Attachment-4-8-1-Operational Report

Google Ireland Data Centre
Industrial Emissions Licence Application
IE0312513-22-RP-0004, Issue: A

Issue date: 25 Nov 2022

Document Sign Off

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Industrial Emissions Licence Application
IE0312513-22-RP-0004, Issue A

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1 Introduction

This Operational Report has been prepared for Google Ireland Ltd. as part of an application to the Environmental Protection Agency (EPA) for an Industrial Emissions (IE) licence for its existing Data Centre facility at Grange Castle Business Park South, Baldonnel Rd, Dublin 22, D22 X602 (Application Ref. No. LA010409).

The IE Licence will permit Google Ireland Ltd. to carry out the following new activity which is listed in the First Schedule of the EPA Act 1992, as amended;

2.1 Combustion of fuels in installations with a total rated thermal input of 50 MW or more.

The combustion plant on site consists of twenty four back-up generators which would be used to power the data centre facility in the abnormal event where the normal supply of electricity was not available to the site from the national grid. If the use of all generators on site was required in an abnormal scenario this would trigger the Industrial Emissions Activity Class 2.1 as the combined rated thermal input of the back-up generators is more than 50MW_{th}.

This Operational Report describes the plant, methods, processes, ancillary processes, abatement, recovery and treatment systems, and operating procedures carried out at the Google Ireland facility in accordance with the EPA's Licence Application Form Guidance[1].

1.1 Site Location

Google Ireland Ltd. first started operations in Grange Castle Business Park South in 2012 with the commissioning of its first data centre at the site (Building 1). Building 2 was constructed in 2015-2019 in two phases. The first phase became operational in 2016 and the second phase in 2019. The area of the site within the proposed IE Licence site boundary is approximately 8 hectares in size.

Most of the land surrounding the site to the west and north is now occupied by industrial campuses including pharmaceutical, data centre, manufacturing and commercial uses (refer to Figure 1.1 and the Site Location Drawing included in *Attachment-3-2-2-Site Location Plan* submitted with this application. The area to the east and south of the site is predominantly a rural setting with Grange Castle Golf Club to the east and Baldonnel Aerodrome located to the south.

Grange Castle Industrial Estate is located to the north and is home to large commercial/industrial facilities including Amazon, Digital Realty, Pfizer, Takeda, Microsoft, Cuisine de France, Grifols, Interxion and EdgeConnex - See Figure 1.1 and Site Location Drawing included in *Attachment-3-2-2-Site Location Map* submitted with this application. Minor public roads are found surrounding the area with scattered single dwellings located along these roads. The nearest residential houses are located adjacent to the south of the site proposed licence boundary.

[1] Environmental Protection Agency, Licence Application Form Guidance Industrial Emissions (IE), Integrated Pollution Control (IPC) and Waste Version 2, March 2018

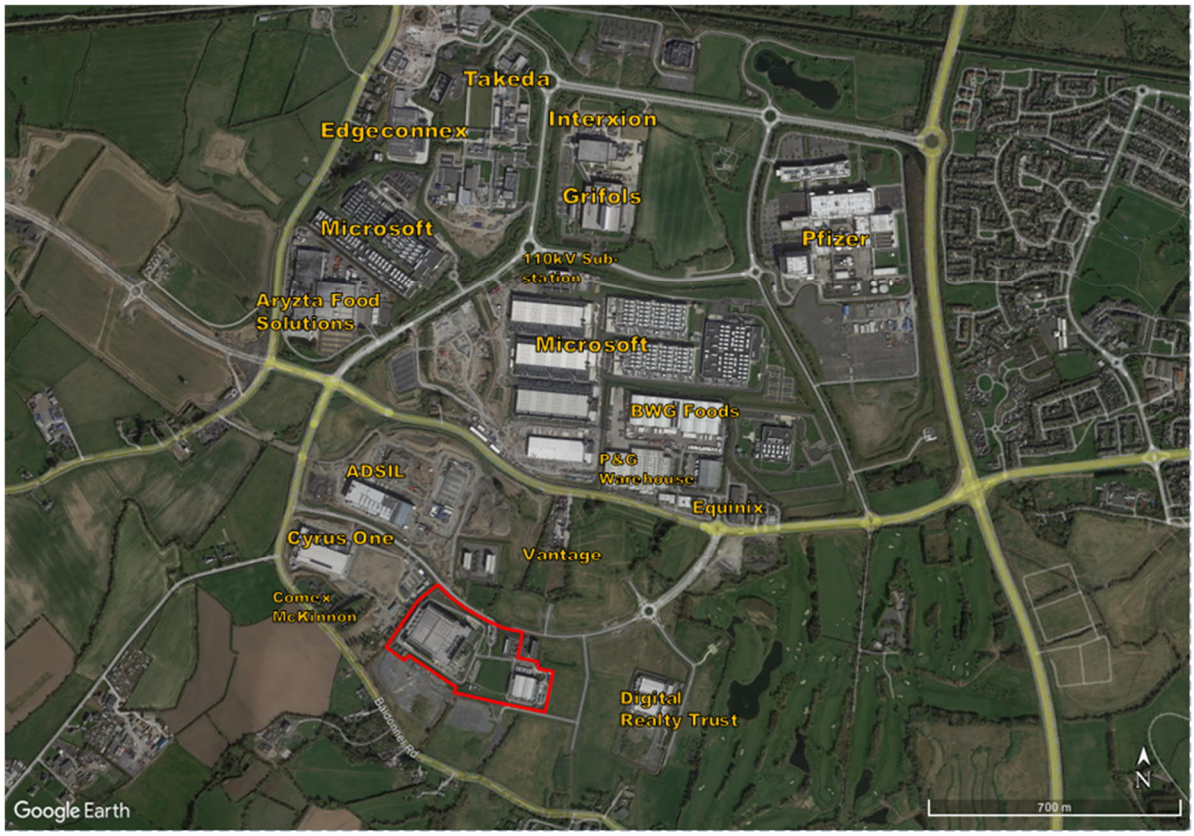


Figure 1.1: Google Ireland Proposed Licence Boundary (outlined in red) and site location (Source: Google Earth; Annotated by PM Group)

1.2 Facility Description and Buildings Overview

A data centre is a centralised computer server, information storage and management facility designed and operated for the purpose of storing, managing and distributing electronic information to individuals, businesses and organisations. The facility is used to house computer systems and networking equipment.

The Google Ireland Data Centre contains servers needed to store information, process queries and deliver content that customer's request. The servers are connected to the customers through fibre networks from the facility and spreading out from Ireland into Europe and globally.

The data centres are powered by two on-site 110 kV transformers at the onsite Google substation which are fed from the EirGrid Barnakyle 110kV substation. Currently there is a single supply from Castlebaggot 220/110 kV substation into Barnakyle substation. The 110kV network is currently being reconfigured. By the end of 2022 the site will have a ring configuration in place with two separate supplies from Castlebaggot 220 kV substation.

One transformer onsite supplies Building 1 and the other transformer onsite supplies Building 2. Each line and transformer has enough capacity to supply the whole site individually should one line or transformer malfunction.

There are back-up generators on site which would be used to power the data centres in a back-up capacity where the normal supply of power was not available. These generators are not operational during normal operations, only for testing and maintenance purposes.

As described in Section 1.1, there are two data centre buildings on the Google Ireland Ltd. site; Building 1 and Building 2, each of which have a number of smaller ancillary buildings associated with them.

Building 1

Building 1 is 15.2m in height and has two technology areas, one at ground floor and one at first floor level with plant rooms and shipping and receiving areas to the north of the technology areas at both levels.

There is an administration area over three levels in the building, and a plant room on the second level.

The building has 24 no. external Air Handling Units (AHU's) to the west and east of its external perimeter which serve the data halls. There are also AHUs in the internal plant areas which serve the Facility Support Areas (FSA) - offices, canteens, meeting rooms etc.

The back-up generators for Building 1 are located to the north of the building in individual enclosures - each with an individual fuel tank.

There is also a Sprinkler Water Tank and Pump House installed on concrete plinths to the northeast corner Building 1.

Building 2

Building 2 is 20m in height and consists of data halls with associated support areas, offices and staff facilities, loading area, internal and external plant over two main storeys. The administration corner is to the southeast of the building with the loading area located to the northeast boundary.

There are 64 no. external AHU's on both the northern and southern sides of Building 2 with 32 no. units on the ground floor and 32 no. units on the first floor (a total of 32 no per floor). Building 2 also has internal AHUs located in an internal plant room.

The back-up generators for Building 2 are located internal to the building, with some located in 5 no. dedicated generator rooms on the east side of the building at ground floor level and the remaining located in 4 no. dedicated generator rooms on the west side of the building at first floor level.

The diesel storage for the back-up generators at Building 2 differs from that of Building 1 - rather than each generator having its own fuel tank, there is a central fuel oil storage system consisting of four no. central single skin tanks, with two tanks located on the west side of the building and two tanks on the east side of the building. Each tank is installed with its own containment bund which has a capacity to hold at least 110% of the working volume of the tanks.

There is a sprinkler water storage tank and associated pump house located to the south of Building 2. There is also a single storey substation building and transformer yard managed and used by Google. There is a stormwater attenuation pond at the northwest of the site.

The site layout is illustrated in Figure 1.2 below, and the site plan drawing included in *Attachment-3-2-3-Site Plan* submitted with this application.

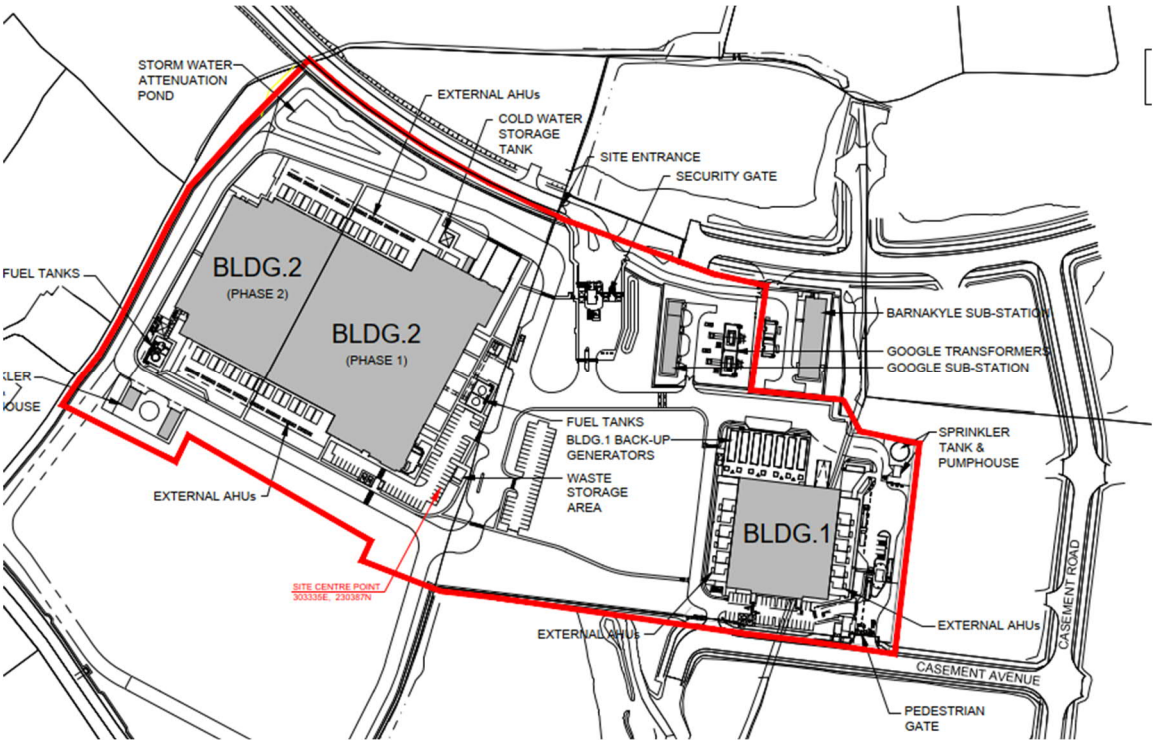


Figure 1.2: Google Ireland Data Centre Site Layout - Proposed Licence Boundary outlined in red

1.3 Hours of Operation

The Google Ireland Data Centre is full-time operational, i.e. 24 hours a day, 7 days a week, with continual shift staff and security presence on site.

2 Products

The Google Ireland Data Centre provides the service of data storage - there are no products manufactured at the facility.

3 Unit Operations and Basic Process Description

A Data Centre is a centralised location where computing and networking equipment is used for collection, storage, back-up and recovery, processing, distributing or allowing access to large amounts of data.

The core element of the data centre facility is the servers which are high-performance computers. Management of the Data Centre and its servers includes the following elements;

3.1 Energy Management

Energy efficiency is a key focus of the Google Ireland Data Centre facility and energy use is continuously monitored and reviewed. Energy Efficiency is incorporated into the site specific Energy Management System (EnMS) implemented at the site. The EnMS is part of the corporate Energy Performance Management System which is part of the ISO 50001:2018. The company has a valid certificate which was accredited by EY CertifyPoint.

The scope of this ISO 50001:2018 certification is as follows:

- Datacentre infrastructure and operations, including:
- Energy consumption from electricity, natural gas and diesel (in back-up generators when utilized during utility outages) in fixed structures, including substations, that contain or directly support Google IT operations;
- Diesel fuel use for operations and maintenance (O&M) purposes in back-up generators once O&M is transferred from construction contractors to Google;
- Fuel use in Google owned or leased vehicles;
- Diesel fuel use in emergency fire pumps;
- DC site selection including power purchase agreements;
- The design and procurement of DC server floor equipment.

All Google Data Centres are designed with high efficiency standards to use as little energy as possible through minimising power loss and removing unnecessary parts. The servers are also designed as energy-proportional systems e.g. they use minimal energy when idle and waiting for a task.

Google matches 100 percent of its global annual electricity use with renewable energy purchase and are carbon neutral through their renewable energy use and carbon offsets. The data centre industry uses the measurement Power Usage Effectiveness (PUE) to measure efficiency. A PUE of 2.0 means that for every watt of IT power, an additional watt is consumed to cool and distribute power to the IT equipment. A PUE closer to 1.0 means nearly all of the energy is used for computing. Google carry out benchmarking of all their Data Centres by comparing the PUE.

Energy efficient design is considered at all possible points during detailed design of proposed new facilities. The following sustainable design features in relation to electrical services are included in the Google Ireland Data Centre;

- Outdoor lighting installed at the facility consists of column mounted and building mounted energy efficient luminaires within car park and loading bay areas.
- The internal lighting installed in the facility is of fluorescent type in Building 1. The lighting in Building 2 is LED, and there is a project in progress to upgrade the lighting in Building 1 to LED also. All lighting is locally switched on in all areas with absence detection for energy efficiency.

- Emergency and exit lighting consists of self-contained high efficiency luminaires.
- High-efficiency power supplies are used to minimize the number of times power is converted from one type of electrical current to another and keep power supplies as close to the load as possible.

3.2 Monitoring and Control

All utilities and services required for the operation of the Google Ireland Data Centre are monitored, recorded and controlled using the Building Management System (BMS) and Power Monitoring System (PMS) in each building.

Using the BMS and PMS systems ensures that the facility is operated at optimal efficiency. It also allows immediate alerting of problems to the operators in the event of a malfunction.

3.3 Cooling and Heating

3.3.1 Electrical Room Cooling

The electrical rooms in Building 1 are cooled by a dedicated mechanical ventilation louvres system utilising airside economisation.

The Electrical Rooms on the east side of Building 2 are cooled by passive ducts, while the Electrical Rooms at the west side of Building 2 use external louvres. Exhaust air is extracted from the electrical rooms via roof mounted exhaust fans. No heating is required in the electrical rooms.

3.3.2 Generator Rooms Cooling and Heating

The generators in Building 1 are external to the main building, located within individual enclosures.

The generator rooms in Building 2 are heated in the winter using a heat recovery system and also electrical heating. Air is drawn from the technology or electrical rooms and used to heat the generator rooms.

When the generators are running, ventilation and combustion air is drawn through the generator intake shaft and discharged via the exhaust gas flue and the radiator discharge wall mounted louvre.

3.3.3 Facility Support Areas (FSA) Comfort Cooling

In Building 1, the Administration Area comfort cooling is based on a Variable Refrigerant Volume (VRV) split unit air condition system complete with Fresh air ventilation AHU.

A heat recovery ventilation AHU provides temperature fresh air to the offices in the Administration Area. This unit reduces the overall energy consumption by extracting hot air from the Data Halls return plenum and then recovering the heating energy to warm the incoming fresh air. The AHU consists of an air to air heat exchange unit which allows hot air from the data hall be utilised to provide pre heat of the outdoor air.

In Building 2, cooling and heating of the Facility Service Areas (FSAs) (e.g. Office, meeting room etc.) is provided by AHU's and a 4-pipe fan coil unit (FCU) system. Each room is fitted with local FCUs which control room temperature via recirculation of conditioned air. Air is supplied to the room via ceiling diffusers and returns to the FCU through the ceiling void. The temperature is controlled by wall mounted controllers.

Chilled water from the Chilled water system (CHW) and hot water from the Low Pressure Hot Water (LPHW) distribution pipework system is extended to each FCU from central air-cooled chiller and water source heat pump.

3.3.4 Data Hall Cooling

The Data Halls in Building 1 and Building 2 have a direct air free cooling system. Air is delivered to the space via Air Handling Units (AHU's) located externally. Supply and exhaust air is delivered to the Data Hall via energy efficient AHU's. Exhaust air is discharged to atmosphere via discharge air stacks.

3.3.5 Loading Bay Heating and Cooling

For the loading areas, heat recovery is utilised by drawing warm air from the technology space via supply air fans. During summer months a combination of natural and mechanical ventilation is utilised to cool the space. Warm air is drawn from the technology space via supply air fans to the loading bay.

3.4 Back-Up Generator Testing and Maintenance

As stated above the back-up generators at the site are not operational during normal conditions, but rather periodically for testing and maintenance purposes. Typically, the testing and maintenance of the generators at Building 1 and Building 2 involves the following:

- **Test 1 (Monthly Maintenance):** Testing eleven times per year of all 24 no. back-up generators on the campus at 0% load for a maximum of 30 minutes each, one generator at a time, sequentially.
- **Test 2 (Annual Maintenance):** All 24 no. back-up generators will be tested individually for 90 minutes at 100% load once per year.
- **Test 3 (Electrical Maintenance Building 1):** All 7 no. back-up generators on Building 1 will be tested individually for 60 minutes at 100% load once per year. In addition, all Building 1 generators will be tested for 12 hours, with no more than three running together once every three years.
- **Test 3 (Electrical Maintenance Building 2):** All 17 no. back-up generators on Building 2 will be tested, with either eight or nine running together for 24 hours at 100% load once every three years. In addition, all Building 1 generators will be tested for 12 hours, with no more than three running together once every three years.
- **Test 4 (MDC Building 1):** All 7 no. back-up generators on Building 1 will be tested together for 12 hours at 100% load once every three years.
- **Test 4 (MDC Building 2):** All 17 no. back-up generators on Building 2 will be tested together for 12 hours at 100% load once every three years.
- **Miscellaneous operation** – an allowance for the operation of all 24 generators to operate 5 hours per year on an individual basis at 100% load each year.

3.5 Security and Safety

The entire facility is surrounded by security fencing, with the only access to the site being via the main site access road through the security gate which is occupied by security staff on a full time basis.

A safety management system is implemented at the site to ensure safe work practices are carried out.

Fire detection – the facility is protected by a purpose built automatic sprinkler system in accordance with BS 5306 - fire extinguishing installations.

3.6 Waste Management

A hierarchy of waste management favouring elimination of wastes over minimisation and disposal is practised at the Google Ireland Data Centre facility in Grange Castle Business Park South.

Given the nature of the activity at the Google Ireland Data Centre, there is minimal amounts of waste generated annually. There are typical office wastes generated and some waste associated with the maintenance and servicing of the back-up generators including Waste lubricant oil, oily waste and waste coolant. All waste is segregated at source and collected in dedicated, appropriate, labelled receptacles. It is collected from site recycled/recovered by appropriately licenced waste vendors.

More details on quantities and types of waste generated at the facility and the waste management hierarchy that is implemented is included in this licence application in *Attachment-8-1-Waste Generated and Animal By-products* and *Attachment-8-2-1-Waste Hierarchy*.

3.7 Site Utilities

The main utilities required to support the facility are;

3.7.1 Water

Domestic Water

24-hour cold water storage is provided via cold water storage tanks on site. Cold water is distributed to sanitary devices via a boosted piped distribution system.

Mains water is provided to drinking fountains and canteen kitchen sinks. Low flow sanitary devices are utilised also.

Domestic Hot water is regenerated via a combined air to water heat exchanger and heat pump and stored in a centralised hot water cylinder in Building 1 and Building 2. Domestic Hot Water is distributed to sanitary fittings and sinks.

3.7.2 Fuel Oil Storage and Handling

Diesel is stored and handled at the Google Data Centre in accordance with the requirements set out in the REF Document on Best Available Techniques for Emissions From Storage, July 2006 and the EPA's Guidance to Storage and Transfer of Materials for Scheduled Activities, 2004.

The diesel tanks at Building 1 are combined with their individual generators in an enclosure (belly tank). Each fuel storage tank is double contained with leak detection system in the void space between the two containment layers.

The generators are located on a concrete slab. The generator tanks also contain very small quantities of oil and coolant. There is a drainage channel around the perimeter of the concrete slab to drain surface runoff and small drops of oil or coolant from the generators from maintenance works.

The drainage channel connects to the stormwater drainage system and passes through the Class 1 full retention petrol/oil separator located at the fuel unloading area.

There is also an emergency shut off valve located at the unloading area which is manually shut during maintenance works to generators as well as for fuel unloading operations.

Fuel pipes from the unloading area to the fuel storage tanks and from the tank to the generators are double contained with a leak detection system in the void space.

The Fuel Oil Control System at Building 2 has a remote tank level indicator with a mechanical overfill protection device in each tank. When the storage tank point level float switch detects a high fill level (approximately 85% tank maximum capacity) a local audible tank high level warning alarm shall be initiated.

When the storage tank point level float switch detects a full fill level (approximately 90% tank volume), a local audible tank full alarm is initiated and valves automatically close down, the fuel delivery is stopped.

From there the delivery operator must stop the fuel transfer, and the start fill hose drain procedure.

There is also a critical high level float that, if activated, automatically locks the fill control valves closed in the event the tank is ever filled to the 95% fill level. The 95% safety lock out will not allow the fill valves to operate open until the 95% alarm is cleared.

Fuel oil distribution pumps from the 4 no. central fuel storage tanks are located in each of the fuel store bunds. The pipework distribution is double contained with leak detection and delivers the fuel oil to the generator rooms. There is leak detection in each bund and at all pumping stations.

Staff are fully trained in site standard operating procedures relevant to transfer and handling of liquids (diesel) at the site.

Details of fuel storage quantities at the site are included in Section 2.5.1 of the Confidential Annex being submitted with this Industrial Emissions Licence Application.

3.8 Overall Instrumentation and Process Control

A Building Management Systems (BMS) and Power Monitoring System (PMS) is installed in both Building 1 and Building 2 to control and monitor building services and utility systems.

There is a Siemens Fire Detection System installed at the Google Ireland Data Centre. This is a fully automatic analogue addressable fire detection system, consisting of a graphics system and fire alarm control panels, connected to field devices located throughout the facility. The system incorporates a continuous scanning method which interrogates each detector individually and collects and reports information to the control panel network. The control units make decisions based on the information collected from each detection device.

VESDA (Very Early Smoke Detection Apparatus) is used at the facility also. This is a laser based aspirating smoke detection system, located in data halls, and battery rooms. It also interfaces with the Siemens Fire Detection System.

4 Environmental Emissions and Abatement Systems

4.1 Emissions to Surface Water (not including Stormwater)

There are no direct emissions to surface waters from the facility.

4.2 Emissions to Sewer

There are two separate foul/canteen wastewater drainage systems and discharge points from the Google Ireland Data centre facility for Buildings 1 and 2 respectively which ultimately are treated within the Ringsend WWTP. Both buildings at the facility are cooled using a mechanical free cooling ventilation system.

No change is proposed as part of this IE Licence application to the existing volume or characteristics of the site's foul/canteen wastewater as currently discharged to the WWTP in Ringsend.

Building 1

The current sources of wastewater generated at Building 1 of Google Ireland Data Centre facility are foul domestic in nature only and include; employee toilets, showers and tea kitchen (no cooking) facilities. The foul effluent generated at Building 1 is discharged from the site at the north east corner of the site into the SDCC public sewer in Grange Castle, before ultimately discharging to Ringsend Wastewater Treatment Plant (WWTP).

Historically, Building 1 at Google Ireland Data Centre site was granted a Trade Effluent Discharge Licence (TEDL) (Register No. WPW/615/475) by South Dublin County Council (SDCC) for its Building 1 facility in March 2013. This TEDL was required as there was trade effluent generated at the site by a reverse osmosis plant and water softening plant for a humidification process associated with the Air Handling Units (AHU)'s. This plant was decommissioned in 2014 and the AHU's no longer use humidifiers. Therefore there is no trade effluent currently generated at the site and the discharge licence (WPW/615/475) is no longer in place.

Building 2

A licence to discharge trade effluent to sewer (Ref. no. IW-FOG-757708-01) was granted by Irish Water for Building 2 in 2016 to accommodate discharge of trade effluent from the canteen at Building 2. A copy of the licence is included in *Attachment-7-3-3-Sewer Discharge Consent* of this licence application. In accordance with the conditions of this licence, all wastewater discharge from the kitchens are fitted with grease traps where required. No effluent monitoring is required for wastewater discharge from Building 2 under this trade effluent discharge licence.

A small amount of condensate from small internal air handling units (AHU's) and fan coil units in Building 2 office building which consists of clean water. This water joins the other foul effluent drainage (from employee toilets and showers) and the canteen wastewater before being discharged from the site at the north west of the site (Discharge Ref. No. SE-1). It is discharged from the site to the SDCC public sewer in Grange Castle, before ultimately discharging to Ringsend Wastewater Treatment Plant (WWTP).

4.2.1 Monitoring Requirements

There is no effluent monitoring required for wastewater discharge from the site as the current sources of wastewater generated at the Google Ireland Data Centre site are domestic and foul in nature only. The wastewater discharge licence (Ref. no. IW-FOG-757708-01) in place for the canteen at Building 2 does not include any monitoring requirements for the canteen wastewater - see *Attachment-7-3-3-Sewer Discharge Consent*.

Currently, wastewater emissions from the site are estimated by Irish Water for billing purposes based on the incoming water to the site. The wastewater generated at the site as a whole in 2021 was approximately 2,558 m^3.

4.2.1 Emissions to Sewer Abatement/Control System

In accordance with the conditions of the site's trade effluent discharge licence ((Ref. no. IW-FOG-757708-01), all wastewater discharge from the kitchens are fitted with grease traps where required.

The following mitigation measures have been implemented to ensure that the provision of foul sewage facilities at the Google Ireland Data Centre site does not adversely affect the water environment:

- All drainage pipelines are identified as surface, combined or foul water and suitably colour coded and marked on site drawings (See Site Drainage Plan included in *Attachment-3-2-5-Site Drainage Plan*).
- All foul sewers were pressure tested and surveyed prior to connection to the existing mains foul sewer.

Due to the nature, scale and characteristics of the foul/canteen wastewater that is discharged via SE1 and from the site, it is considered that the discharge of wastewaters from the site to the Ringsend WWTP does not have any significant impact on the operation of the WWTP or its subsequent discharge to the Liffey Estuary.

4.3 Emissions to Atmosphere

4.3.1 Main Air Emissions

There are no main air emission points at the Google Ireland Data Centre.

4.3.2 Minor Air Emissions

The minor air emission points at the Google Ireland Data Centre facility include only general HVAC emissions consisting solely of clean air (12 no. Air Handling Unit Exhausts at Building 1 and 64 no. Air Handling Unit Exhausts at Building 2.)

Further details of all minor emissions at the Google site are provided in *Attachment-7-4-2*, and their locations are shown on the drawing in *Attachment-3-2-3-Air Emission Points* of this licence application.

4.3.2 Potential Air Emissions

Potential emission points are points from which there is no emission during normal operations but emissions to atmosphere may result from equipment malfunctions or accidents.

The potential emission points at the Google Ireland Data Centre facility consist of the following:

Back-up Generators

In the event of a loss of electrical power to the facility, back-up generators will be used to maintain operations at the facility. Under normal circumstances, they will be run for short periods for testing and maintenance purposes only.

The emissions from these diesel-fired back-up generators, when operational, will include the products of combustion - NO_X/NO_2, CO, $PM_{10/2.5}$ and SO_2. A comprehensive impact assessment has been undertaken for the operation of the backup generators at the Google Ireland Data Centre including cumulative air dispersion modelling. See full details in *Attachment-7-1-3-2- Emissions Impact Assessment* of this IE Licence Application (227501.0238R01 (Google Ireland Cumulative Air Assessment).

As the rated thermal input of each of the back-up generators at the Google Ireland Data Centre facility is more than 1 MWth and less than 50 MWth, they are regulated by the (Medium Combustion Plant) Regulations 2017 (S.I. 595 of 2017) (referred to as the MCP Regulations).

The generators in Building 1 and Building 2 (Phase 1) were commissioned in June 2012 and in March 2016 respectively, meaning they are classified as 'existing' combustion plant under the MCP Regulations. The back-up generators in Building 2 (Phase 2) were commissioned in August 2019, meaning they are classified as 'new' combustion plant under the MCP Regulations.

The 'existing' combustion plant at the site (backup generators in Building 1 and in Building 2 (Phase1) will not be operational for more than 500 operating hours each per year, as a rolling average over a period of five years.

The 'new' Combustion plant at the site (backup generators in Building 2 (Phase 2) will not be operational for more than 500 operating hours each per year, as a rolling average over a period of three years.

Emission Limit Values

The Medium Combustion Plant Directive (MCPD) (transposed in Ireland by the European Union (Medium Combustion Plant) Regulations 2017) sets out emission limit values (ELVs) and monitoring requirements for gas emissions of sulphur dioxide (SO_2), nitrogen oxides (NO_x) and dust into the air from medium combustion plant.

However, due to their required operational hours (for testing and backup supply only) the backup generators at the Google Ireland Data Centre facility qualify for exemption from these emission limit values under the MCP Regulations, Regulation 13 (1) for the 'existing' generators and Regulation 13 (3) for the 'new' generators.

Monitoring Requirements

The requirements for monitoring of gas emissions from MCP are set out in Schedule 3, Part 1 of the MCP Regulations. As the back-up generators at the Google Ireland Data Centre facility qualify for exemption from these emission limit values under the MCP Regulations, Regulation 13 (1) for the 'existing' generators and Regulation 13 (3) for the 'new' generators, the following monitoring requirements apply:

'Existing' combustion plant at the site (back-up generators in Building 1 and in Building 2 (Phase1) will undergo periodic air emissions monitoring of sulphur dioxide (SOx), nitrogen oxides (NOx),

particulate matter (PM) and Carbon Monoxide (CO) each time 1,500 operating hours have elapsed, or at least every five years.

'New' Combustion plant at the site (back-up generators in Building 2 (Phase 2) will undergo periodic air emissions monitoring of sulphur dioxide (SOx), nitrogen oxides (NOx), particulate matter (PM) and Carbon Monoxide (CO) each time 1,500 operating hours have elapsed, or at least every five years.

The generators in Building 1 are all uniform and have the same testing regime.

The back-up generators in Building 2 are different from those in Building 1 but are all uniform also.

Therefore, it is proposed there will be representative emissions monitoring points as follows to cover the periodic monitoring requirements of the back-up generators:

- Building 1 back-up generators will be represented by monitoring completed at (A4-1)
- Building 2 (Phase 1) back-up generators will be represented by monitoring completed at (A4-16)
- Building 2 (Phase 2) back-up generators will be represented by monitoring completed at (A4-8)

Emergency Fire Pump Engine

There are two emergency diesel fire pump engines (rated thermal input >1 MWth) at the Google Ireland Data Centre – one at Building 1 and one at Building 2.

These are located in the sprinkler pump-house buildings at each facility and supply fire-fighting water to the site firewater ring main.

The fire pump engines are not run during normal operation other than for testing purposes - (approximately 30 minutes per week and 1-2 hours per quarter). Low sulphur diesel (maximum 0.1% sulphur by mass) is used as a fuel for the firewater pump. When operational, these diesel supplied pumps will emit combustion exhaust gases containing NO_X/NO_2, CO, $PM_{10/2.5}$ and SO_2 into the atmosphere. As the Fire Pump Engines are operational only for testing and as they have a rated thermal input of >1MWth (and therefore are not MCP) - there is no monitoring of the air emissions generated during testing are required.

4.3.4 Fugitive Air Emissions

Some fugitive emissions could arise during the filling and from transfer route connections at the diesel storage tanks at Building 1 and Building 2.

There are also vents fitted in the tanks which release minimal amounts of fuel vapour.

These emissions are considered to be 'fugitive' and will not give rise to negative air quality impacts off-site.

4.4 Noise Emissions

There are a number of different noise sources associated with the operation of the Google Ireland Data Centre.

These include noise generating equipment which will run during normal operations (external HVAC units) and also equipment which will only run only in emergency situations (back-up generators and the fire-water pumps) or intermittently for testing and maintenance purposes.

4.4.1 Abatement of Noise Emissions

The various noise control and attenuation measures that are employed at the Google Ireland Data Centre can be summarised as follows:

- Acoustic insulation / enclosures / baffles and attenuation is provided on plant and equipment as necessary, including the external AHUs, and back-up generators.
- Much of the significant plant and equipment is housed within buildings and therefore has minimal impact on ambient noise levels external to the building.
- Activities outside normal operations are limited to daytime hours as far as practicable to minimise noise generated at night-time. For example, back-up equipment (e.g. back-up generators) is only tested during daytime hours.
- Plant and equipment is maintained and serviced on a maintenance schedule to ensure that they continue to operate as normal without generating any additional noise due to defects.
- Site access roads are of smooth hard standing surface to reduce vehicular noise.

4.5 Emissions to Ground and/or Landspreading

There are no direct emissions to ground or groundwaters from activities carried out at the site.

4.6 Stormwater Emissions

The drainage and paving design at the Google Ireland Data Centre has been developed to ensure no emissions to groundwater. Stormwater runoff from hard-standing areas is collected through a series of drainage networks. The stormwater from site is discharged via SW-1 and SW-2 at controlled rates. Refer to Figure 2.1 for schematic of the site's stormwater system.

There is no change proposed as part of this IE Licence application to the existing volume or characteristics of the site's stormwater drainage system as currently discharged from site.

Stormwater Drainage at Building 1

All stormwater runoff from the vicinity of the Building 1 facility passes through a Class 1 oil/petrol separator and drains to a manhole at the northeast of the site where it is discharged through SW-1 at a restricted rate using a hydro-brake flow control device to an underground culvert north of the site. This culvert originates as a redirected drainage ditch from the south of the east side of the site and runs along the inside of the eastern perimeter of the site boundary to the north where it exits the culvert to a drainage ditch approximately 50m to the north of the site. The drainage ditch discharges to a tributary of the Griffeen River which in turn discharges to the River Liffey approximately 5 km to the north of the site (see the stormwater drainage illustrated on the drawing in *Attachment-3-2-5-Site Drainage Plan*).

The adjacent greenfield areas surrounding the Building 1 facility drain predominantly to the north where stormwater is collected in a series of open ditches which ultimately connect to the Griffeen River.

It is noted that during the Planning Application process for Building 1, it was agreed with SDCC that condensate from cooling plant at the facility would drain through an oil separator to the stormwater drain. Since commission, the steam humidifiers associated with the AHUs at Building 1 have been disabled and therefore there is no longer any condensate generated from them.

There are 28 no. fan coil units at Building 1 which generate a small amount of condensate (clean water) which goes to the stormwater drain through oil interceptors.

Stormwater Drainage at Building 2

The stormwater attenuation system in place at the Building 2 facility includes an attenuation pond located close to the main access road in the northwest of the site.

The stormwater drainage network at Building 2 collects stormwater generated in the vicinity of the Building 2 facility which passes through a number of oil separators and drains to the pond. This pond can cater for both 30-year and 100-year storm events.

A petrol interceptor with an oil alarm, and a sluice gate valve is located at the outfall of the Stormwater pond which discharges to the public stormwater sewer connection point via SW-2

adjacent to Falcon Avenue. This public stormwater sewer drains to a drainage ditch to the north of the site, and ultimately discharges to the Griffeen River approx. 800m north west of the site.

Stormwater discharges from the site comply with the permissible outflow limit of 4 litres/sec per hectare as agreed with SDCC Drainage Department.

Stormwater Drainage at the Google Substation:

Stormwater in the Google substation transformer bunds (2 no.) is manually pumped from a sump into a gully through a full retention oil separator and into the stormwater system if found to be uncontaminated during inspection.

There are 2 smaller house transformer bunds at the Google substation which drain into the stormwater system passing through an oil separator also.

Stormwater runoff from the roads on site drains to gullies which pass through oil separators before joining the site stormwater drainage system.

4.6.1 Storm Water Runoff Abatement/Control Systems

The stormwater drainage system at the Building 1 facility includes 2 no. attenuation tanks and 2 over sized pipes acting as attenuation also. Stormwater attenuation is provided for the Building 2 side of the Google Ireland Data centre site by the attenuation pond in the northwest of the site.

The following mitigation measures are implemented at the facility to prevent any accidental contamination of stormwater runoff from the site and prevent/contain any accidental discharges of hazardous substances such as fuel or coolant:

- All stormwater passes through oil interceptors before leaving the site. The oil interceptors are regularly inspected and emptied of any oily water/sludge to maintain their efficiency. Any oily water/sludge removed is disposed off-site by a licensed waste contractor;
- All stormwater gullies have silt traps, which are inspected and emptied at regular intervals and any silt collected is disposed of off-site by a licensed waste contractor;
- The storage, containment and handling facilities for materials at the facility have been designed in accordance with statutory requirements and best practice to minimise the likelihood of accidental leaks/spillages occurring and to contain any such leaks / spillages should they occur. Other hazardous chemicals used on site are stored in small quantities (e.g. oils/lubricants for maintenance) in fully contained areas (details of fuel storage quantities at the site are included in the Confidential Annex being submitted with this IE Licence Application Form).
- A standard operating procedure is followed during tanker unloading and filling of tanks. This involves closing the stormwater shut off valve prior to filling of the tanks. Once the filling is complete and provided there are no spills during the filling of the tanks, the shut off valve is re-opened;
- All diesel transfer lines are double contained;
- Any other potential sources of spillage (e.g. pumps, sample points, level gauges etc) are provided with local shelter and collection trays, sumps or interceptors as appropriate to contain any leaks/spillages;
- Good housekeeping practises including preventative maintenance and routine monitoring of tanks and equipment are implemented to minimise the likelihood of leaks/spills occurring and ensure that any leaks are quickly detected and controlled;
- Spill kits are provides on site.

  Building 1

- Each diesel tank for the back-up generators at Building 1 is double contained equipped with leak detection;

- There is a dedicated oil tanker unloading area to the north of the site at Building 1 - potential spills drain to a drainage channel which drains to a Class 1 full retention Forecourt Separator. The separator is sized to retain one full compartment of the fuel delivery vehicle plus storm water runoff. There is also a shut-off valve for the stormwater drains in this area;

  Building 2

- All diesel tanks at Building 2 are bunded to more than 110% of their working capacity, and incorporate overfill protection. All diesel lines are installed over ground.
- There are two dedicated oil tanker unloading areas to the east and west of Building 2. Each of the fuel loading areas for these fuel tanks are sloped to provide containment for any spillage from the unloading process. Both areas drain to the site's stormwater drainage system passing through interceptors upstream of the attenuation pond. There is a full retention separator located on the stormwater drainage line between the north west (Phase 2) fuel unloading area and the stormwater attenuation pond. There is a forecourt separator located on the stormwater drainage line between the north east (Phase 1) fuel unloading area and the stormwater attenuation pond.
- The sluice gate valve at the outfall of the attenuation pond to the northwest of Building 2 is operated by local hardwired interlock with the Fire Alarm System, independently of the Building Management System. The valve will normally be open, closing on an activation from the fire alarm system when flow is detected in any sprinkler system riser and manually re-opened again when water in the pond has been tested.
- There is a Class-1 oil interceptor in place at the outflow of the stormwater attenuation pond also. The interceptor also includes an OilSet 1000 monitoring system which continuously monitors conductivity of the stormwater and sends a signal to the BMS on alarm or fault condition. In this event a visual inspection is undertaken immediately and the sluice gate valve is closed manually if required.
- The oil separator has a high level float switch that is monitored by the BMS, in the event that the high level is reached in the oil separator an alarm is triggered by the BMS.
- After a fire event, testing is to be carried out on the water contained in the stormwater pond to determine if it is contaminated prior to discharge. If the water quality is within the parameters for receiving waters, the valve is opened manually and the water released. If contaminated, the pond is to be over-pumped to the foul water outfall from the site, as agreed with SDCC Environmental Services Department following receipt of planning permission reference SD14A/0023.

With the above abatement/control systems in place on the site stormwater drainage system, it is considered that there is minimal potential of off-site surface water contamination due to activities at the Google Ireland Data Centre facility.

5 Alternatives Considered

5.1 Selection for the Preferred Site

5.1.1 Approach

Google undertook a detailed process of comparative evaluation to determine the most appropriate location to establish this Data Centre facility. This evaluation was conducted on two levels:

- Selection of preferred country location; and
- Selection of preferred site location.

The selection of Ireland as the preferred country location for the Google Ireland Data Centre development was based largely on strategic business considerations such as:

- Availability of a skilled workforce to support the development and operation of the facility;
- Availability of the necessary infrastructure to support the development and operation of the facility;
- Appropriate mild climate for such an operation.

Having selected Ireland as the preferred country location, a detailed process of local site selection was undertaken.

There were a number of essential site requirements that this location had in order to meet Google's basic criteria for the long-term success of the project. These included:

- A sufficient developable site area to meet long-term development goals;
- A sufficiently developed and stable local infrastructure that could meet the demands of the project without compromising the project schedules.

5.2 Selection of the Preferred Processes/Technology

During the design of the Google Ireland Data Centre facilities, many different options were considered in relation to the energy management system to use, taking into account sustainability and efficiency.

Further details on the systems chosen as well as reasons for not choosing various systems are detailed in *Attachment-4-7-1c-BREF-Economics and cross media effects*.

In the event of a power loss from the grid there is currently no alternative other than running the back-up generators to maintain services at the Google Ireland Data Centre facility.