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FIREWATER RISK ASSESSMENT 2021

IE Licence Application Grange Castle Business Park

Technical Report Prepared For

Amazon Data Services Ireland Ltd.

Technical Report Prepared By

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Our Reference

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EXECUTIVE SUMMARY

AWN Consulting were requested by Amazon Data Services Ireland Limited (hereafter referred to as ADSIL) to carry out an assessment of the firewater capacity and the risk of firewater contamination at a data storage facility within the townlands of Milltown; Ballybane and 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 assessment has been carried out in accordance with methodology prepared by the Environmental Protection Agency (EPA).

Surface water from the facility comprising storm water runoff from roads, hard standing and roof surfaces is collected in the site drainage system and discharged to the local authority drainage system.

Areas not containing significant quantities of substances classified as hazardous to the environment were not considered to pose a risk to the environment through the generation of firewater and firewater may be disposed of via the stormwater drainage network. Based on the risk assessment undertaken for each area in accordance with the EPA's guidance, the majority of areas assessed were deemed to be ***R0 – Not at Risk***. Area 3, Area 5, Area 6 and Area 7 which each have bulk storage of diesel and so received a rating of ***R1 – at Risk*** on this basis. There is adequate bund capacity in these areas to contain hazardous material, the suppressants, as well as 6 hours' worth of rainfall.

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1.0 INTRODUCTION

AWN Consulting were requested by Amazon Data Services Ireland Limited (hereafter referred to as ADSIL) to carry out an assessment of the firewater capacity and the risk of firewater contamination at their data storage facility within the townlands of Milltown; Ballybane and 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 assessment has been carried out in accordance with methodology prepared by the Environmental Protection Agency (EPA).

1.1 SITE DESCRIPTION

When fully constructed the facility will consist of 3 no. two storey data storage buildings and 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 permitted site layout and main buildings is shown on Figure 1.1.

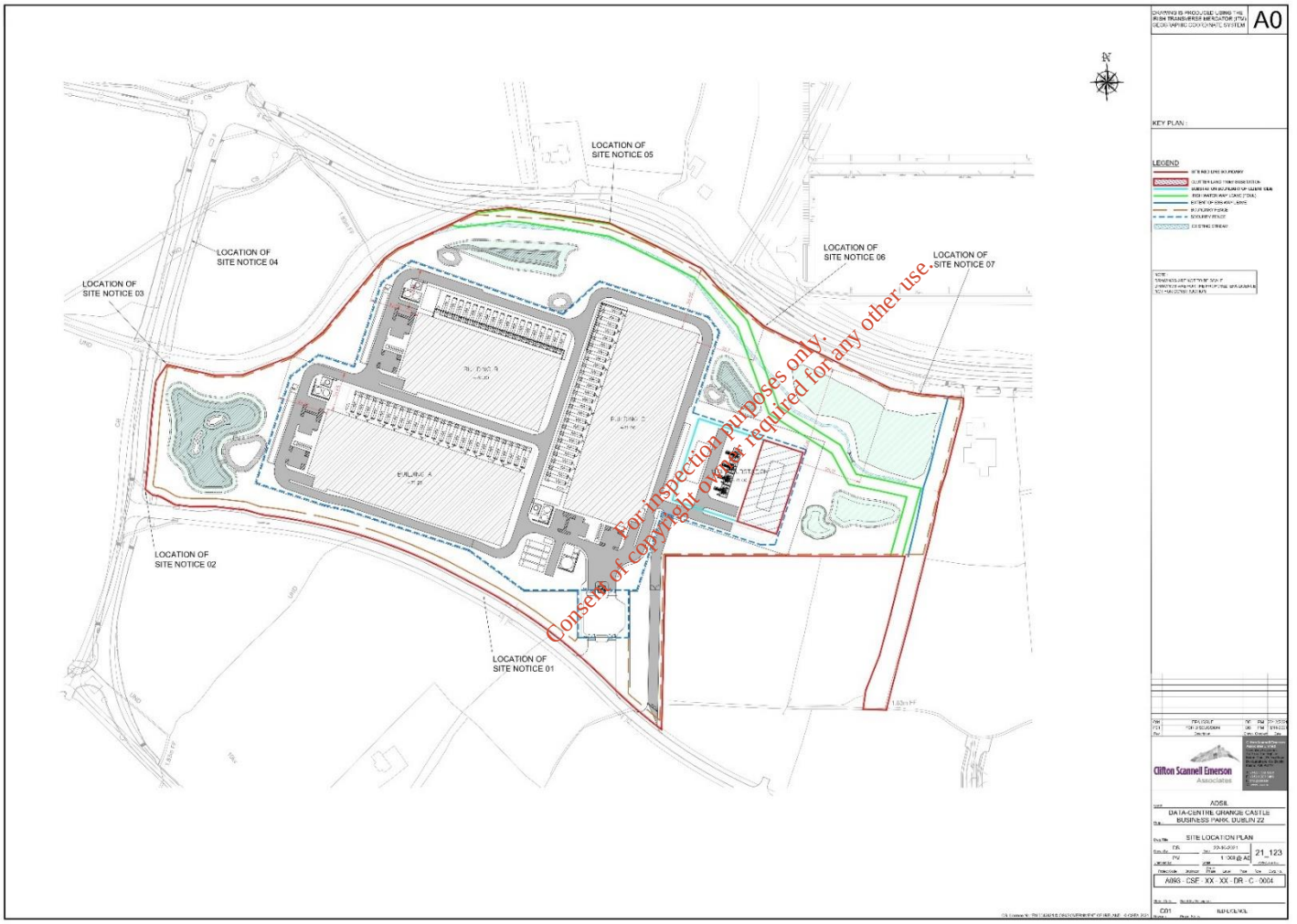

Figure 1.1 *Site Location*

2.0 DESCRIPTION OF OPERATIONAL ACTIVITY

2.1 PLANT OPERATION

Once operational, c. 50 full time employees will be present on site daily in each data centre 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.

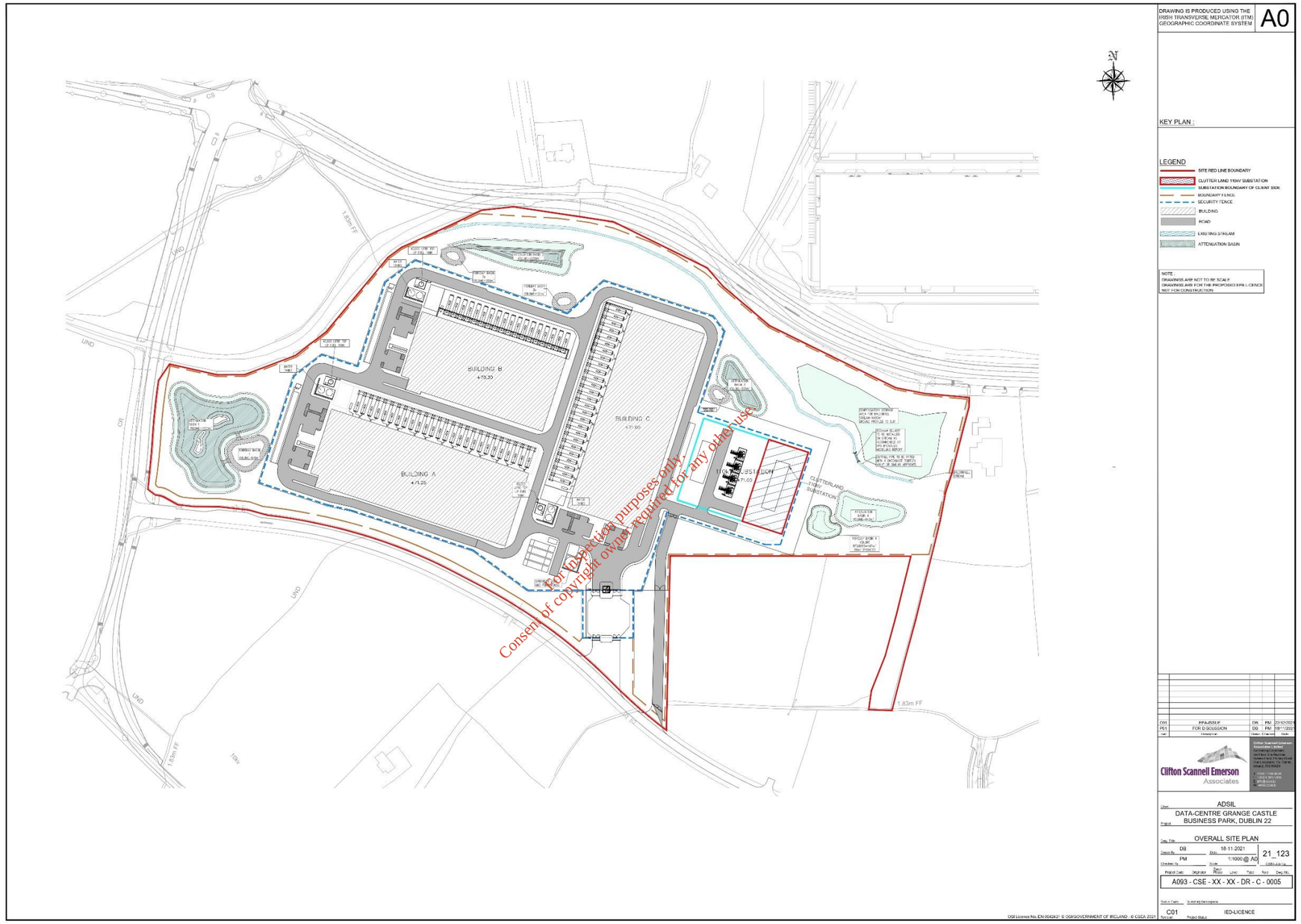

Figure 1.1 *Site Layout Plan*

2.1 UTILITIES AND PROCESSES

Data storage facilities are centralised computer server systems on a large scale.

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 emergency backup generators provide the necessary power to ensure the data centre buildings to continue to operate in the event of a temporary failure of electricity supply. An uninterruptible power source is also provided for the short-term transition from mains power to the emergency back-up generators. 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 emergency backup 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. The individual belly tanks, centrally filled from top up tank, 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 generator housing includes retention bunding in the base of the container, there are leak detection systems within the belly tank to alert in the event of a leak from the generator fuel tank. The onboard controller for individual generators is connected to the Building Management System (BMS).

2.2 SECONDARY PROCESS/ACTIVITIES

2.1.1 Water

The water supply will be sourced from mains water supply via a metred connection from the existing main to the south of the site.

Fire water

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

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

The fire hydrants have been connected to the underground pumped fire ring main.

Both above and below ground-key-operated dry barrel type hydrants will be available. Hose connection type (instantaneous coupling) comply with the local Fire Officers requirements. Each fire hydrant is fitted with an approved pressure reducing valve which is compliant with the local Fire Officers requirements. All hydrants have been provided with an isolating valve. The Hydrants are in accordance with BS 750 and BS EN14339.

2.1.2 Surface Water Drainage

Rainwater runoff from impermeable areas of the site will be collected via the onsite storm water drainage network. This network will convey the stormwater to one of four stormwater attenuation ponds to be constructed on site (Figure 2.3). All storm water generated on site from roof areas, hardstanding, & roads will pass through a suitably sized hyrdocarbon interceptor prior to disposal.

2.1.3 Fire Protection

All buildings will have smoke detectors which are linked to the on-site fire alarm system. The fire alarm system is designed and maintained in accordance with IS3218: 2009 - Fire detection and alarm systems for buildings – System design, installation, servicing and maintenance.

2.1.4 Waste

All waste will be stored in a manner that prevents environmental harm. Hazardous wastes are stored in appropriate receptacles and are kept within designated storage areas until removed from the site.

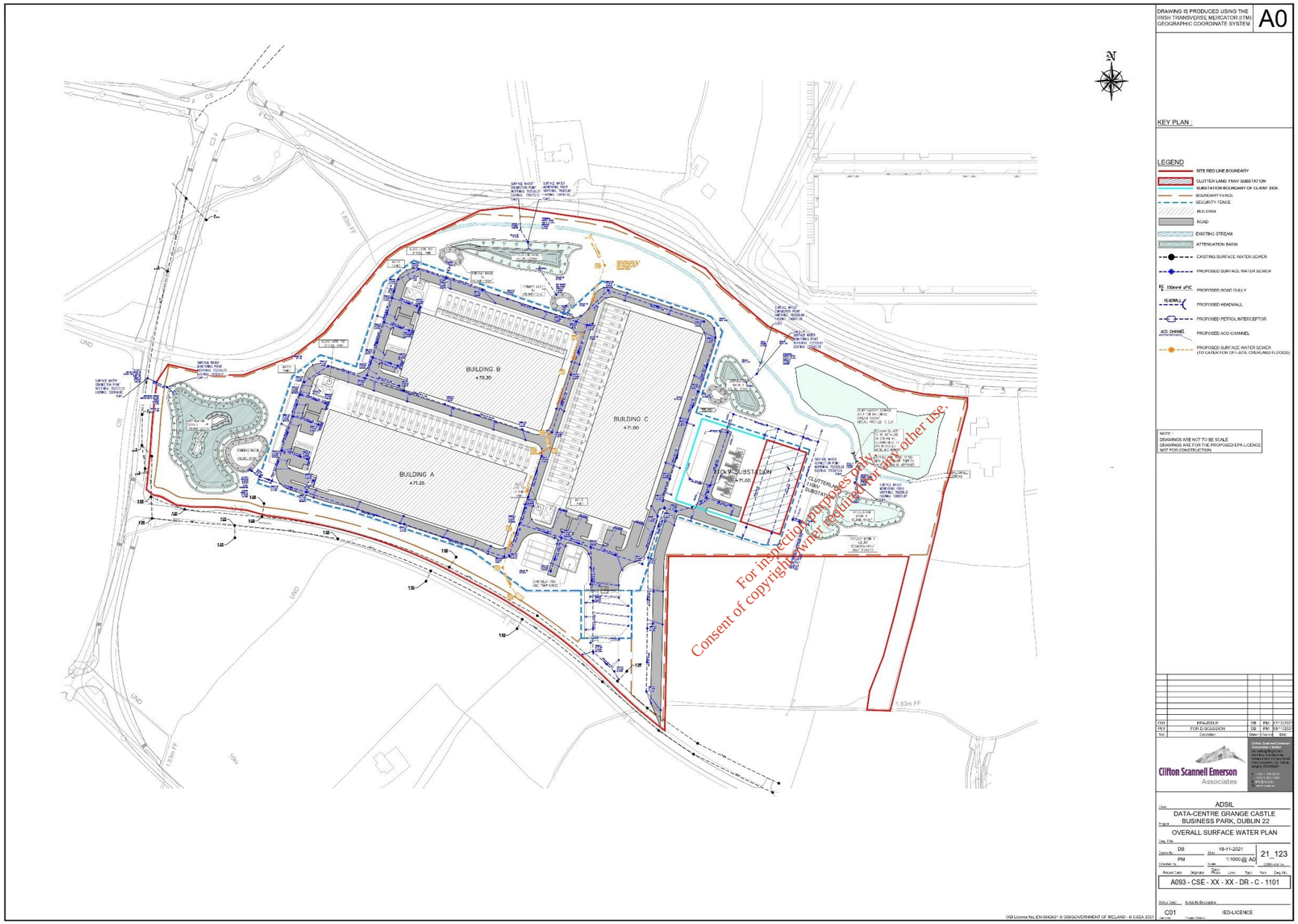

Figure 2.3 *Site Stormwater Drainage System*

3.0 RECEIVING ENVIRONMENT

3.1 GEOLOGY AND HYDROGEOLOGY

The Geological Survey of Ireland (GSI) geological maps and records for the area were inspected as part of the research work for this section of the report.

3.1.1 Bedrock Geology

Mapping from the Geological Society of Ireland (GSI) indicates that the site is underlain by Dinantian Upper Impure Limestones. According to the GSI online database, no Karstic features are located in the study area.

3.1.2 Soils and Subsoils

The Teagasc Soils Map of Ireland indicates that soils covering the area of the site to be predominantly surface water Gleys and Grey Brown Podzolics/Brown earths.

The subsoil has been classified as limestone till (Carboniferous).

3.1.3 Aquifer Classification

Reference to the GSI National Draft Bedrock Aquifer Map for the subject site indicates that the site is underlain by a Locally Important Aquifer (Ll), which is described by the GSI as bedrock which is Bedrock which is Moderately Productive only in Local Zones.

3.1.4 Aquifer Vulnerability

Reference to the GSI Groundwater Vulnerability Map indicates that the vulnerability of the bedrock aquifer beneath the site has been classed High. The presence of concrete cover over the majority of the site will impede the vertical migration of any contamination to the underlying aquifer should a leak occur.

The GSI groundwater database indicates that there are no groundwater source protection zones in the vicinity of the site.

3.1.5 Groundwater Wells

The site is not located near any public groundwater supplies or group schemes. There are no groundwater source protection zones in the immediate vicinity of the site.

3.1.6 Groundwater Body

The Groundwater Body (GWB) regionally underlying the site is the Dublin GWB (EU Groundwater Body Code: IE_EA_G_008). Currently, the EPA (2021) on-line mapping classifies the GWB as “Good”.

3.2 HYDROLOGY

The existing site is greenfield development where surface water flows via overland drainage ditches and a surface water drain into the Baldonnell Stream and Griffeen River which ultimately outfalls into the River Liffey.

3.3 FLOODING

The Planning Application (SDCC Planning Ref. SD20A/0121) for the 3 no. data storage buildings included a Site Specific Flood Risk Assessment for the development site entitled 'Site Specific Flood Risk Assessment Proposed Data Centres Grange Castle Business Park South, Baldonnel, Dublin 22' that was prepared by CS Consulting Group (May 2020).

The Site Specific Flood Risk Assessment concluded that:

- *A review of historical data compiled by the Office of Public Works did not indicate on site flooding for the development.*
- *The proposed layout was modified to ensure that it would not be susceptible to flooding once a compensatory area was constructed to the north of the Baldonnell Stream.*
- *Given the sites inland location and elevation there is no perceived risk form tidal flooding events.*
- *Pluvial flooding has been assessed and modelling by RPS Consulting Engineers indicated the potential for flood water to enter the site from the south. It is proposed to convey this flow through the site and to discharge an unrestricted flow into the Baldonnell Stream. The proposed compensatory storage area mitigates any potential flooding from this pluvial source.*
- *The risk of the site contributing to offsite flooding, or the site's vulnerability to flooding from the public drainage network, is mitigated by the installation of attenuation ponds to retain the storm volumes experienced on site during high intensity storm events.*
- *A review of the GSI's ground water flood mapping and a review of the hydrogeological conditions of the site does not indicate the potential for flooding from this source to be likely.*

3.4 ECOLOGICAL DESIGNATIONS

The site is not designated as a Special Area of Conservation (cSAC), Natural Heritage Area (NHA), proposed Natural Area (pNHA) or a Specially Protected Area (SPA), however, it is located upstream of European designated sites in Dublin Bay. The nearest European site to the Data Storage Facility is the Rye Water Valley/ Carton SAC; c. 5.2km north-west.

4.0 IDENTIFICATION OF EXISTING AND POTENTIAL HAZARDS

The Firewater Risk Assessment process as defined by EPA guidance focuses on substances that pose a risk to the environment by way of environmental toxicity.

4.1 INVENTORY OF RAW MATERIALS, PRODUCTS AND WASTES

Error! Reference source not found. below provides a description of the relevant Classification, Labelling and Packaging (CLP) Regulations (EC No. 1272/2008) hazard statements that is used to identify chemicals that are hazardous to the aquatic environment. There are several designated storage areas for raw materials, fuel and waste located across the site as indicated in the site.

Table 4.1 *Relevant Hazard Statements*

Hazard Statements	Description
H203	Explosive; fire, blast or projection hazard
H221	Flammable gas
H225	Highly Flammable liquid and vapour
H226	Flammable liquid and vapour
H280	Contains gas under pressure; may explode if heated
H301	Toxic if swallowed
H302	Harmful if swallowed
H304	May be fatal if swallowed and enters airways
H311	Toxic in contact with skin
H312	Harmful in contact with skin
H314	Causes severe skin burns and eye damage
H315	Causes skin irritation
H317	May cause an allergic skin reaction
H318	Causes serious eye damage
H319	Causes serious eye irritation
H330	Fatal if inhaled
H331	Toxic if inhaled
H332	Harmful if inhaled
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335	May cause respiratory irritation
H336	May cause drowsiness or dizziness
H351	Suspected cancer causing
H360	May damage fertility or the unborn child
H361	Suspected of damaging fertility or the unborn child
H372	Causes damage to organs through prolonged or repeated exposure
H373	Causes damage to organs through prolonged or repeated exposure
H400	Very toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects
H411	Toxic to aquatic life with long lasting effects
H412	Harmful to aquatic life with long lasting effects

4.2 CLASSIFICATION OF CHEMICALS

The EPA's 2019 guidelines require an assessment of the quantities of substances that process CLP hazard statements within the range of H400 to H499 (Environmental Hazards). Table 4.1 specifies the storage thresholds for specific hazard statements which lead to the potential for firewater retention and Apart from fuel, all other hazardous to the environment chemicals are stored within drums or smaller containers.

Table 4.2 *Total Onsite Storage of Substances with Environmental Hazard Statements*

Material/ Substance	CAS number	Amount Stored (tonnes)	Hazard Statements	Hazardous Substances in Groundwater (December 2010)
R410A Refrigerant	75-10-5	0.9	H220, H221, H280	No
Diesel	68334-30-5	1,245	H226, H304, H351, H332, H315, H373, H411	Yes

specifies total onsite storage for specific hazard statements.

Table 4.1 *Storage Thresholds of Substances with Environmental Hazard Statements*

Hazard Statement	Storage Quantity (tonnes)
H400 H410	1
H401 H411	10
H402 H412	100
H413	1000

Apart from fuel, all other hazardous to the environment chemicals are stored within drums or smaller containers.

Table 4.2 *Total Onsite Storage of Substances with Environmental Hazard Statements*

Material/ Substance	CAS number	Amount Stored (tonnes)	Hazard Statements	Hazardous Substances in Groundwater (December 2010)
R410A Refrigerant	75-10-5	0.9	H220, H221, H280	No
Diesel	68334-30-5	1,245	H226, H304, H351, H332, H315, H373, H411	Yes

4.3 CONTAINMENT SYSTEMS

In the event of a spillage in the first level of containment, the secondary containment shall be inspected, and liquids diverted for collection and safe disposal as required.

Drainage from the unloading facility for diesel trucks is also diverted for collection and safe disposal.

All tanks, bunded storage and pipelines have been designed for their specific purpose and their contents. As required the structures are rendered impervious to the materials stored therein. Tanks are stored in bunds meeting the requirements of Agency guidelines on the “Storage and Transfer of Materials for Scheduled Activities”.

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.

5.0 FIRE CONTROL SYSTEMS

A system is provided for the detection, alarm and fire suppression systems 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 system incorporates fire alarm panels strategically located to provide both Fire Fighters and operational staff to indicate the fire alarm status and report any alarm or fault events and to provide detailed device address information. Detection shall comprise manual call points, smoke and/or heat detectors.

5.1 FIRE RESPONSE PROCEDURES

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 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.

Fire detection and alarm systems will be regularly checked to ensure they are fully operational in accordance with ADSIL's policy. The SOP on Safety Fire System Inspection, Testing, and Maintenance Guidelines includes (weekly) sprinkler maintenance and sets out frequency of testing and maintenance to be undertaken by vendors.

6.0 FIRE RISK ASSESSMENT

6.1 CLASSIFICATION OF ENVIRONMENTAL RISK ASSESSMENT

The risk assessment process follows the main processes as follows:

- Identify Hazards- identified for all aspects of the task,
- Identify who might be harmed and how- the people at risk must be identified, along with the way in which they could come to harm.
- Identify existing controls- procedures, PPE, etc,
- Assess the Risk-the likelihood and severity of harm must be assessed,
- Evaluate the level of residual risk-assess the level of existing controls and determine if further action is required.

Significance of the Fire Event

Significance of the fire event is a measure of the potential scale of a fire scenario occurring at the facility. To facilitate this, it is necessary to assess the possible sources and responses to a fire scenario and to produce a measurable outcome.

To undertake this calculation of it is necessary to determine the following factors:

- Quantities and types of flammable and combustible materials
- The fire detection systems in place
- The fire suppression systems in place

The amount and type of flammable and combustible materials will determine the risk of a fire in the area and the extent of the fire spread. The risk is lowest when there are low volumes of flammable and combustible materials and highest when there are significant volumes of flammable and combustible materials.

The fire detection methods will determine the likelihood and / or speed of detection of the fire incident. The risk will be lowest if the facility incorporates an automatic fire detection system and/or the area in question is not usually occupied.

The effectiveness of the fire response system such as automatic sprinklers, fire tenders, etc., will determine whether the fire can be suppressed in a timely manner. The areas with an automatic system can be classified as low risk while other areas given sufficient fire extinguishers and fire response procedures can be classified as medium. Table 3.1 below highlights the classification of the significance of the fire event used.

Table 3.1 *Classification of the Significance of the Fire*

Significance (S)	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Environmental Hazard Potential

The environmental severity is an assessment of the total potential for environmental damage. This is not a measure of risk or probability of the chemical components reaching the environment or receiving body but the potential damaging effects. The

environmental severity depends on the characteristics of the materials located within the facility that could cause environmental damage. Table 6.2 highlights the classification of environmental severity used.

The defining factor outlined in the EPA guideline is the quantities and types of 'Hazardous to the Aquatic Environment' Materials (H400, H401, H402, H410, H411, H412, H413) as well as the WGK Classification.

Table 6.2 *Classification of Environmental Severity*

Hazard Potential (H)	Description
H0	No Hazard Potential
H1	Hazard Potential

Overall Firewater Run-off Risk

The above classifications are used to determine the firewater run-off risk (R) as per the matrix below in Table 6.3.

Table 6.3 *Classification of Environmental Severity*

	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

Based on the firewater retention risk rating (R), the guidance provides an indication as to whether firewater retention is required (Table 6.4).

Table 6.4 *Requirement for Firewater Retention*

Risk	Minimum Firewater Retention Measures Required
R0	No dedicated firewater retention required
R1	Firewater run-off must be retained within the operational site. The retention can be provided by means of the site's drainage system and other suitable infrastructure which is not exclusively foreseen for firewater retention (e.g., storm water ponds / tanks in WW treatment plants). All elements of the site infrastructure to be used for firewater retention (including shutoff valves) must be regularly inspected to ensure functionality and impermeability. The retention facility must remain impermeable for the duration of the incident up to the removal of the firewater run-off. The documented available retention capacity in the existing site infrastructure must be monitored and maintained. Automatic shut-off valves must be maintained and tested. Diversion of firewater to retention facilities must be automatic on activation of the site fire alarm. Onsite bunds cannot be used to provide firewater retention unless the content of a bund is directly involved in the fire event.

6.2 ENVIRONMENTAL RISK ASSESSMENT OF THE SITE

6.2.1 Area 1 Data Halls

Significance of the Fire Event

There are ignition sources in this area but the risk of faults leading to an ignition source is deemed unlikely. The data halls are equipped with fire detection and alarms.

The fire alarm and detection system incorporate Aspirating Smoke Detection systems within the data processing facility for high sensitivity technical/pre-alarm only. The system interfaces to the main fire alarm systems. Duct mounted smoke probes have been installed on the supply air to the data processing facility and incorporates interfaces to shut down fresh air AHU plant in the event of a fire condition external to the building.

Fire alarm interfaces have been provided for all security doors and access control equipment. The fire alarm releases all doors in the event of a fire condition or by manual and automatic programmed override control from the fire alarm panel.

A water-based fire suppression system based on a sprinkler fire protection system interfaced with the fire detection system shall comprise pre-action protection in the data processing facility. A centralised fire suppression water storage facility shall be provided to be distributed to all the buildings.

As such, the fire significance (S) rating is ***S1 – Low.***

Environmental Hazard Potential

A shut off valve one will be installed on the surface water drainage system, discharge off site will then be isolated in the event of fire-water run-off being generated. This ensures that there are limited pathways to environmental receptors from the site in the event of a fire.

The hazard potential is therefore ***H0 – No Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 1 is classified as no risk and firewater retention is therefore not required.

Table 6.5 *Determination of Overall Firewater Run-off Risk – Area 1*

Category	Rating
Significance of Fire Event (S)	S1
Environmental Hazard Potential (H)	H0
Overall Firewater Run-off Risk (R)	R0

6.2.2 Area 2 Office, Security and Meeting Rooms

Significance of the Fire Event

Detection comprises manual call points, smoke and heat detectors.

Duct mounted smoke probes have been installed on the supply air to the offices and shall incorporate interfaces to shut down fresh air AHU plant in the event of a fire condition external to the building.

Fire alarm interfaces shall be provided for all security doors and access control equipment. The fire alarm shall release all doors in the event of a fire condition or by manual and automatic programmed override control from the fire alarm panel.

A water-based sprinkler fire suppression system shall be provided to the office areas interfaced with the fire detection system.

There are potential ignition/heat sources in the canteen area. These rooms contain significant volumes of combustible materials (including the building itself). The area is equipped with fire detection and alarm systems and fire extinguishers are available.

As such, the fire significance (S) rating is ***S1 – Low.***

Environmental Hazard Potential

These rooms do not contain any hazardous materials and as such any release of firewater to the stormwater drainage network would not be regarded as hazardous to the environment.

Therefore, the resulting hazard potential is therefore ***H0 - No Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 6 is classified as no risk and firewater retention is therefore not required.

Table 6.6 *Determination of Overall Firewater Run-off Risk – Area 2*

Category	Rating
Significance of Fire Event (S)	S1
Environmental Hazard Potential (H)	H0
Overall Firewater Run-off Risk (R)	R0

6.2.3 Area 3 Fuel Storage Areas – Belly Tanks

There are belly tanks at each of the back-up generator units with 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 generators are housed within a container with various designed control measures in place. The belly tanks are filled centrally from the fill 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.

Significance of the Fire Event

There is the potential for heat/ignition sources in this area due to the presence of generators. Good fire detection and suppression systems are available. Firefighting equipment in the area includes hose reels and portable fire extinguishers.

Based on containment measures in place, the fire significance (S) rating is ***S3-High.***

Environmental Hazard Potential

Diesel is classified as H411, toxic to aquatic life with long-lasting effects.

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.

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 resulting hazard potential is therefore ***H1 – Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 7 is classified as at risk and firewater retention is therefore required.

Table 6.7 *Determination of Overall Firewater Run-off Risk – Area 3*

Category	Rating
Significance of Fire Event (S)	S3
Environmental Hazard Potential (H)	H1
Overall Firewater Run-off Risk (R)	R1

6.2.4 Area 4 Waste Management Areas

These areas will contain waste management facilities.

Significance of the Fire Event

The waste is assumed not to be flammable but may be combustible.

Due to the volume of combustible and flammable materials the fire significance (S) rating is ***S1 – Low.***

Environmental Hazard Potential

These areas are not used to store large volumes of hazardous wastes. The resulting hazard potential is therefore ***H0 - No Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 8 is classified as no risk and firewater retention is therefore not required.

Table 6.8 *Determination of Overall Firewater Run-off Risk – Area 4*

Category	Rating
Significance of Fire Event (S)	S1
Environmental Hazard Potential (H)	H0
Overall Firewater Run-off Risk (R)	R0

6.2.5 Area 5 Building A Top Up Tank Fuel Storage Areas

Diesel is stored in multiple locations across the site. Bulk diesel is supplied to generators via a fill tank of 40 m^3 located adjacent to each data centre (i.e., 3 no. tanks of 40 m^3 will be required). Tanks are only filled to 80% of maximum volume. 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.

Significance of the Fire Event

There is the potential for heat/ignition sources in this area due to the presence of a generator. Good fire detection and suppression systems are available. Firefighting equipment in the area includes hose reels and portable fire extinguishers.

Based to the volume of flammable material, the presence of fire detection and suppression systems (non-automatic), the fire significance (S) rating is ***S3-High.***

Environmental Hazard Potential

Diesel is classified as H411, toxic to aquatic life with long-lasting effects.

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.

A diesel unloading bay will be built onsite adjacent to Buildings A. 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.

Specific firewater retention is required for H401-H411 chemicals stored on site, the total amount of diesel exceeds the retention requirement threshold of 10 tonnes.

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 resulting hazard potential is therefore ***H1 –Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 12 is classified as at risk and firewater retention is therefore required.

Table 6.9 *Determination of Overall Firewater Run-off Risk – Area 5*

Category	Rating
Significance of Fire Event (S)	S3
Environmental Hazard Potential (H)	H1
Overall Firewater Run-off Risk (R)	R1

6.2.6 Area 6 Building B Top Up Tank Fuel Storage Areas

Bulk diesel is supplied to generators via a fill tank of 40 m^3 filled to 80% volume (32,00L). The 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.

Significance of the Fire Event

There is the potential for heat/ignition sources in this area due to the presence of a generator. Good fire detection and suppression systems are available. Firefighting equipment in the area includes hose reels and portable fire extinguishers.

Based to the volume of flammable material, the presence of fire detection and suppression systems (non-automatic), the fire significance (S) rating is ***S3-High.***

Environmental Hazard Potential

Diesel is classified as H411, toxic to aquatic life with long-lasting effects.

The bulk fuel tank 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.

A diesel unloading bay will be built onsite adjacent to Buildings B. 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.

Specific firewater retention is required for H401-H411 chemicals stored on site; the total amount of diesel exceeds the retention requirement threshold of 10 tonnes.

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 resulting hazard potential is therefore ***H1 – Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 13 is classified as at risk and firewater retention is therefore required.

Table 6.10 *Determination of Overall Firewater Run-off Risk – Area 6*

Category	Rating
Significance of Fire Event (S)	S3
Environmental Hazard Potential (H)	H1
Overall Firewater Run-off Risk (R)	R1

6.2.7 Area 7 Building C Top Up Tank Fuel Storage Areas

Bulk diesel is supplied to generators via a fill tank of 40 m^3 located adjacent to a fill tank of 40 m^3. The 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.

Significance of the Fire Event

There is the potential for heat/ignition sources in this area due to the presence of a generator. Good fire detection and suppression systems are available. Firefighting equipment in the area includes hose reels and portable fire extinguishers.

Based to the volume of flammable material, the presence of fire detection and suppression systems (non-automatic), the fire significance (S) rating is ***S3-High.***

Environmental Hazard Potential

Diesel is classified as H411, toxic to aquatic life with long-lasting effects.

The bulk fuel tank 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.

A diesel unloading bay will be built onsite adjacent to Building 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.

Specific firewater retention is required for H401-H411 chemicals stored on site, the total amount of diesel exceeds the retention requirement threshold of 10 tonnes.

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 resulting hazard potential is therefore ***H1 –Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 14 is classified as at risk and firewater retention is therefore required.

Table 6.11 *Determination of Overall Firewater Run-off Risk – Area 7*

Category	Rating
Significance of Fire Event (S)	S3
Environmental Hazard Potential (H)	H1
Overall Firewater Run-off Risk (R)	R1

6.2.8 Area 8 Building A Carpark

Significance of the Fire Event

The only flammable materials present in this area will be due to fuel leaks from vehicles. There are no fire detection and alarm systems present in this area. Therefore, the fire significance (S) rating is ***S2-Medium.***

Environmental Hazard Potential

Similarly fuel or oil from vehicles could pose a hazard to the environment however as these amounts are anticipated to be low the resulting hazard potential is therefore ***H0 – No Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 8 is classified as no risk and firewater retention is therefore not required.

Table 6.12 *Determination of Overall Firewater Run-off Risk – Area 8*

Category	Rating
Significance of Fire Event (S)	S2
Environmental Hazard Potential (H)	H0
Overall Firewater Run-off Risk (R)	R0

6.2.9 Area 9 Building B Carpark

Significance of the Fire Event

The only flammable materials present in this area will be due to fuel leaks from vehicles. There are no fire detection and alarm systems present in this area. Therefore, the fire significance (S) rating is ***S2-Medium.***

Environmental Hazard Potential

Similarly fuel or oil from vehicles could pose a hazard to the environment however as these amounts are anticipated to be low the resulting hazard potential is therefore ***H0 – No Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 9 is classified as no risk and firewater retention is therefore not required.

Table 6.13 *Determination of Overall Firewater Run-off Risk – Area 9*

Category	Rating
Significance of Fire Event (S)	S2
Environmental Hazard Potential (H)	H0
Overall Firewater Run-off Risk (R)	R0

6.2.10 Area 10 Building C Carpark

Significance of the Fire Event

The only flammable materials present in this area will be due to fuel leaks from vehicles. There are no fire detection and alarm systems present in this area. Therefore, the fire significance (S) rating is ***S2-Medium.***

Environmental Hazard Potential

Similarly fuel or oil from vehicles could pose a hazard to the environment however as these amounts are anticipated to be low the resulting hazard potential is therefore ***H0 – No Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 10 is classified as no risk and firewater retention is therefore not required.

Table 6.14 *Determination of Overall Firewater Run-off Risk – Area 10*

Category	Rating
Significance of Fire Event (S)	S2
Environmental Hazard Potential (H)	H0
Overall Firewater Run-off Risk (R)	R0

6.2.11 Area 11 Office, Security and Meeting Rooms

Significance of the Fire Event

Detection comprises manual call points, smoke and heat detectors.

Duct mounted smoke probes have been installed on the supply air to the offices and shall incorporate interfaces to shut down fresh air AHU plant in the event of a fire condition external to the building.

Fire alarm interfaces shall be provided for all security doors and access control equipment. The fire alarm shall release all doors in the event of a fire condition or by manual and automatic programmed override control from the fire alarm panel.

A water based sprinkler fire suppression system shall be provided to the office areas interfaced with the fire detection system.

There are potential ignition/heat sources in the canteen area. These rooms contain significant volumes of combustible materials (including the building itself). The area is equipped with fire detection and alarm systems and fire extinguishers are available.

As such, the fire significance (S) rating is ***S1 – Low.***

Environmental Hazard Potential

These rooms do not contain any hazardous materials and as such any release of firewater to the stormwater drainage network would not be regarded as hazardous to the environment.

Therefore, the resulting hazard potential is therefore ***H0 - No Hazard Potential.***

Overall Firewater Run-off Risk

Based on the EPA's classification for the overall firewater run-off risk (R), Area 11 is classified as no risk and firewater retention is therefore not required.

Table 6.15 *Determination of Overall Firewater Run-off Risk – Area 11*

Category	Rating
Significance of Fire Event (S)	S2
Environmental Hazard Potential (H)	H0
Overall Firewater Run-off Risk (R)	R0

7.0 REQUIRED RETENTION VOLUME FOR FIREWATER

Many of the materials stored at the ADSIL facility are flammable but are stored in dedicated storage areas. Any fire that occurs on the site is unlikely to spread to other combustible areas and is likely to burn out.

Any fire on site is likely to be very localised which will be controlled or allowed to burn out. There are automatic sprinkler systems utilised at the facility and a fire detection system is employed throughout the facility together with the robust fire-response practices will enable control of a fire event.

7.1 CALCULATIONS FOR AREA 3 FUEL STORAGE AREAS – BELLY TANKS

The firewater calculations below have been based on ***Method 2 – Tank Farm / Process Plant*** retention calculation.

The generators are potential ignition sources.

The nature of the fire event has also been considered when calculating the firewater potential as water will not be required to fight all fire types. Fires involving diesel will be fought using foam rather than firewater from the tenders. It is assumed this will be supplied from 1 fire tenders as this fire will be restricted to a very small area. A 6 hour fire event is the appropriate duration for this area.

Cooling of the tanks using water from the local hydrants following a fire would not be required as the fire load for such an area is not significant enough to cause overheating of the tank.

The following assumptions were made in calculating fire water retention volume:

- The fire tenders will use foam rather than water to fight a hydrocarbon fire. A conservative estimate of 1m^3 has therefore been included.
- The total volume of diesel in each belly tank at any one time has been estimated at 16,000L.
- 60.1 mm of rainfall is the 10-year 24 Hour Return rainfall event used for the firewater calculation as per the EPA (2019) guidance - Met Eireann rainfall return shown in Appendix 1. Under this scenario the firewater calculations would be as follows:

Contribution from the belly tank – worst case scenario (VT)	16 m^3
Foam likely to be used (WE)	1m^3
Rainfall contribution (RW) = 0.0610m x 5m^2	0.3 m^3
The total required retention volume (VT + WE)	17.3 m^3

7.2 CALCULATIONS FOR AREA 5 DIESEL TOP UP TANK

The firewater calculations below have been based on ***Method 2 – Tank Farm / Process Plant*** retention calculation.

The generators are potential ignition sources. Onsite bunds can be used to provide firewater retention if the content of a bund is directly. involved in the fire event. Accepted practice is to design the bund such that 110% of the volume of the largest tank will be contained within the bunded area.

The nature of the fire event has also been considered when calculating the firewater potential as water will not be required to fight all fire types. Fires involving diesel will be fought using foam rather than firewater from the tenders. Each water tender carries c. 50L of foam, which at an assumed expansion rate of 200:1 is 10,000L. It is assumed this will be supplied from 1 fire tenders as this fire will be restricted to a very small area. A 6 hour fire event is the appropriate duration for this area.

Cooling of the tanks using water from the local hydrants following a fire would not be required as the fire load for such an area is not significant enough to cause overheating of the tank.

The following assumptions were made in calculating fire water retention volume:

- The fire tenders will use foam rather than water to fight a hydrocarbon fire. A conservative estimate of $10m^3$ has therefore been included.
- The total volume of diesel in the fill tank at any one time has been estimated at 32,000L (80% of 40,000 volume tank).
- 60.1 mm of rainfall is the 10-year 24 Hour Return rainfall event used for the firewater calculation as per the EPA (2019) guidance - Met Eireann rainfall return shown in Appendix 1. Under this scenario the firewater calculations would be as follows:

Contribution from the diesel fill tank – (80% fill)	32 m^3
Foam likely to be used (W_E)	10 m^3
Rainfall contribution (R_W) = 0.0610m x $20m^2$ (bund areas)	0.12 m^3
The total required retention volume ($V_T + W_E$)	**52.12 m^3**

7.3 CALCULATIONS FOR AREA 6 DIESEL TOP UP TANK

The firewater calculations below have been based on ***Method 2 – Tank Farm / Process Plant*** retention calculation.

The generators are potential ignition sources. Onsite bunds can be used to provide firewater retention if the content of a bund is directly. involved in the fire event. Accepted practice is to design the bund such that 110% of the volume of the largest tank will be contained within the bunded area.

The nature of the fire event has also been considered when calculating the firewater potential as water will not be required to fight all fire types. Fires involving diesel will be fought using foam rather than firewater from the tenders. Each water tender carries c. 50L of foam, which at an assumed expansion rate of 200:1 is 10,000L. It is assumed this will be supplied from 1 fire tenders as this fire will be restricted to a very small area. A 6 hour fire event is the appropriate duration for this area.

Cooling of the tanks using water from the local hydrants following a fire would not be required as the fire load for such an area is not significant enough to cause overheating of the tank.

The following assumptions were made in calculating fire water retention volume:

- The fire tenders will use foam rather than water to fight a hydrocarbon fire. A conservative estimate of $10m^3$ has therefore been included.
- The total volume of diesel in the largest tank at any one time has been estimated at 32,000L.
- 60.1 mm of rainfall is the 10-year 24 Hour Return rainfall event used for the firewater calculation as per the EPA (2019) guidance - Met Eireann rainfall return shown in Appendix 1. Under this scenario the firewater calculations would be as follows:

Contribution from the diesel fill tank – (80% fill)	32 m^3
Foam likely to be used (W_E)	10 m^3
Rainfall contribution (R_W) = 0.0610m x $20m^2$ (bund areas)	0.12 m^3
The total required retention volume ($V_T + W_E$)	**42.12 m^3**

7.4 CALCULATIONS FOR AREA 7 DIESEL TOP UP TANK

The firewater calculations below have been based on ***Method 2 – Tank Farm / Process Plant*** retention calculation.

The generators are potential ignition sources. Onsite bunds can be used to provide firewater retention if the content of a bund is directly. involved in the fire event. Accepted practice is to design the bund such that 110% of the volume of the largest tank will be contained within the bunded area.

The nature of the fire event has also been considered when calculating the firewater potential as water will not be required to fight all fire types. Fires involving diesel will be fought using foam rather than firewater from the tenders. Each water tender carries c. 50L of foam, which at an assumed expansion rate of 200:1 is 10,000L. It is assumed this will be supplied from 1 fire tenders as this fire will be restricted to a very small area. A 6 hour fire event is the appropriate duration for this area.

Cooling of the tanks using water from the local hydrants following a fire would not be required as the fire load for such an area is not significant enough to cause overheating of the tank.

The following assumptions were made in calculating fire water retention volume:

- The fire tenders will use foam rather than water to fight a hydrocarbon fire. A conservative estimate of 10m³ has therefore been included.
- The total volume of diesel in the largest tank at any one time has been estimated at 32,000L.
- 60.1 mm of rainfall is the 10-year 24 Hour Return rainfall event used for the firewater calculation as per the EPA (2019) guidance - Met Eireann rainfall return shown in Appendix 1. Under this scenario the firewater calculations would be as follows:

Contribution from the diesel fill tank – (80% fill)	32 m^3
Foam likely to be used (W_E)	10 m^3
Rainfall contribution (R_W) = 0.0610m x 20m^2 (bund areas)	0.12 m^3
The total required retention volume (V_T + W_E)	**42.12 m^3**

8.0 FIREWATER RETENTION OPTIONS

In the event of a fire, firewater/foam contaminated with diesel needs to be stored in the bund along with any rainwater.

The available bund volume within the containerised emergency generator for each belly tank is 17.6 m^3 , therefore further retention is not required for the belly tanks.

The available bund volume for each fill tank is 44m^3, therefore further retention is not required for the belly tanks.

9.0 CONCLUSION

The preceding risk assessment was completed in accordance with the recently published EPA Guidance on Retention Requirements for Firewater Run-off (EPA, 2019). The purpose of this risk assessment was to determine whether firewater retention was required to prevent the loss of substances hazardous to the environment to the surface water, soil and groundwater environments.

Areas not containing significant quantities of substances classified as hazardous to the environment were not considered to pose a risk to the environment through the generation of firewater and firewater may be disposed of via the stormwater drainage network.

Based on the risk assessment undertaken for each area in accordance with the EPA's guidance, the areas assessed were deemed to be ***R0 – Not at Risk*** except for Area 3, Area 5, Area 6 and Area 7 which each contain >10 tonnes of diesel and so received a rating of ***R1 – at Risk*** on this basis.

There is adequate bund capacity in these areas to contain hazardous material, the foam / powder suppressants, as well as 6 hours' worth of rainfall.

Bunds will be emptied and repaired, if necessary, as soon as possible after a fire event to reinstate the available bunding capacity of the area. Firewater will not be pumped to other site bunds for storage, bunds will only be utilised where the firewater is generated in the bund during the fire event. Under normal operating conditions, bunds will be regularly inspected and emptied of uncontaminated rainwater, to maintain available capacity

As part of operational procedures, a 'Hot Works' permit system will be implemented to minimise risk of fire.

An Emergency Response Plan (ERP) will be implemented to cover a fire scenario. Drills should be undertaken at regular intervals by all staff. All staff will be trained in the emergency procedures in the event of fire therefore minimising the risk of fire spreading to other areas of the site.

Staff are trained as certified Fire Wardens.

All tanks, bunds and pipelines are subject to a preventative maintenance programme and regular inspection

9.1 RECOMMENDATIONS

<u>Containment</u>

- An Automatic shut off valve that activates upon fire alarm on stormwater network would allow for the containment of additional discharge and for testing prior to discharge should be installed.

<u>Operational Procedures</u>

- The ERP should detail key personnel, emergency services contact numbers and the action plans in the events of a fire. A copy of the emergency response plan should be kept for reference at key locations around the datacentre.

10.0 REFERENCES

1. Environmental Protection Agency (EPA), (2019), EPA Guidance on Retention Requirements for Firewater Run-off, EPA.

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5. GSI, (2021). Geological Survey of Ireland; Available on-line at: www.gsi.ie [Accessed: 26-07-2021].

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APPENDIX I

Dublin Rainfall Return Rainfall Period

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 307985, Northing: 238617,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.5,	4.1,	5.0,	5.6,	6.1,	7.7,	9.5,	10.7,	12.4,	13.9,	15.1,	17.0,	18.4,	19.6,	N/A ,
10 mins	3.4,	4.9,	5.8,	7.0,	7.9,	8.5,	10.7,	13.2,	14.9,	17.3,	19.4,	21.1,	23.7,	25.7,	27.4,	N/A ,
15 mins	4.0,	5.8,	6.8,	8.3,	9.3,	10.0,	12.6,	15.6,	17.6,	20.4,	22.9,	24.8,	27.9,	30.2,	32.2,	N/A ,
30 mins	5.3,	7.6,	8.8,	10.6,	11.9,	12.8,	16.0,	19.6,	22.0,	25.3,	28.4,	30.7,	34.3,	37.1,	39.4,	N/A ,
1 hours	7.1,	9.9,	11.4,	13.7,	15.2,	16.4,	20.3,	24.6,	27.5,	31.6,	35.2,	37.9,	42.2,	45.5,	48.3,	N/A ,
2 hours	9.3,	12.9,	14.8,	17.6,	19.5,	21.0,	25.7,	31.0,	34.5,	39.3,	43.6,	46.9,	52.0,	55.9,	59.1,	N/A ,
3 hours	11.0,	15.1,	17.2,	20.4,	22.5,	24.2,	29.5,	35.4,	39.3,	44.7,	49.5,	53.1,	58.7,	63.0,	66.6,	N/A ,
4 hours	12.3,	16.8,	19.2,	22.7,	25.0,	26.8,	32.6,	39.0,	43.2,	49.0,	54.1,	58.0,	64.0,	68.6,	72.4,	N/A ,
6 hours	14.5,	19.7,	22.3,	26.3,	28.9,	30.9,	37.4,	44.6,	49.4,	55.7,	61.3,	65.7,	72.3,	77.3,	81.5,	N/A ,
9 hours	17.1,	23.0,	26.0,	30.5,	33.4,	35.7,	43.0,	51.0,	56.1,	63.3,	69.6,	74.3,	81.6,	87.2,	91.8,	N/A ,
12 hours	19.2,	25.6,	29.0,	33.8,	37.1,	39.5,	47.4,	56.1,	61.6,	69.3,	76.0,	81.2,	89.0,	94.9,	99.8,	N/A ,
18 hours	22.6,	30.0,	33.7,	39.2,	42.9,	45.6,	54.5,	64.1,	70.3,	78.8,	86.2,	91.9,	100.5,	107.0,	112.4,	N/A ,
24 hours	25.4,	33.4,	37.6,	43.6,	47.5,	50.5,	60.1,	70.5,	77.2,	86.3,	94.3,	100.4,	109.5,	116.5,	122.2,	141.8,
2 days	31.6,	40.7,	45.3,	51.9,	56.3,	59.6,	69.9,	81.0,	88.1,	97.7,	106.0,	112.2,	121.7,	128.8,	134.6,	154.4,
3 days	36.6,	46.6,	51.6,	58.7,	63.4,	66.9,	77.9,	89.6,	97.1,	107.1,	115.7,	122.2,	132.0,	139.3,	145.3,	165.6,
4 days	40.9,	51.7,	57.0,	64.7,	69.6,	73.3,	85.2,	97.2,	104.9,	115.4,	124.3,	131.0,	141.1,	148.7,	154.8,	175.6,
6 days	48.6,	60.6,	66.6,	75.0,	80.4,	84.4,	97.0,	110.3,	118.6,	129.7,	139.2,	146.4,	157.0,	165.0,	171.4,	193.1,
8 days	55.5,	68.6,	75.0,	84.0,	89.8,	94.2,	107.6,	121.7,	130.5,	142.3,	152.3,	159.7,	170.8,	179.2,	185.9,	208.4,
10 days	61.7,	75.8,	82.6,	92.3,	98.4,	103.1,	117.3,	132.1,	141.3,	153.6,	164.0,	171.8,	183.4,	192.0,	199.0,	222.3,
12 days	67.6,	82.5,	89.8,	99.9,	106.4,	111.3,	126.2,	141.7,	151.3,	164.1,	174.9,	183.0,	194.9,	203.9,	211.1,	235.1,
16 days	78.4,	94.9,	102.9,	114.0,	121.1,	126.4,	142.5,	159.2,	169.5,	183.2,	194.7,	203.3,	216.0,	225.5,	233.1,	258.4,
20 days	88.5,	106.4,	115.0,	127.0,	134.6,	140.2,	157.4,	175.2,	186.1,	200.6,	212.7,	221.8,	235.1,	245.0,	253.0,	279.4,
25 days	100.3,	119.8,	129.1,	142.0,	150.2,	156.2,	174.7,	193.6,	205.2,	220.5,	233.4,	243.0,	257.0,	267.5,	275.8,	303.5,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf