FIREWATER RETENTION RISK ASSESSMENT DROGHEDA IDA BUSINESS AND TECHNOLOGY PARK

Technical Report Prepared For

Amazon Data Services Ireland Limited

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Our Reference

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EXECUTIVE SUMMARY

AWN Consulting was appointed by Amazon Data Services Ireland Ltd. ("ADSIL" or 'the applicant') to carry out an assessment of the firewater capacity and the risk of firewater contamination at their data storage facility (the subject 'Installation' under this licence application) located in Drogheda IDA Business and Technology Park, Donore Road, Drogheda, Co. Meath. 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 areas assessed were deemed to be ***R0 – Not at Risk*** except for Area 4 and Area 6 which each contain large quantities 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, fire 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.

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1.0 INTRODUCTION

AWN Consulting was appointed by Amazon Data Services Ireland Ltd. ("ADSIL" or 'the applicant') to carry out an assessment of the firewater capacity and the risk of firewater contamination at their data storage facility (the subject 'installation' under this licence application) located in Drogheda IDA Business and Technology Park, Donore Road, Drogheda, Co. Meath.The site context is shown on Site Location Plan 21_123G-CSE-00-XX-DR-C-0001 - Overall Site Location Plan included with this application. The application relates to the entire facility that is c. 18.623 hectares in total ('the Site')

The assessment has been carried out in accordance with methodology prepared by the Environmental Protection Agency (EPA).

1.1 SITE DESCRIPTION

The Installation comprises one two-storey data storage installation building (Building A) with mezzanine floors at each level 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 overall site includes the Oldbridge 110kV Substation. The permitted site layout and main building is shown on Site Layout Plan Drawing Ref: 21_123G-CSE-00-XX-DR-C-0002- Overall Site Plan included with this application.

The site layout and main buildings is shown in Figure 1.1.

The detailed description of the Installation operational activities is set out in Attachment 4-8-1 Operational Report, that is included as part of this licence application.

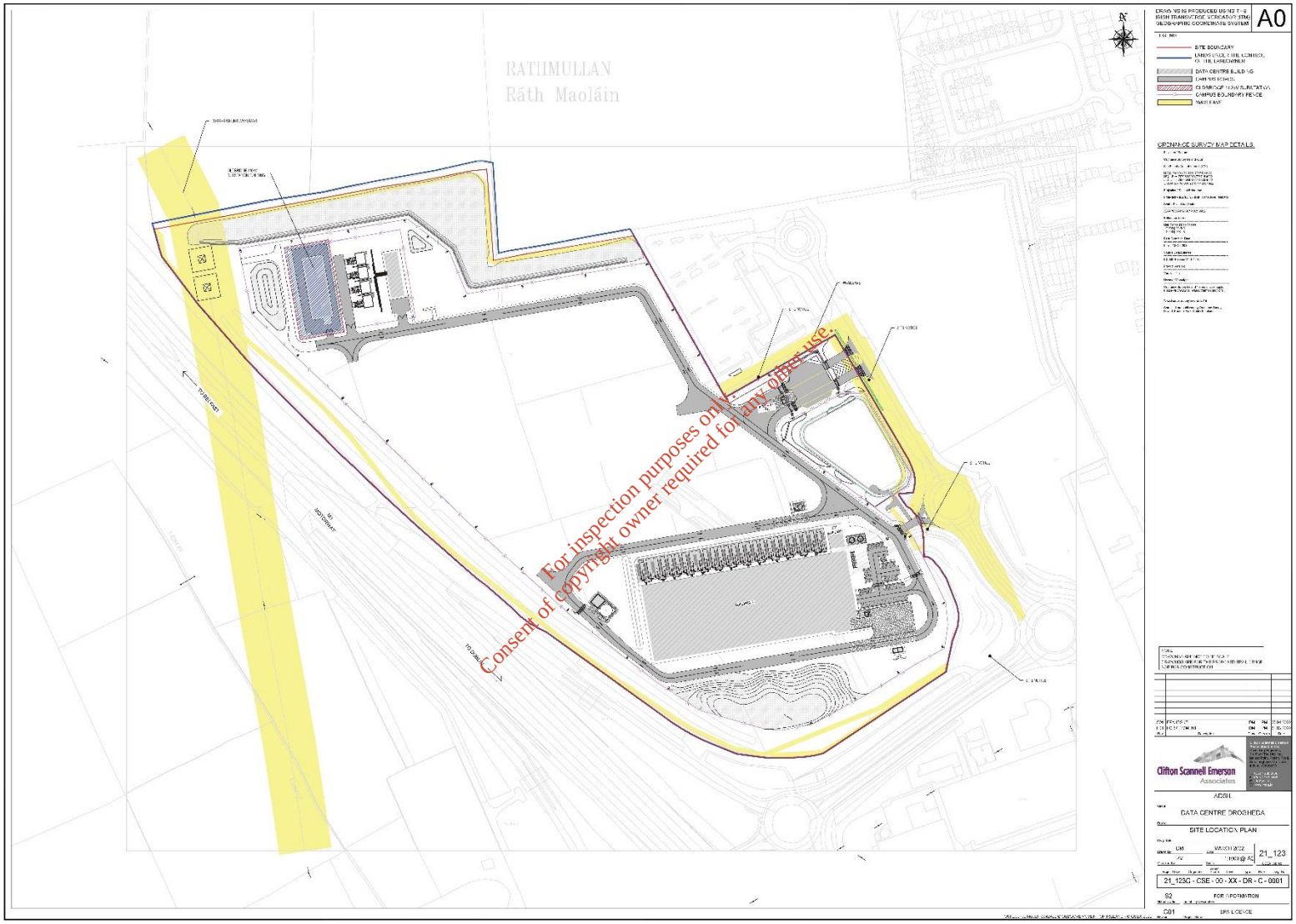

Figure 1.1 *Site Layout 21_123G-CSE-00-XX-DR-C-0002*

2.0 DESCRIPTION OF OPERATIONAL ACTIVITY

2.1 PLANT OPERATION

Staff will be present on a shift basis, so numbers will vary throughout the day. Operational hours are 24 hours a day, 7 days a week.

Up to 50 staff will be on site at the data storage facility at any given time (i.e. a maximum of 50-day time staff). It is estimated that up to 35 no. full time data storage facility staff will be on site on a daily basis during standard operation, including security staff with a further 7 per building no. night shift staff and 15 no. external staff/maintenance contractors/visitors.

2.2 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. These emergency backup generators provide the necessary power to ensure the data centre buildings can 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.

The individual generators are housed within a container with various designed control measures in place including acoustic attenuation, exhaust silences. Diesel is stored locally in day tanks and belly tanks within each containerised generator.

The top up tank fuel is fitted with automated level gauges and the online readings from these gauges are fed back into the facility's BMS/EPMS. The top up tank has high/low level alarms (90% high, 30% low) and a high-level switch at 95% which alarm to the BMS/EPMS critical alarm.

The individual double skinned day tanks and belly tanks at the emergency back-up generators have level gauges (high and low) within the fuel tanks connected to an onboard controller which will alarm to prevent overfilling and identify a sudden loss of fuel within the tank.

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

Fuel (diesel) for the emergency back-up generators is stored in multiple locations across the Site; including the Top Up tank and day tanks, and belly tanks contained within each emergency back-up generator container.

Further details are presented in Attachment 4-8-1 Operational Report.

2.2 SECONDARY PROCESS/ACTIVITIES

2.2.1 Water Supply

The water supply will be sourced from mains water supply via a metred connection from the existing main to the east of the installation in accordance with the MCC Planning Ref. LB191735. The Installation has a demand for general potable supply, for cleaning, drinking and sanitary facilities, cooling equipment, and for firefighting.

The design requires a peak water demand of up to 1.0 litres per second (l/s) whilst peak water demand was calculated as 6 litres/se. Where water demand is required during a short-term drought, additional supply can be provided from an alternative source such as tanker supply.

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

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

Fire water

A fire water ring main will be installed around the site to provide firefighting water to hydrants to be used in the event of a fire. The development will include fire water sprinkler pump room and adjacent storage tank (450,000m³) to the west of the proposed data storage facility building.

A 250-300mm fire ring main is in place to provide firefighting water to the site in accordance with the MCC Planning Ref. LB191735. The sprinkler pump house is equipped with 2 diesel fired sprinkler pumps) for the supply of firefighting water.

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

2.2.2 Stormwater Drainage Systems

Rainwater runoff from impermeable areas of the Site is collected via the onsite stormwater drainage network in accordance with the MCC Planning Ref. LB191735. This network will convey the stormwater via Hydrocarbon Interceptors to one of 2 no. stormwater system shown on Drawing 21_123G-CSE-00-XX-DR-C-1100 Surface Water Layout Plan. The stormwater discharges offsite at 1 no. Emission Point (SW1).

There is 1 no. detention basin (6,144 m^3 capacity) that located to the east of the site. There is a stormwater flow control device located downstream of the attenuation system to control to the maximum permissible discharge flow rate from the site.

Prior to the site stormwater network entering the attenuation basin, the stormwater passes through hydrocarbon interceptors, and hydrodynamic solid separator to ensure that the quality of the stormwater discharge is controlled. The fuel unloading bay contains drainage channels that direct stormwaters to the site network via hydrocarbon interceptor. This network is shown on Drawing 21_123F-00-XX-DR-C-1100 Surface Water Layout Plan.

Evaporative Cooling Water

Evaporative cooling water from the AHUs discharges to the stormwater drainage network. This is recirculated mains water that has been through the AHUs only. There is no addition of water treatment chemicals and therefore the water is of sufficient quality to be discharged to the stormwater drainage network.

2.2.3 Fire Protection

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

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

2.2.4 Foul Water Drainage System

Domestic effluent arising from occupation of the Site, including the from the transformer compound and control building is discharged the public foul sewer (at Emission Points SE1). Refer to Drawing 21_123G-CSE-00-XX-DR-C-1200 for the foul drainage layout. The foul water connection to the public foul sewer is in accordance with the MCC Planning Ref. LB191735.

Domestic Effluent

The foul drainage network comprising of 150-225 mm pipes take effluent from internal sanitary locations and outfall into the external foul network. The outfall into the foul network is at 1 locations (SE1) This foul sewer discharges to a 450 mm diameter public foul sewer.

All internal foul drainage networks were designed in accordance with the relevant guidance including Irish Waters Code of Practice for Wastewater Infrastructure, National Building Regulations Technical Guidance Document H – Drainage & Waste Disposal.

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

Diesel Top Up Tank Bund

Drainage of rainwater from the top up tank bund to the north of Building A is directed to foul sewer and connects to the foul main at emission point SE1.

The drainage sump located in the top up tank concrete bund contains a hydrocarbon detectors which automatically shut off drainage from these sumps if diesel is detected in the sump, preventing any contaminated stormwater from exiting the bund. These probes are also connected to the BMS/EPMS critical alarm.

Drainage from the top up tank bund is equipped with hydrocarbon interceptor(s). The hydrocarbon interceptors are equipped with an oil warning system which is connected to the BMS/EPMS critical alarm.

Oldbridge Substation and Transformer Compound

Drainage from the Oldbridge Substation transformer compound is directed to the site foul network; and is equipped with hydrocarbon interceptors located at the compound. The hydrocarbon interceptors are equipped with an oil warning system which is connected to the BMS/EPMS critical alarm. The foul network connects to the site foul main to discharge at emission point SE1.

2.2.5 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.

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.

The site has been evaluated in the Complete Baseline Report (Attachment 4.8.3).

3.1.1 Soils and Subsoils

The site is underlain by two principal soil types, these comprise the following:

- Sandstone and shale till (Lower Paleozoic) (TLPSsS): This is the predominant soil type located in the study area. It is a clayey till type (diamictons).
- Shales and sandstones till (Namurian) (TNSSs). There is an area located in southwest of the study identified as TNSSs.

3.1.2 Bedrock Geology

The bedrock geology underlying the site and surrounding area consists of Dinantian Upper Impure Limestone which is part of the PlatinFormation.

3.1.3 Aquifer Classification

The bedrock aquifer underlying the site is classified as a karstified regionally important bedrock (Rkd)

3.1.4 Aquifer Vulnerability

The GSI currently classifies the bedrock aquifer in the region of the site primarily as having (L) - Low Vulnerability status in the south of the site (indicating >10 m of low permeability soil) to Moderate Vulnerability status in the north of the site (indicating 5-10 m of low permeability soil).

3.1.5 Groundwater Wells

The area in the vicinity of the site is generally serviced by public mains. There are no public water supplies sourced from groundwater in the area and there are no groundwater Source Protection Zones in the vicinity of the site

3.1.6 Groundwater Body

The Groundwater Body (GWB) underlying the site is the Drogheda GWB (EU Groundwater Body Code: IE_EA_G_008). Currently, the EPA (2019) classifies the Drogheda GWB as under review. However, the GWBs to the north and south of this currently are projected as “At Risk” i.e. at risk of not achieving good status

3.2 HYDROLOGY

The area is drained by the Boyne River which runs approximately 1km to the north of the site. There are no streams on the site itself or along its boundaries. Stormwater run-off will be collected and discharged to the public storm sewer which eventually discharges to the Boyne River c. 1km meters to the north.

3.3 FLOOD RISK

The site is in an area which is not liable to flooding and will not in and of itself result in any additional flood risk.

3.4 ECOLOGICAL DESIGNATIONS

An Appropriate Assessment (AA) Screening Report (Attachment-6-3-4) has been prepared by Moore Group and has been submitted with the licence application. This exercise found that the nearest European sites to the installation are associated with the River Boyne, with the nearest being River Boyne and River Blackwater SAC (Site Code 002299) situated almost 1km to the north.

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

Table 4.1 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 4.2 specifies the storage thresholds for specific hazard statements which lead to the potential for firewater retention.

Table 4.2 *Storage Thresholds of Substances with Environmental Hazard Statements*

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

Table 4.3 specifies the onsite storage of potentially hazardous substances on site.

Table 4.3 *Total Onsite Storage of Substances with Environmental Hazard Statements*

Material/ Substance	CAS number	Amount Stored (tonnes)	Hazard Statements	Hazardous Substances in Groundwater (December 2010)
R32 Refrigerant	75-10-5, 354-33-6	0.032	H220, H221, H280	No
R410A Refrigerant	75-10-5, 354-33-6	0.37	H220, H221, H280	No
Diesel	68334-30-5	370	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 the specific purpose and contents. As required the structures will be rendered impervious to the materials stored therein. Diesel fuel pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (dual-contained pipe system). The Top Up tank is located within a bunded area meeting the requirements of Agency guidelines on the “Storage and Transfer of Materials for Scheduled Activities”. 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.

The Top Up fuel tank is fitted with automated level gauges and the online readings from these gauges are fed back into the facility’s BMS/EPMS. The Top Up fuel tank 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.

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.

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.

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

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 6.1 below highlights the classification of the significance of the fire event used.

Table 6.1 *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.

6.1.1 Area 1 Data Halls

Significance of the Fire Event

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 is provided to be distributed to all the buildings.

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

Environmental Hazard Potential

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

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

6.1.2 Area 2 Building A 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 are 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 is 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 2 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

6.1.3 Area 3 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 3 is classified as no risk and firewater retention is therefore not required.

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

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

6.1.4 Area 4 Bulk Diesel Tank Fuel Storage Area

Bulk diesel is supplied to generators from `1 no. 40,000 L tanks located in the tank farm facility in the east of the site. The bund has a capacity of 89.55 m^3. The bund capacity exceeds the EPA guidance for 110% of the capacity of the largest tank or drum within the bunded area, or 25% of the total volume of the substance which could be stored within the bunded area.

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 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 bunds are 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 The Top Up tank bund is equipped with a hydrocarbon probe in the bund sump which detects diesel in the bund. This triggers closure of the sump discharge and sends an alarm signal to the BMS.

The Top Up fuel tank is fitted with automated level gauges and the online readings from these gauges are fed back into the facility's BMS/EPMS. The Top Up fuel tank also has high/low level alarms (90% high, 30% low) and a high-level switch at 95% which alarm to the BMS/EPMS critical alarm. Fuel delivery to the Top Up tank will take place within the designated unloading areas under strict Standard Operating Procedures. Diesel will then be piped from the bulk storage tanks to the emergency backup generator day tanks. Diesel fuel pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (dual-contained pipe system).

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 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 4 is classified as at risk and firewater retention is therefore required.

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

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

6.1.5 Area 5 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 5 is classified as no risk and firewater retention is therefore not required.

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

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

6.1.6 Area 6 Building A – Double Skinned Tanks

Bulk diesel is supplied to the emergency backup generator day tanks at Buildings A from the Top Up Tank to the north of Building A.

Each of the 26 no. emergency backup generators at Buildings X are accompanied by a double skinned belly tanks (18,000 litres each) and 1,000L day tanks for immediate supply to the generator. These day tanks are equipped with level gauges with high/low alerts which will also alarm to BMS/EPMS critical alarm.

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 double skinned tanks will be fitted with automated level gauges and the online readings from these gauges are fed back into the facility's BMS/EPMS.

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 8 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

7.0 REQUIRED RETENTION VOLUME FOR FIREWATER

Flammable materials stored at the ADSIL facility 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 in place will enable control of a fire event.

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. 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.

7.1 CALCULATIONS FOR AREA 4 BULK TANK FARM FUEL STORAGE

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

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

- The fire tender 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 (40m^3) at any one time has been estimated at 32,000L if filled to a maximum of 80%.
- 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 largest tank – worst case scenario (VT) ..... 32.0m^3

Foam likely to be used (WE) ..... 10 m^3

Rainfall contribution (RW) = 0.0610m x 50m^2 ..... 3.0 m^3

The total required retention volume (VT + WE) ..... 45.0 m^3

The bund has a capacity of 54.87 m^3. This exceeds the EPA guidance for 110% of the capacity of the largest tank or drum within the bunded area, or 25% of the total volume of the substance which could be stored within the bunded area.

7.2 CALCULATIONS FOR AREA 6 BUILDING A – DOUBLE SKINNED TANKS

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

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

- The fire tender will use foam rather than water to fight a hydrocarbon fire. A conservative estimate of 0.5m^3 has therefore been included.
- The total volume of diesel in the largest double skinned tank (18.0m^3) at any one time has been estimated at 14,400L if filled to a maximum of 80%.
- 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 largest tank – worst case scenario (VT) ..... 14.4 m^3

Foam likely to be used (WE) ..... 0.5 m^3

Rainfall contribution (RW) = 0.0610m x 2m^2 ..... 0.1 m^3

The total required retention volume (VT + WE) ..... 20.0 m^3

The tanks are double skinned with +10% capacity within the tank layers. The capacity of the double skinned tanks exceeds the EPA guidance for 110% of the capacity of the largest tank or drum within the bunded area, or 25% of the total volume of the substance which could be stored within the bunded area.

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 bund capacity in the tank farm provides adequate retention in the unlikely event that the largest diesel storage tank ruptures, the foam suppressant, diesel and rainwater will be fully retained within the respective bunds and additional firewater retention is not required.

The bund for the bulk tank in Area 4 have bund capacities which exceeds the EPA guidance for 110% of the capacity of the largest tank or drum within the bunded area, or 25% of the total volume of the substance which could be stored within the bunded area.

Area 6 has double skinned tanks which have +10% capacity within the tank layers. The capacity of the double skinned tanks exceeds the EPA guidance for 110% of the capacity of the largest tank or drum within the bunded area, or 25% of the total volume of the substance which could be stored within the bunded area.

Therefore, further retention is not required.

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 4 and Area 6 which each contain large quantities of diesel and so received a rating of ***R1 – at Risk*** on this basis.

Further retention is not required, there is adequate bund capacity in these areas to contain hazardous material, the fire 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 bund 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) has been developed for the data storage facilities, that includes a fire scenario, and will be updated to incorporate any requirements of the Licence. Drills are undertaken at regular intervals by all staff. All staff will be trained in the emergency procedures 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.

Bunds are constructed of suitable concrete and have undergone testing for their integrity during the commissioning phase. All pipelines are integrity tested following installation by vendor. The diesel Top Up tank bund is equipped with a hydrocarbon probe in the bund sump which detects diesel in the bund. This triggers closure of the sump discharge and sends an alarm signal to the BMS.

The bulk fuel tanks are 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.

Fuel delivery to the bulk storage tanks will take place within the designated unloading areas under strict Standard Operating Procedures. Diesel will then be piped from the

bulk storage tanks to the emergency backup generator units. Diesel fuel pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (dual-contained pipe system).

9.1 RECOMMENDATIONS

Containment

- A shut off system on the relevant storm or foul water network should be installed that can be manually or automatically closed to allow for the containment of potentially hazardous fire water.

Operational Procedures

- The ERP should be continuously reviewed and updated. Updates should include key personnel; emergency services contact numbers and action plans in the events of a fire. A copy of the ERP should be located at key locations around the data storage facilities.

10.0 REFERENCES

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

2. EPA, (2022). Environmental Protection Agency, on-line mapping; Available on-line at: http://gis.epa.ie/Envision [Accessed: 30-03-2022].

3. GSI, (2022). Geological Survey of Ireland; Available on-line at: www.gsi.ie [Accessed: 30-03-2022].].

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,	44.5,	49.2,	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,	47.6,	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,	84.9,	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