accumulates in external bunds is to be tested prior to discharge into rainwater drains. Any contaminated water will be removed using a vacuum pump	Low	Medium	Low

Hazard	Operational scenario	Receptor	Pathway	Risk management techniques	Probability of exposure	Consequence	Overall risk
				and recycled or disposed using an appropriate waste disposal company. The areas in which the belly tanks will be located will be subject to a daily site housekeeping walk around to look for issues. The Site ground surface consists of hardstanding in good condition both inside and outside of the building. Microsoft will develop emergency response procedures to be followed in the event of a release of oil or diesel, processes for the planning for such eventualities and checklists to audit the response in case such an event occurs. Example procedures are provided in **Appendix B**.			
Emission to water (bulk Ad Blue storage)	Accidental	Local surface water course	Run-off from hardstanding and/or drainage routes and then to the surface water	Ad Blue storage tanks are fully bunded. Any water that accumulates in external bunds is to be tested prior to discharge into rainwater drains. Any contaminated water will be removed using a vacuum pump and recycled or disposed using an appropriate waste disposal company.	Low	Medium	Low

Hazard	Operational scenario	Receptor	Pathway	Risk management techniques	Probability of exposure	Consequence	Overall risk
				The areas in which the tanks will be located will be subject to a daily site housekeeping walk around to look for issues. Microsoft will develop emergency response procedures to be followed in the event of a release of oil or diesel, processes for the planning for such eventualities and checklists to audit the response in case such an event occurs. Example procedures are provided in **Appendix B**.			
Emission to sewer *(*bulk fuel storage*)*	Accidental	Waste water treatment plant (WWTP)	Combined sewer following a direct spill onto hard standing and entry to the drainage system following catastrophic failure of tank / pipework, overfill or bund failure and/or failure of and site wide hard surfacing.	As above with emission to water	Low	Medium, WWTP may need to quarantine the affected flow	Low
Emission to sewer (bulk Ad Blue storage)	Accidental	WWTP	Combined sewer following a direct spill onto land through catastrophic failure of tank/pipework/overfill, bund and site surfacing.	As above with emission to water	Low	Medium	Low
Emission to sewer	In case of fire	WWTP	Combined sewer	Li-ion battery rooms are isolated. If a fire happens inside these	Low	Low	Low

Hazard	Operational scenario	Receptor	Pathway	Risk management techniques	Probability of exposure	Consequence	Overall risk
(firefighting water)				rooms firewater would be contained, tested then tankered off as required. Any firewater within other data centre buildings (excl. admin building) would be contained in the building or isolated within the foul sewer network before being tested and either discharged to sewer or tankered off site. The surface water drains of the sites connects to the local sewer system.			
Emission to land (bulk fuel storage)	Accidental	Land within or adjacent to the installation boundary	Direct spill onto land through catastrophic failure of tank / pipework or overfill, bund failure and/ or failure of site hardstanding	See response for emissions to water (bulk fuel storage)	Medium	Low – Site clean-up and possible remediation required	Medium – low
Emission to land (bulk Ad Blue storage)	Accidental	Land within the installation boundary and surrounding commercial	Direct spill onto land through failure of tank/ pipework / overfill, bund and site surfacing	As above with emission to water.	Low	Low	Low

Hazard	Operational scenario	Receptor	Pathway	Risk management techniques	Probability of exposure	Consequence	Overall risk
		and residential land					
Emission to groundwater (bulk fuel storage)	Accidental	CWL01 and CWL02 do not lie within a Groundwater Protection source.	Infiltration through land surface following direct spill as above	See response for emissions to water (bulk fuel storage)	Low	Medium – Site clean-up and possible remediation required	Medium – low
Emission to groundwater (bulk Ad Blue storage)	Accidental	As above	Infiltration through ground following failure of tank or associated underground pipe work.	As above with emissions to water	Very Low	Low	Low – Medium
Odour	No known scenarios for significant emissions reaching offsite receptors. There may be some ammonia slip from the SCR systems but the ammonia released is not expected to be detectable by human receptors.						
Noise and vibration	Generator testing/ emergency operation	Local businesses / residential receptors	Airborne	Noise impacts from both the routine testing and emergency operation of the emergency back-up generators are considered to be low. See the noise impact assessment for further details in Appendix G.	Very low	Low – nearest residences are approximately 220m to the north west.	Low
Litter/ pests	Normal operation	Neighbouring industrial and	Windblown	Housekeeping is given a high priority as company policy. Waste generating activities occur within the data centre building and are not external. Waste	Very low	Low	Very low

Hazard	Operational scenario	Receptor	Pathway	Risk management techniques	Probability of exposure	Consequence	Overall risk
		commercial units		generated by the data centres is not putrescible			
Visible emissions *(Black smoke on start up)*	Generators testing / emergency operation	Neighbouring industrial and commercial units	Airborne/ visual	Minimisation of planned testing Low likelihood of emergency running (see emissions to air)	Low	Low – short duration visible emission	Low
Surface water flooding from a weather event	All operational scenarios	Site operations restricted	Direct effects	Surface water drainage to combined sewer. Site operations are principally internal and reasonably protected from flood events.	Low – not in a fluvial flood plain	Low – operational impact	Low

APPENDIX A DIESEL FILLING PROCEDURES

APPENDIX B EMERGENCY RESPONSE PROCEDURE

APPENDIX C AIR QUALITY IMPACT ASSESSMENT REPORT

APPENDIX D SITE CONDITION REPORT

APPENDIX E DRAINAGE DRAWINGS

APPENDIX F AD BLUE SAFTEY SHEET

APPENDIX G NOISE IMPACT ASSESSMENT

APPENDIX H TRADE EFFLUENT CONSENT

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