Amazon Data Services Ireland Ltd.

Operational Report

Attachment-4-8-1

January 2022

Licence Application (LA007494)

CONTENTS

1.0 SITE OVERVIEW

The following Operational Report relates to the Amazon Data Services Ireland Ltd. ("ADSIL" or 'the applicant') data storage facility (the subject 'installation' under this licence application) is located within the townlands of Milltown; Ballybane; Aungierstown and Ballybane; and bounding Baldonnel Road to the west; both the Old and New Nangor Road to the north; and Grange Castle South Access Road to the south, Baldonnel, Dublin 22. The site context is shown on Site Location Plan A093-CSC-XX-XX-DR-C-0004 - Overall Site Location Plan included with this application. The application relates to the entire facility that is c. 16.5 hectares (ha) in total ('the Site')

The site when fully constructed will consist of three no. two storey data storage installation buildings with mezzanine floors at each level (Buildings A, B and C) ancillary elements. The ancillary elements of the development include; loading bays, maintenance and storage spaces, associated water tanks, sprinkler, tanks, pump house and electrical rooms, security and utility spaces, underground foul and storm water drainage network, on site attenuation ponds, internal roading network, and site landscaping. The site overall sites includes the Clutterland 110 kV Substation. The permitted site layout and main buildings is shown on Site Layout Plan Drawing Ref: A093-CSC-XX-XX-DR-C-0004 - Overall Site Plan included with this application.

The installation requires a continuous supply of electricity to operate. During normal operations, the facility is supplied electricity from the national grid. Outside of normal operations, the facility is first supplied electricity by some or all of the onsite battery installations and then by some or all of the onsite emergency backup generators. Outside of routine testing and maintenance, the operation of these emergency back-up generators is typically only required under the following emergency circumstances:

- A loss, reduction or instability of grid power supply,
- Critical maintenance to power systems,
- A request from the utility supplier (or third party acting on its behalf) to reduce grid electricity load.

The facility once fully operational will have installed a total of 70 no. 6.49 MW_{th} diesel powered emergency back-up generators; 3 no. 3.03 MW_{th} diesel powered emergency back-up generators, and 2 no. 0.450 MW_{th} diesel powered emergency back-up fire pumps.

The relevant requirement for an Industrial Emissions (IE) Licence is outlined within the First Schedule of the EPA Act 1992. Activity '*Class 2.1 Combustion of fuels in installations with a total rated thermal input of 50 MW or more'* specifically relates to this facility.

The combined thermal input from the emergency generators once operational is 464.3 MWth., this exceeds the 50MW_{th} threshold of *Class 2.1* First Schedule of the EPA Act 1992. The applicant is applying to the Environmental Protection Agency (EPA) for an Industrial Emissions (IE) Licence principally relating to the operation of diesel-powered emergency standby generators under Activity Class 2.1.

Once operational, c. 50 full time employees will be present on site daily in each data storage facility (Buildings A, B and C) meaning that 150 people will be on site at any one time, including external staff, maintenance contractors and visitors, as required. The number of external staff, maintenance contractors and visitors will typically be c. 30 staff per day. (Staff will be present on a shift basis, so numbers will vary throughout

the day with up to 7 no. of the staff on night shifts each day). Operational hours are expected to be 24 hours a day, 7 days a week.

Development Phasing

Phase 1 of the Installation commenced in Q3 2020. This includes the construction of Building A, as well as 2 no. attenuation ponds and landscaping to the south, west and north of the site with construction works with all data rooms in operation by Q1 2024.

Phase 2 of the Installation is due to commence in Q2 2023 with the construction of the data centre (Building B) located to the north-west of the site. The first data room in Building B is anticipated to be operational Q2 2024, with construction works with all data rooms in operation by Q4 2026.

Phase 3 of the Installation will commence in Q1 2026 with the construction of the data centre (Building C) located to the east of Buildings A and B. The first data room in Building C is anticipated to be operational Q1 2026, with construction works with all data rooms in operation by Q3 2028.

2.0 SITE CONTEXT

The Installation is located on a site of c. 16.5 hectares that consists of a formerly greenfield site within the Grange Castle South Business Park. The site is bounded by the realigned Baldonnel Road to the west; by the old and new Nangor Road to the north; by agricultural fields and the Grange Castle Motor Company to the east; and by the Grange Castle South Access Road that provides access off the Baldonnel Road into Grange Castle South Business Park to the south.

The overall site is located between the N4 and N7 national primary roads and is served by a good road network that has recently undergone an upgrade as well as the new Business Park road (Grange Castle South Access Road) that provides access into this part of the Grange Castle Business Park from the Baldonnel Road.

The wider context of the site is defined primarily by commercial and industrial development. Large areas of the surrounding lands to the south and north within the Grange Castle Business Park and Profile Park have been developed in the past 10-15 years and are occupied by industrial campuses including pharmaceutical, data centres and food manufacturing uses. The Google data centre campus is located to the south-east of the site and the Cyrus One data storage facility development is currently being constructed to the immediate south. To the immediate north is the Microsoft data centre campus and the EdgeConneX data centre campus to the north west. The closest occupied residential properties are located c. 230m south of the site boundary along the Baldonnel Road.

The surrounding 5 km of the site includes IE and IPC Licenced sites including:

- Takeda Ireland Limited (Shire Pharmaceuticals Ireland Limited) (P0693-01), Pfizer Ireland Pharmaceuticals (P0652-01) and Grange Back Up Power (P1033-02) power station development located to the east in Grange Castle; and
- Crag Digital Limited (P1113-01) power station development to support data centre development; located further to the east in Clondalkin.

The site layout and wider context is presented in A093-CSC-XX-XX-DR-C-0004 - Overall Site Location Plan included with this application.

3.0 PLANNING STATUS

The installation received Final Grant of planning permission on 3rd September 2020 by South Dublin County Council (SDCC) under SDCC Planning Ref. SD20A/0121 for a 10-year permission, to develop a 16.5-hectare site for three data storage buildings.

Ireland's list of Projects for which an EIA is required are set out in Part 1 and Part 2 of Schedule 5 of the Planning and Development Regulations 2001-2018. This list was developed from Annex I and Annex II of the EIA Directive. The proposed activity is not directly listed under Annex I of the EIA Directive, or Part 1, Schedule 5, or Part 2, Schedule 5.

It is considered that most relevant development class in the context of the proposed Project under Part 2, Schedule 5 is Class 10(a):

> *"Industrial estate development projects…where the area would exceed 15 hectares"*

The development is within an Industrial Estate and as the total site area is c. 16.5 hectares and so exceeds the limit, quantity or threshold set out in Part 2, Schedule 5 is Class 10(a).

The Environmental Impact Assessment Report (EIAR) relating to this activity, prepared by Marston Planning Consultancy et. al. dated April 2020, which has been previously submitted to SDCC for Planning Ref. SD20A/0121 has been submitted to the Agency as part of this application (Attachment 6-3-6 of the IE Licence application).All planning permissions for the data storage facilities that are relevant to this Licence application under Class 2.1 of the EPA Act 1992 (as amended) have been granted on site.

The installation is to be constructed and operated in accordance with SDCC for Planning Ref. SD20A/0121 therefore the EIAR submitted to the EPA dated April 2020 (Attachment 6-3-6 of the IE Licence application) is relevant to this IE License activity. Any further information, including reports and advice, relating to the environmental impact assessment of the proposed activity is made available and contained within Section 7 of this licence application .

4.0 DESCRIPTION OF ACTIVITY

4.1 SITE OVERVIEW

The site when fully constructed will consist of three no. two storey data centre buildings with mezzanine floors at each level (Buildings A, B and C)with a gross floor area of 80,269sqm:

- 1 no. two storey data centre (Building A) that will be located to the south-west of the site and will have a gross floor area of 28,573sqm. It will include 26 no. emergency back-up generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located

above the northern end of each emergency generator that will measure 20m in height,

- 1 no. two storey data centre (Building B) that will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sqm. It will include 18 no. emergency back up generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 18 no. ventilation shafts that will be located above the southern end of each emergency generator that will measure 20m in height,
- 1 no. two storey data centre (Building C) that will be constructed last and will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sqm. It will include 26 no. emergency back-up generators located at ground floor level within a compound to the western side of the data centre with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the western end of each emergency generator that will measure 20m in height,
- Each of the three data centres will includes data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate 3.03 MWth generator for each facility that will provide emergency power to the admin and ancillary spaces. Each data centre will also include a diesel tank and a refuelling area to serve the emergency generators,
- The overall height of each data centre apart from the flues and plant at roof level is c. 19.85m above the finished floor level,
- Construction of internal road network and circulation areas, security hut (30sqm) at entrance; footpaths, provision of 150 no. car parking spaces, and 78 no. cycle parking spaces, with 50 no car parking spaces and 26 no. cycle parking spaces being provided for each building,
- single storey and temporary substation (29sqm),
- 3 no. single storey MV buildings (each 249sqm - 747sqm in total) that manage the supply of electricity to each data centre and are located to the immediate west of the generator compound within Buildings A and B, and to the south of the generator compound within Building C,
- 8 no. prefabricated containerised electrical rooms (65sqm each and 520sqm overall) that are stacked in pairs to the immediate south of the temporary substation; and
- Ancillary site development works, that will include 4 no. attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the Baldonnel Stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gate, sprinkler tank house (72sqm), security hut (30sqm) and 150 no. car parking spaces, and 78 no. sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west.

4.2 PRIMARY PROCESSES/ACTIVITIES

4.2.1 Emergency Backup Generators (Generation Compound)

The facility is supported by containerised diesel-powered emergency back-up generators that are located externally in the generator yard associated with each data centre building. These generators immediately provide the necessary power to ensure the data centre buildings continue to operate in the event of a temporary failure of

electricity supply. An uninterruptible power source or UPS system is also provided for the short-term transition from mains power to the emergency back-up generators.

The installation requires a continuous supply of electricity to operate. During normal operations, the facility is supplied electricity from the national grid. Outside of normal operations, the facility is first supplied electricity by some or all of the onsite battery installations and then by some or all of the onsite backup generators. Outside of routine testing and maintenance, the operation of these back-up generators is typically only required under the following emergency circumstances:

- A loss, reduction or instability of grid power supply,
- Critical maintenance to power systems,
- A request from the utility supplier (or third party acting on its behalf) to reduce grid electricity load.

Each of the three data storage buildings are accompanied by a designated generator compound for the supply of emergency power to that building. There is no interconnectivity between the generators of different buildings.

The facility once fully operational will have a maximum operational electrical demand of 48MW_e for each of Building A and C, and 32MW_e for Building B, with an overall maximum operational demand for the site of 128MW_e.

The generators are housed within a container with various designed control measures in place includes acoustic attenuation, exhaust silences, and diesel stored locally within each containerised generator. There are drip trays at the diesel fill point for the generator belly tank. The individual belly tanks are double skinned tanks, with level gauges (high and low) within the fuel tanks connected to an onboard controller which will alarm to prevent overfilling and identify a sudden loss of fuel within the tank. The containerised emergency backup generator housing includes retention bunding in the base of the container, there are leak detection systems within the bund to alert in the event of a leak from the generator fuel tank or lubricating oil tank. The onboard controller for individual generators is connected to the Building Management System (BMS).

4.2.2 Data Storage Building(s)

Data storage facilities are centralised computer server systems on a large scale. At typical data storage facility scale (typically involving systemised racks of hundreds/thousands of server units), they offer significant advantages (and economies of scale) over traditional in-house data storage systems. The primary advantages are:

- Higher reliability and redundancy of systems,
- 24/7 monitoring and maintenance of storage by staff,
- Higher security and data protection, and
- Flexibility – ability to increase or decrease storage requirements at short notice in line with specific business needs.

The demand for cloud computing and data storage continues to be high and the installation is intended to help meet this need.

4.3 SECONDARY PROCESS/ACTIVITIES

4.3.1 Ancillary infrastructure

There are integrated administration areas, associated with each main data hall buildings. The administration areas comprise the following main components:

- Reception areas,
- Open office areas, and conference rooms/meeting rooms,
- Maintenance and storage spaces; and
- Break room and sanitary facilities.

Additional Ancillary infrastructure includes:

- Underground foul and storm water drainage network,
- utility ducts and cables,
- Internal road network and 150 no. car parking spaces, and 78 no. sheltered bicycle parking spaces,
- security hut and security fencing; and
- Drainage infrastructure including 4 no. attenuation ponds.

4.3.2 Data Hall Cooling Systems

The location of the facilities in Ireland allows for the use of free-cooling media without the need for mechanical cooling. To take advantage of this, the air handling equipment will be fitted with airside condensers to utilise this outdoor air to cool the space.

The cooling units or Air Handling Units (AHUs) provide conditioned air to maintain temperature, relative humidity and pressurisation in the data halls. The cooling units under 2 modes; Free Cooling and Evaporative Cooling. Duty and standby units are in place to ensure cooling is available at all times. The AHUs have two modes of operation: Free Cooling which uses outside airair, and Evaporative Cooling mode or 'Adiabatic Cooling' which uses water from the mains supply as the cooling media.

In the Free Cooling system, fresh air from outside the buildings enters the data halls via external louvres. The air is warmed as it passes across the IT servers located in the data halls, and subject to temperature conditions, this air is either recirculated or exhausted to atmosphere by the exhaust fans located at roof level. There is no emission of air pollutants from this process; and therefore, the exhaust is not considered an 'emission point'.

Free Cooling is sufficient to cool the data halls for the majority of time. There areThere are a small number of hours each year, during elevated external temperatures particularly during summer months, that Evaporative Cooling (also known as adiabatic cooling) is required.

Evaporative Cooling utilises 'Evaporative Cooling Water' mains water (at ambient temperature) from the mains supply as the cooling media. The Fresh air is passed over evaporative cooling pads that are dampened by the cooling water as it is drawn into the building, the external air is cooled through an air/water heat exchange before entering the data hall. The majority of the Evaporative Cooling Water is evaporated in this process. The Evaporative Cooling system provides greater energy efficiency then other options such as the use of chillers/compressor systems.

Evaporative Cooling water is distributed via a ring main to each AHU corridor. The AHU has a water 'sump' which is supplied from the cooling water tanks. These sumps are equipped with a mechanical float valve to maintain the water level at an operational level to ensure there is sufficient water for the pumping system. Water is then pumped up into the AHU. Water that is not evaporated is recirculated back to the sump for re-use.

The recirculated Evaporative Cooling Water in the AHU sumps at Buildings A, B, and C is drained down typically every 7 days to the foul water drainage network to prevent legionella growth in the system. The drained down cycle is sequential to prevent overwhelming the drain capacity of the facility. A Trade Effluent Discharge Licence has been applied for with Irish Water (Irish Water Reference 11712).

The regular replenishment of the Evaporative Cooling Water prevents legionella growth. The Evaporative Cooling Water quality in the AHU sump is maintained by a UV water sterilizer, and a conductivity probe is used to determine the level of salts build up – there is no water treatment or water softeners added.

In the event that conductivity exceeds 1500 microsiemens (µS/cm)AHU, water is bled off constantly when 1,500 µS/cm is reached, the sump is not drained fully as that would impede the evaporative system. Water is bled off until conductivity drops below 1,500 µS/cm and the drain valve is closed.

Cleaning of the water-based cooling systems including all AHUs and pipelines with hydrogen peroxide solution is only undertaken if positive legionella samples have been detected in the unit.

4.3.3 Office Space Air Conditioning

Office air conditioning is provided by a Variable Refrigerant Flow (VRF) system which allows varying degrees of cooling across the office and support spaces thereby reducing energy consumption. High efficiency unit are used to minimise the electrical power demand. R410a refrigerant is used in these systems.

The fresh air ventilation system for the office area will be served using energy efficient Heat Recovery Units which will recover waste heat from the office spaces and re-use to pre-heat the air with the HRU.

This will reduce the overall energy consumption for this system. The toilet areas shall be mechanically ventilated and automatically controlled by occupancy sensors to set back the ventilation rate during periods of non-use.

4.3.4 Waste Heat Recovery

The cooling system design can accommodate the future installation of heat recovery coils in the central ventilation plant. If incorporated, the heat recovery coils would remove heat from the air after it passes through the data storage rooms to a hydraulic (water) pipe network, before the air is re-introduced to the data storage room or exhausted to the atmosphere.

The heat recovery coils could generate hydraulic temperatures of between 20-30°C at the point of recovery.

The above provision could supply heat energy to a future district heating scheme developed by others external to the site boundary. It should be noted that in order to

benefit from the above heat recovery that district heating infrastructure external to the site including plate heat exchangers, pumps and distribution networks would need to be developed by others.

A suitable receptor is not currently available and therefore this is not included in the licence application.

The layout of the facility is shown on drawing A093-CSC-XX-XX-DR-C-0004 - Overall Site Plan included with this application.

4.3.5 Electricity Supply and 110kV Substation

The power requirements for the installation are to be provided via a connection to an 110kV Gas Insulated Switchgear (GIS) Substation Compound substation located to the east of the main buildings that was approved under ABP-308585-20. The 110kV Substation (known as Clutterland) is shown on the site plan ref A093-CSC-XX-XX-DR-C-0004 - Overall Site Plan. The substation provides a 20kV electrical power distribution at medium voltage throughout the site. The site distribution system supplies all electrical rooms where stepdown transformers are deployed to provide 415V electricity to all loads.

The 110kV GIS Substation Compound includes the provision of a two storey GIS Substation building (with a gross floor area of 1,447sqm), four transformers, a Client Control Building (with a gross floor area of 380sqm), Lighting Masts, Car Parking and Roads within a 2.6m high fenced compound and all associated construction and ancillary works.

ESB Networks are the transmission asset owner (TAO). ESB Networks is a subsidiary within ESB Group. ESB Networks finances, builds, and maintains the transmission system through which electricity flows from generation stations to bulk supply points near Ireland's cities and towns. It does this under a TAO licence granted by the Commission for Regulation of Utilities (CRU). ESB Networks performs its transmission related functions under the direction of Eirgrid. In summary EirGrid operates the transmission system (TSO) while ESB Networks carries out construction, maintenance, and repairs (TAO) under the direction of EirGrid. For this development, EirGrid will operate and the proposed new GIS substation, remotely from their control centres. However, ESB Networks will carry out all local operations on Eirgrid's behalf. Eirgird and ESB Networks are committed to running their businesses in the most environmentally friendly way possible.

The two storey GIS substation building (with a gross floor area of 1,447sqm) will accommodate a cable room, control room, mess room, generator room, battery room and workshop at ground floor level, with a storeroom and substation room at first floor level. The single storey Client Control Building (with a gross floor area of 380sqm) will accommodate 4 number electrical switch rooms and a control room.

The proposed transformers will be located centrally within the substation compound, set out in a row running north-south within the compound area. A main access gateway to the compound will be provided on the southern side of the substation compound, providing for vehicular and pedestrian access to the substation area.

In addition to the mains connection, provision for an array of PV panels shall be made to generate on site renewable energy up to a peak of 73.15kWe per building, to comply with Nearly Zero Energy Building (nZEB) requirements. The on-site renewable electricity generation will be back-fed to the electrical general supply for the building,

serving lighting, office area general services and office IT equipment. The total amount of panels will cover 150sqm per building and shall be located at the plant roof area. The total contribution to the onsite electrical demand from this addition is presented in Attachment-4-6-1.

4.4 WATER, SEWER, AND STORMWATER DRAINAGE INFRASTRUCTURE

4.4.1 Potable Water Supply

The water supply will be sourced from mains water supply via a metred connection from the existing main to the south of the installation in accordance with the SDCC Planning Ref. SD20A/0121. The design requires a peak water demand of up to 0.5 litres per second (l/s). Where water demand is required during a short-term drought, additional supply can be provided from an alternative source such as tanker supply.

On-site water storage is and will be provided at each building in bulk water tanks. These water tanks are to support the evaporative cooling function of the building's AHUs.

Cold water storage tanks will be provided. Pumps will supply water to the data storage facilities from the storage tanks. The storage tanks will act as break tanks and buffer demand on the public watermain infrastructure.

When constructed the facility has a demand for general potable supply, for cleaning, drinking and sanitary facilities, cooling equipment, and for firefighting. This is sourced from a metred 150mm uPVC connection from the existing 500mm Ductile Iron main to the south of the subject lands.

The connection will be made limiting peak flow to 4.9 l/s with an annual limit of 4,959m^3.

Fire water

A 250-300mm fire ring main is in place across the campus to provide firefighting water to the site in accordance with the SDCC Planning Ref. SD20A/0121. The sprinkler pump house is equipped with 2 diesel fired sprinkler pumps) for the supply of firefighting water.

Water is stored in localised water storage tanks at each of the data storage facilities. There is no addition of water treatment chemicals applied however the water tanks are emptied once annually.

A 655,900 litre capacity fire sprinkler tank, will be filled upon building occupation, and have infrequent top-ups thereafter.

4.4.2 Stormwater Drainage Systems

Rainwater runoff from impermeable areas of the site will be collected via the onsite storm water drainage network in accordance with the SDCC Planning Ref. SD20A/0121. This network will convey the stormwater via Oil Separator to one of 4 no. stormwater basins (See Drawing DUB69-CSC-XX-XX-DR-C-1101). The attenuated stormwater discharges offsite at 4 no. Emission Points (SW1, SW2, SW3, SW4).

Attenuation basin 1 (4,100 m^3 capacity) is located to the west of the site and discharges directly to the existing stormwater network to the west. Attenuation basin 2 (2250 m^3 capacity) is located to the north of Building B, and discharges to the Baldonnel Stream.

Attenuation basin 3 (806 m^3 capacity) is located to the east of Building C and discharges to the Baldonnel Stream. Attenuation basin 4 (943 m^3 capacity) is located to the east of the Clutterland Substation (as described in Section 4.3.5 above). and discharges to the Baldonnel Stream.

Prior to storm water entering the attenuation retention ponds, storm water is directed via Oil Separator and into 'forebays'. The forebays allow small intensity rainfall events to be stored separated from the main water body. This allows for any detritus material to be removed from the water and aids in particulate removal, increasing overall storm water quality prior to disposal.

4.5 WASTEWATER DRAINAGE SYSTEM

Domestic Effluent

All internal foul drainage networks were designed in accordance with the SDCC Planning Ref. SD20A/0121, and Irish Waters Code of Practice for Wastewater Infrastructure, National Building Regulations Technical Guidance Document H – Drainage & Waste Disposal.

When constructed a gravity piped foul drainage network comprising of 225 mm uPVC pipes will take effluent from internal sanitary locations and outfall into the external foul network. When constructed the outfall into the existing foul network will be at two locations, one to the west (SE1) and the second to the east (SE2). The western outfall will cater for foul flows from Blocks A, B and 50% of Block C. while the second outfall to the east will cater for 50% of Block C. and the welfare facilities associated with the Clutterland Substation (as described in Section 4.3.5 above).

The foul network ultimately discharges into a regional pumping station before final treatment and disposal at Ringsend Wastewater Treatment Plant (WWTP) in Dublin.

Cooling Water Drain down

In additional to domestic effluent generated on site, there is a requirement to have the capability to discharge run-off from coolant effluent into the foul network. The coolant effluent is a biproduct of potable water used, when atmospheric temperatures are above the setpoint to cool components within the facility. This is recirculated mains water that has been through the AHUs only. There is no addition of water treatment chemicals.

During winter months when the water is not required for evaporative cooling systems it is drained down every 7 days to the stormwater system to prevent legionella growth.

During the summer months the water is re-circulated into the evaporative cooling units. As water evaporates over time the total suspended solids accumulate and therefore the system flushes the water storage tanks. The cut off for this is currently a conductivity reading of 1500 micro siemens (µS/cm), these setpoints are reviewed in line with BAT/industry best practice. A Trade Effluent Discharge Licence has been applied for (Irish Water Reference 11712).

5.0 BEST AVAILABLE TECHNIQUES AND COMMISSION IMPLEMENTING DECISION

Section 86A(3) of the EPA Act 1992 as amended, requires that the Agency shall apply BAT conclusions as a reference for attaching one or more conditions to an IE Licence. The installation has principally been assessed against the BAT conclusions contained in Table 6.1:

Table 5.1 Applicable BAT documents

Horizontal BREF	Publication date	Attachment
Best Available Techniques (BAT) Reference Document for Large Combustion Plants	2017	Attachment-4-7-1-BREF - Large Combustion Plants
Reference Document on the Best Available Techniques for Energy Efficiency	2009	Attachment-4-7-2-BREF - Energy Efficiency
Reference Document on the Best Available Techniques on Emissions from Storage	2006	Attachment-4-7-3 BAT REF - Emissions from Storage
Reference Document on the application of Best Available Techniques to Industrial Cooling Systems	2001	Attachment-4-7-4 BAT REF - Industrial Cooling Systems

The assessment has demonstrated that the installation will comply with all applicable BAT Conclusion requirements specified in the CID and will be in line with the guidance specified in the other relevant BREF Documents and relevant national BAT notes.

6.0 MANAGEMENT OF RAW MATERIALS, INTERMEDIARIES AND WASTES

A list of all raw materials in use on the site is provided in Attachment-4-6-2. The only chemical stored in bulk is diesel.

Spill kits will be located across the site in highly visible and mobile units. These will include absorbent socks, mats, pads, disposable bags, and PPE. Spill kits will be utilised in the event of a spill outside the designated bund and staff are trained in the use of spill management materials. Staff will be fully trained in site procedures, including all Standard Operating Procedures (SOPs) and emergency response and safety procedures in relation to the storage and handling of all substances being used at the installation.

6.1 RAW MATERIALS MANAGEMENT

There are no other raw materials held onsite other than domestic cleaning chemicals for cleaning of the staff facilities. These are managed by the cleaning company. All oils, paints, adhesives or other materials required are brought onsite and removed from site by the relevant contractors.

Refrigerant is held within the VRF system for the offices. No refrigerants are stored onsite. R32 and R410A are held within this system on a continuous basis and would only be removed during decommissioning.

The small amounts of hazardous waste generated are stored internally in appropriate waste receptacles on bunds, or externally to each building in appropriate waste receptacles in covered bunds.

The waste is covered, and a mobile retention bund is in place to contain any liquid waste that requires storage. The waste is collected from this area by an authorised waste manager for disposal off-site.

Waste oil and filters and waste batteries are not stored onsite and are removed by the maintenance companies during maintenance operations and change outs.

6.1.1 Diesel Fuel Oil

Diesel is stored in multiple locations across the site. Bulk diesel is supplied to generators from fill 'top up' tanks of 40 m^3 located adjacent to each data centre (i.e., 3 no. tanks of 40 m^3 will be required). Each fill tank is bunded to a volume of 110% of the capacity of the tank within the bund (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunds is diverted for collection and safe disposal.

The bunds will be constructed of suitable concrete and have undergone testing for their integrity during the commissioning phase. All pipelines are integrity tested following installation by vendor and follow up integrity testing of both bunding and pipelines will be completed every three years in accordance with the IE Licence.

The bulk fuel tanks will be fitted with automated level gauges and the online readings from these gauges are fed back into the facility's BMS/EPMS. The bulk tanks also have high/low level alarms (90% high, 30% low) and a high-level switch at 95% which alarm to the BMS/EPMS critical alarm (locally referred to as high-high) and an equivalent low level alarm (low-low).

A diesel unloading bay will be built onsite adjacent to Buildings A, B and C. Fuel delivery to the bulk storage tanks will take place within designated bunded unloading areas. Diesel will then be piped from the bulk storage tanks to an internal double-skinned belly tanks at each of the back-up generator units.

The installation once fully operational will have installed a total of 70 no. 6.49 MW_{th} diesel powered emergency back-up generators; 3 no. 3.03 MW_{th} diesel powered emergency back-up generators, and 2 no. 0.450 MW_{th} diesel powered emergency back-up fire pumps.

The 70 no. 6.49 MWth emergency back-up generator units have 16.4 m^3 belly tanks, these have a maximum fill capacity of 16 m^3 (i.e., 70 no. tanks of 16 m^3 will be required). Building A and Building C will each have 26 no. and Building B will have 18 no. generators (total of 70 no Diesel Generators). The 3 no. 3.03 MW_{th} diesel powered emergency back-up generators have 1m^3 'day tanks'. The 2-no. diesel powered fire pumps have 1m^3 'day tanks'.

There is a total storage volume on site, including generator tanks and bulk fuel tanks, is 1,245m3.

The generators are housed within a container with various designed control measures in place there are drip trays at the diesel fill point for the generator belly tank. The individual belly tanks are double skinned tanks, with level gauges (high and low) within the fuel tanks connected to an onboard controller which will alarm to prevent overfilling and identify a sudden loss of fuel within the tank.

6.1.2 Other raw materials

There are no other raw materials held onsite other than domestic cleaning chemicals for cleaning of the staff facilities. These are managed by the cleaning company.

All oils, paints, adhesives or other materials required are brought onsite and removed from site by the relevant contractors.

6.1.3 Energy Use

The operation of the installation will involve the consumption of electricity, fuel and mains water. The estimated quantities to be used when the installation is operational are specified in Attachment-4-6-1 of the application and are shown below in Table 6.1 below.

Table 6.1 Summary of the Estimated Future Resource use at the Installation Resource

Resource	Estimated quantity per annum
Electricity (purchased) (MAX CONSUMPTION)	1,121,280 MWh
Total Electricity (generated and used) (MAX CONSUMPTION)	1,131,280 MWh
Electricity (generated and exported)	N/A
Natural Gas	N/A
Diesel (Gas Oil)	1,486 tonnes annually
Water (Public Supply & Rainwater Harvesting)	4,959 m^3

The applicant will employ a variety of technologies to maximise the efficient use of energy within the installation. The installation will be operated in accordance with an Energy Efficiency Management System (ENEMS)as well as the requirements of BAT.

The application of BAT provides for the efficient use of resources and energy in all site operations. It requires an energy audit to be carried out and repeated at intervals as required by the Agency and the recommendations of the audit to be incorporated into the ENEMS.

6.2 INTERMEDIATES

There are no intermediates produced as part of the data storage operations.

6.3 WASTE MANAGEMENT

There will be minimal solid and liquid waste produced at the data storage facilities including domestic wastes, kitchen wastes, packaging wastes, non-hazardous WEEE, E-Waste, filters, waste oils and spent batteries. A more detailed description of the waste types and their management is provided in Section 8 of this application.

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins.

Packaging waste associated with rack deliveries to the data storage facilities is collected in recycling bins located in the rack delivery room.

The small amounts of hazardous waste generated are stored in a designated storage area in each building. The waste is covered, and a mobile retention bund is in place to

contain any liquid waste that requires storage, where required. The waste is collected from this area by an authorised waste contractor for recovery and / or disposal off-site.

Waste oil and filters and waste batteries are not stored onsite and are removed by the maintenance contractors during maintenance operations and change outs.

Waste sludge from the oil separators is removed directly from each separator by a specialised and appropriately licensed contractor by means of a vacuum tanker.

Other smaller amounts of domestic waste are produced at the offices and other staff areas including the canteens. This includes paper and office waste as well as dry mixed recyclables and compost food wastes. Very small quantities of mixed municipal wastes may also be produced from time to time. These are separated at each of the individual data storage facilities and then are emptied into skips/larger bins externally for collection by the nominated waste contractor. The quantities are small due to the number of staff present onsite on a daily basis.

6.4 TANKS, BUNDS AND PIPELINES

All tanks, bunded storage and pipelines have been designed for the specific purpose and contents. As required the structures will be rendered impervious to the materials stored therein. Diesel fuel pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (dual-contained pipe system).

Bunds and delivery bays are equipped with hydrocarbon probes in the bund sump which detects diesel in the bund. This triggers closure of the sump discharge and sends an alarm signal to the BMS.

Each fill 'top up' tank (See section 6.11) is bunded to a volume of 110% of the capacity of the tank within the bund (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunds is diverted for collection and safe disposal.

Delivery of diesel fuel oil will be a controlled process. and is undertaken in accordance with the Fuel Delivery SOP. Deliveries will be supervised and will take place in designated bunded loading bays. Hydrocarbon separators will be in place for the diesel tanker delivery bay to capture any spills.

The containerised emergency backup generator housing includes retention bunding in the base of the container (see section 6.11), there are leak detection systems within the bund to alert in the event of a leak from the generator fuel tank or lubricating oil tank. The onboard controller for individual generators is connected to the Building Management System (BMS).

The removal of any waste (oil/diesel) from the interceptors is undertaken by a licenced contractor.

All bunds and underground pipelines are integrity tested following installation by the vendor. Follow up integrity testing will be completed every three years in accordance with the IE Licence.

7.0 EMISSIONS AND ABATEMENT TREATMENT SYSTEMS

This section describes the emissions from the unit operations above and the abatement or treatment system in place for those emissions and summarises any

monitoring controls in place. There are no planned emissions to ground, ground water or surface water from the operational development therefore this has not been described.

7.1 AIR EMISSIONS

Main Air Emissions

There are no major air emissions proposed.

Minor emissions

The following is a list of the minor air emission points from each of the emergency back-up generators on the extended campus. These are classified as minor based on the size of the combustion plant and the routine testing and maintenance testing:

- Building A: 26 no. 6.49 MW_{th} diesel powered emergency back-up generator stacks with a minimum height of 25m above ground level; 1 no. 3.03 MW_{th} diesel powered emergency back-up generators
- Building B: 18 no. 6.49 MW_{th} diesel powered emergency back-up generator stacks with a minimum height of 25m above ground level, 1 no. 3.03 MW_{th} diesel powered emergency back-up generators
- Building C: 26 no. 6.49 MW_{th} diesel powered emergency back-up generator stacks with a minimum height of 25m above ground level, 1 no. 3.03 MW_{th} diesel powered emergency back-up generators
- Sprinkler Pumphouse: 2 no. 0.450 MW_{th} diesel powered emergency back-up fire pumps.

The installation requires a continuous supply of electricity to operate. During normal operations, the facility is supplied electricity from the national grid. Outside of normal operations, the facility is first supplied electricity by some or all of the onsite battery installations and then by some or all of the onsite backup generators. Outside of routine testing and maintenance, the operation of these back-up generators is typically only required under the following emergency circumstances:

- A loss, reduction or instability of grid power supply,
- Critical maintenance to power systems,
- A request from the utility supplier (or third party acting on its behalf) to reduce grid electricity load

The environmental impact of these minor emissions are set out in Section 7; Attachment-7-1-3-2-Air Emissions Impact of this license application.

Potential Emissions

These are emissions which only operate under abnormal process conditions. Typical examples include bursting discs, pressure relief valves, and emergency generators. The emergency back-up generators are included as minor emission sources due to the routine testing and maintenance.

- 3 no. Diesel Top Up Tank Emergency Relief Vents (1 per each 40m^3 bulk tank); and
- 70 no. Emergency Generator Diesel Belly Tank Emergency Relief Vents.

The diesel storage bulk tanks and belly tanks at the facility each include two-way normal pressure (breather) and pressure relief vents on the diesel belly tanks. These produce minor diesel vapour (trace) emissions.

Fugitive Emissions

Fugitive emissions are defined as low level diffuse emissions, mainly of volatile organic compounds, that occur when either gaseous or liquid process fluids escape from plant equipment. There are no such emissions anticipated from the installation. External pipelines containing diesel will have flange guards to prevent fugitive emissions.

7.1.1 Treatment and Abatement Systems

The emissions from the emergency back-up generators have been considered against the Medium Combustion Plant (MCP) Regulations (S.I No. 595 of 2017), which transposed the Medium Combustion Plant Directive ((EU) 2015/2193). Under the Regulations new medium combustion plants which do not operate more than 500 operating hours per year, as a rolling average over a period of three years, shall not be required to comply with the Emission Limit Values (ELV) under the Regulations.

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. Air dispersion modelling has been undertaken as discussed in Attachment-7-1-3-2-Air Emissions Impact to ensure that the appropriate ambient air quality standards are met. The modelling has been undertaken using the AERMOD air dispersion model in line with EPA Guidance Note AG4.

The stack heights of the emergency back-up generators for the have been designed to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with these ambient air quality standards at all off-site locations (including background concentrations). There is no SCR abatement or treatment systems proposed or required for the emergency diesel generators.

The results on the air dispersion model undertaken for the installation is set out in Attachment-7-1-3-2-Air Emissions Impact. The USEPA methodology modelling results (based on 72 hours of operation) indicate that ambient ground level concentrations are below the relevant air quality standards for NO_2 for all scenarios modelled and no additional abatement systems are required.

7.1.2 Control and Monitoring

The emissions from the emergency back-up generators have been considered with respect to the Medium Combustion Plant (MCP) Regulations (S.I No. 595 of 2017), which transposed the Medium Combustion Plant Directive ((EU) 2015/2193).

The diesel generators are for emergency back-up use only and are not anticipated to operate in excess of 500 hours per annum. Therefore, the emergency generators are exempt from complying with the emission limit values subject to Section 13(3) of the Medium Combustion Plant (MCP) Regulations.

7.2 EMISSIONS TO SEWER (WASTEWATER EMISSIONS)

Foul Water Drainage

Foul drainage will be collected in the onsite foul network and will be discharged to the local foul sewer(s).

The foul sewerage from the site will discharge via 225mm pipes into the existing foul network at two locations to the west and east of the site. The western outfall will cater for foul flows from Blocks A, B and 50% of Block C. while the second outfall to the east will cater for 50% of Block C as well as the welfare facilities associated with the permanent 110kV GIS Substation.

The wastewater discharged from the site will ultimately discharge to the Ringsend WWTP and will not materially impact on its capacity.

Cooling Water Discharge/Emissions

Residual cooling water, associated with the evaporative cooling process, is discharged from the cooling systems to the foul network.

7.2.1 Treatment and Abatement systems

There is no requirement for onsite treatment or abatement for foul effluent or process water produced from the facility. This will be treated offsite at the Ringsend Wastewater Treatment Plant. The cooling water discharged from the evaporative cooling units is effectively clean water that has passed through the cooling equipment.

Rainfall which passes through the back-up generator exhaust stacks will discharge to a Class 2 petrol interceptor before connecting to the foul drainage network. The Class 2 petrol interceptor is located downgradient of the foul drain which collects the rainwater which passes through the backup generator stacks.

As there are no food preparation areas within Buildings A to C there is no requirement for the installation of a grease trap to prevent fats, oils and greases (FOG) from entering the foul network.

7.2.2 Control and Monitoring

As there is no separate process and foul water network on site, monitoring of the overall sewer discharge is proposed.

The emission / offsite discharge points are labelled SE1, SE2 on the Foul Water Drainage Drawing A093-CSC-XX-XX-DR-C-1201 Layout included with the application.

An application for Trade Effluent Discharge Licence for the discharge of evaporate cooling water for the installation has been applied for (Irish water Reference number: 11712).

7.3 SURFACE WATER EMISSIONS

There are no process emissions to surface water or to the storm sewer. The only planned emission to surface water consists of clean stormwater from building roofs, yards and the road network.

The attenuated stormwater drains at 4 no. Emission Points (SW1, SW2, SW3, SW4) The site drainage is shown on Drawing A093-CSC-XX-XX-DR-C-1101 included with this application. Attenuation Basin 1 discharges at Emission Point SW1 into the existing 450mm storm sewer to the west of the subject lands. Attenuation Basin 2, Attenuation Basin 3, and Attenuation Basin 4 discharge at Emission points SW2, SW3, SW4 respectively, into Baldonnell Stream located to the north of the site.

The existing 450mm storm sewer and the Baldonnell Stream outfalls into the Griffeen River; and ultimately connect to the River Liffey and Dublin Bay.

7.3.1 Treatment and Abatement systems

This network conveys the stormwater through petrol interceptors, to one of 4 no. stormwater attenuation basins with sediment forebays constructed on the campus.

The discharge from site will pass through Klargester Bypass Oil Separator and a Hydroshark stormwater treatment to remove any hydrocarbons and screen rubbish, debris and sediment from the surface water. The Klargester Class 1 Bypass Oil Separators are located immediately up gradient of each attenuation basins to ensure the quality of stormwater discharge is controlled prior to attenuation and discharge offsite. The interceptor will be equipped with level detection and will connect to the BMS/EPMS critical alarm. Stormwater discharge from the offloading areas for the bulk diesel tanks also discharge through the Class 1 bypass petrol interceptor upgradient of the attenuation basin.

The sediment forebays in each attenuation pond are design to trap and capture any debris or sediment in the stormwater. There is no further requirement for additional on-site treatment of stormwater from the site.

Additional onsite control and mitigation measures are in place including:

- Double lined diesel tanks with high- and low-level alarms;
- Bunded bulk diesel tanks with high- and low-level alarms;
- hydrocarbon interceptors with level alarms; and
- Standard operating procedures for fuel delivery.

7.3.2 Control and Monitoring

No online monitoring is proposed for the stormwater discharge. The only bulk chemicals stored are hydrocarbons; adequate control measures are in place to monitor any potential leaks or spills of hydrocarbons at source.

It is proposed that weekly visual inspections for discolouration and odour are undertaken upstream of the stormwater discharge points (Monitoring Point SW1, SW2, SW3, and SW4).

Due to the lack of bulk chemicals storage on site, and the robust control measures outlined above it is considered that no further monitoring or control methods are required.

7.4 EMISSIONS TO GROUND

There are no emissions to ground from the installation.

7.5 NOISE EMISSIONS

During operational, the primary source of noise is expected to arise from building service plant which will be required to service the data storage facilities (i.e. the AHU air intake and the AHU air exhaust) as well as the operation of the emergency back-up generators during testing and emergency scenarios (i.e. generator air intake, generator air exhaust and generator engine exhaust).

An assessment of the noise emission impacts in line with the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* has been conducted by AWN and included in Attachment-7-1-3-2-Noise Emissions Impact Assessment.

7.5.1 Treatment and abatement systems

Plant items have been selected in order to achieve the required noise levels in order that the plant noise emission levels are achieved on site during operations. Each emergency generator is contained within an acoustic container to dampen the noise, and in line attenuators for the generator stacks and exhausts are used where necessary.

With due consideration as part of the detailed design process, this approach will result in the site operating well within the constraints of the best practice guidance noise limits that have been adopted as part of the detailed assessment.

It is anticipated that the noise abatement measures are sufficient to ensure that the noise levels comply with the daytime, evening and night-time noise limits proposed, to be stipulated in the IE licence at the nearest noise sensitive receptors.

7.5.2 Control and Monitoring

Annual day time, evening and night-time monitoring is proposed to be undertaken in accordance with standard IE licence requirements.

8.0 MANAGEMENT AND PROCESS CONTROL SYSTEMS

8.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

An Environmental Management System (EMS) will be developed for the site in accordance with the requirements of BAT. The EMS will outline the management of the site's environmental program and, although not certified by ISO, will be in line with the principals of ISO14001.

8.1.1 Building Management System (BMS) and Electrical Power Monitoring System (EPMS)

The installation operates a Building Management System (BMS) and an Electrical Power Monitoring System (EPMS) for control and monitoring, data collection and alarm/reporting of the air handling systems and mechanical utility systems site wide. Specifically, this includes the cooling systems, electrical supply, emergency back-up generators, water supply, fire alarms, fire detection and suppression systems and fuel oil use.

The BMS/EPMS will ensure the facility is running an optimal efficiency and will alert the operators in the event of a malfunction through the use of visual and auditable alarms. This includes malfunctions of the bulk fuel tank level indications and of the hydrocarbon interceptors, and any fuel bund or tank leaks.

The EPMS monitors the total fuel use as required for the GHG Permit. The EPMS will also control the changeover in electrical supply from the grid to the emergency back-up generators in the event of an outage.

8.2 EMERGENCY RESPONSE PLAN

An on-site Emergency Response Plan (ERP) has been developed for the data storage facilities and will be updated to incorporate any requirements of the Licence and future development. The ERP details the required actions to be undertaken in the event of an incident on site and will cover all possible emergency scenarios including fires, explosions, natural disasters, chemical spills, terrorism, etc. The ERP also includes the arrangements for contacting the emergency services and the relevant ADSIL personnel. The ERP is reviewed regularly by the Regional Environmental Manager and Regional Safety Manager and is updated as required.

It should be noted that the installation will operate 24/7, 365 days a year. There is therefore no additional specific procedure required for emergencies outside normal working hours.

In addition to the ERP there is a disaster response procedure which provides instruction for the Disaster Response Action Team (AWS DRT).

8.3 STANDARD OPERATING PROCEDURES

Standard Operating Procedures (SOPs) have been developed for ADSIL sites and these will be continuously updated in conjunction with the EMS. These address all the relevant environmental matters onsite including, but not limited to;

- Spill prevention and response procedures,
- Pollution management and prevention,
- Waste Management,
- Fuel delivery,
- Emergency electricity supply and changeover procedures.

8.4 PREVENTATIVE MAINTENANCE

Preventative Maintenance (PM) is undertaken on mechanical moving parts equipment and electrical equipment including pumps, AHUs, humidifiers, generators, power transformers, etc. This maintenance includes all the regular and systematic tasks that ADSIL will carry out to ensure that the equipment is in an acceptable working condition, delivering required performance and expected durability.

Enterprise Asset Management (EAM) is the software platform ADSIL Infrastructure uses to maintain and manage its mechanical, electrical, and plumbing (MEP) equipment. This platform enables Infrastructure teams to do a variety of tasks:

- Track and coordinate planned and unplanned maintenance
- Track the full life cycle of critical data center assets

- Identify defective equipment through mechanisms like field service bulletins (FSBs)
- Provide tracking for DCEO spare part inventory
- Provide key insights for equipment failure, root cause analysis (RCA), and total cost of ownership (TCO)

The EAM team maintains the EAM system – the EAM team objective is to create and maintain a reliable maintenance platform that improves operational excellence, reduces both equipment failures and maintenance costs, and promotes standardized processes that support operations in ADSIL data centers.

A Maintenance Plan is developed before commissioning of equipment to include all the operations to be carried out in detail, as well as the means to be used and the estimated duration of the operations. The plan shall also include periodic assessments of the state of the installation and proposals for improvement.

In addition to the PM, regular inspections of all infrastructure onsite. The twice a shift inspection of infrastructure ensures that any issues are dealt with if they arise.

8.5 WASTE MANAGEMENT

The majority of the wastes generated at the installation will be non-hazardous. Waste operations will involve proper segregation and management of waste.

All waste leaving site will be recycled or recovered, except for those waste streams where appropriate recycling facilities are currently not available and the waste is disposed of as a last resort. All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted and / or licenced facilities. All waste leaving the site will be recorded and copies of relevant documentation maintained.

Any waste classed as hazardous will be stored in a designated area (suitably bunded, where required) and will be removed off site by a licensed hazardous waste contractor(s).

Waste oil, filters, waste batteries and waste sludge from the petrol interceptors will be removed directly by the maintenance contractors as and when generated; however, the Operator will appropriate permits and waste documentation, compliant with relevant legislation are provided by the licensed waste contractors.

Waste SOPs are in place for the operation of the data storage facilities. This will ensure the proper management and recycling of wastes generated at the facilities. The waste SOPs will enable the facility to contribute to the targets and policies outlined in the *Eastern-Midlands Region Waste Management Plan 2015-2021.*

8.6 ENERGY MANAGEMENT

Energy management forms an integral part of the installation's management. Measures are in place to minimise energy use as far as possible. ADSIL is committed to continually improving their energy efficiency and reducing their carbon footprint.

A Building Management System (BMS) and an Electrical Power Management System (EPMS) are in place to track the operation of critical sub-units and report back on energy efficiency of each section.

The Energy Efficiency Management System (ENEMS) that will be developed for the site in accordance with BAT will set out the energy targets for the specific facility on an annual basis along with the responsible party; and targets will be assessed at the end of each year and reported in the Annual Environmental Report for the facility. Energy efficiency learnings are shared between sister facilities in Ireland and Europe.

The ENEMS will include Key Performance Indicators (KPIs) for energy efficiency. The efficient use of energy will be monitored as part of the site's continuous improvement programme to ensure all colleagues on site actively participate in the programme. Key process monitoring will be carried out to monitor the plant performance including water usage, energy consumption (diesel and electricity), hours of operation and power generated. The energy monitoring via the BMS will be accessible in real time so that future decisions on energy management/optimisation can be made on a fully informed basis.

Electrical performance monitoring in respect of Power Usage Effectiveness (PuE) of the site is undertaken on a continuous basis. PUE is an indicator for measuring the energy efficiency of a data centre. PuE is measured as a ratio of total amount of energy used by a computer data storage facility to the energy delivered to computing equipment. An ideal PUE is 1.0. Anything that isn't considered a computing device in a data storage facility (i.e. lighting, cooling, etc.) falls into the category of facility energy consumption.

Further details of energy efficiency measures on site are included in Attachment-4-7-2 of this Application.

8.7 FIRE MANAGEMENT

A system shall be provided for detection, alarm and fire suppression to enhance life safety and protection of property by the detection of fire, enabling an audio/visual alarm to be given such that emergency actions may be taken fully compliant with Irish and EU regulations and in accordance with the insurers' requirements.

The data storage facilities are equipped with automated fire detection systems (heat and smoke). These are connected to a main fire panel in the security office which is manned at all times. In the event that a fire is detected, the fire panel will display the location of the detected fire. Once detected the location of the potential fire will go into an alarm state. The fire detection and alarm systems are connected to the sprinkler system and these will be triggered in the event of a fire.

The fire detection and alarm systems are/will be subject to routine checks by site personnel and are/will be inspected and tested by the external service provider on a regular basis.

A firewater retention risk assessment is included with this application documentation Attachment-9-2-3-FWRA.

9.0 CESSATION OF ACTIVITY

9.1 SITE CLOSURE

A certain amount of environmental risk is associated with the cessation of any licensable activity (site closure). An outline Site Closure report has been provided in

Section 9 of this application. Details outlined in the Site Closure Plan include the following:

- Decommissioning of equipment will involve disconnecting all electrical connections and decommissioning the IT Hardware, the diesel fired generators, the transformers, and all other relevant operational equipment at the installation,
- The diesel generators, transformers, servers and other equipment will be removed and sold to a third party or scrapped depending on the age/condition at the time of closure,
- Hazardous materials stored in chem-stores, raw materials in the operations area, and any other materials on site will either be returned to the suppliers or disposed of as hazardous waste by a suitable waste contractor; and
- All non-hazardous waste will be sent for appropriate recycling, recovery, treatment or disposal.

It is anticipated that the EPA will impose suitable Conditions to the IE Licence once granted to ensure the proper closure of the activity with aim of protecting the environment.

9.2 BASELINE REPORT

A complete Baseline Report for the site has been produced and included in Attachment-4-8-3 Complete Baseline Report. The baseline report provides conditions of the site prior as it existed prior to the construction and operation of the facility.

On the basis of the site investigations undertaken prior to construction and an assessment of source-pathways-receptors, the Baseline Report concludes that:

- A review of the available soil and water quality confirms that there is no evidence of any residual contamination beneath the site.
- There is only bulk diesel storage proposed for the facility. However, the risk prevention measures planned at the facility significantly reduce the potential for an environmental impact to soil or water to occur. These measures include bunded and double contained vessels, double lined drainage and containment systems and spill management procedures.
- Source-pathway-receptor linkages were assessed for the bulk storage areas. It was concluded that there are no direct pathways to either the soil or groundwater environment. Interceptors are installed on the surface water drainage. A leakage from a bulk tank would be fully contained in the designated bund or the double skin lining of the tank, with leaks during delivery fully contained within the continuous hard stand delivery area. Any leakage outside of the delivery area would be contained within the drainage system.

9.3 ALTERNATIVES

9.3.1 Process alternatives

In terms of technology, the installation will employ similar data server technology that is used by the Operator at their other facilities, in the greater Dublin area and around the world, and represents state of the art technology.

Alternative technologies are considered on an ongoing basis by the Operator as a part of each of its designs based on many factors including technical feasibility, environmental impact, efficiency, security, reliability and cost.

The Operator is committed to continually assessing and improving this technology particularly with respect to minimising power and water consumption, in accordance with the goals of Irelands Framework for Sustainable Development *'Our Sustainable Future'*. The operator's designs are constantly evolving, and hardware is chosen with energy efficiency central to the decision-making process.

High efficiency EC direct drive fans will be used in all air supply and extract systems serving the data storage rooms. Also, the office air conditioning shall be served by a variable refrigerant flow (VRF) refrigerant system. Typically, the energy efficiency of a VRF system will exceed that of traditional air-cooled chillers by 15-25%.

9.3.2 Alternative Mitigation Measures

The Environmental Impact Assessment Report (EIAR) relating to this activity, prepared by Marston Planning Consultancy et. al. dated April 2020, which has been previously submitted to SDCC for Planning Ref. SD20A/0121 has been submitted to the Agency as part of this application (Attachment 6-3-6 of the IE Licence application).

The mitigation measures proposed are outlined in the EIAR completed for the installation at planning phase (operational phase and construction phase). These represent the best practice for achieving minimal impact on the receiving environment.

For each environmental factor considered within the EIAR, the specialist considered the existing environment, likely impacts of the development and reviewed feasible mitigation measures to identify the most suitable measure appropriate to the environmental setting the project design. In making a decision on the most suitable mitigation measure the specialist considered relevant guidance and legislation at the time. The selected mitigation measures are set out in the EIAR Chapters (Attachment 6-3-6 of the IE Licence application).

In each case, the specialist at the time reviewed the possible mitigation measures available and considered the use of the mitigation in terms of the likely residual impact on the environment. The four established strategies for mitigation of effects have been considered: avoidance, prevention, reduction and offsetting (not required in this development). The mitigation measures presented in the EIAR report represent the best options for the site.

The mitigation measures for the environmental aspects considered under this IE licence application (if relevant) are set out in the accompanying emissions impact assessment reports within Section 7 of this licence application.