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# FIREWATER RISK ASSESSMENT 2021

## Amazon Data Services Ireland Ltd.

Technical Report Prepared For

**Amazon Data Services Ireland Ltd.**



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## EXECUTIVE SUMMARY

AWN Consulting was 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 proposed data storage facility in Clonshaugh Business & Technology Park, Dublin 17. The assessment has been carried out in accordance with methodology prepared by the Environmental Protection Agency (EPA).

The existing campus accommodates 4 no. data storage facilities (Building A, B, C & D). The extended campus will accommodate 2 no. data storage facilities (Buildings E & F).

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 5, Area 6, Area 7, Area 8 and Area 9 each have contain 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, fire suppressants, as well as 6 hours' worth of rainfall

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## 1.0 INTRODUCTION

AWN Consulting was 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 in Clonshaugh Business & Technology Park, Dublin 17. The assessment has been carried out in accordance with methodology prepared by the Environmental Protection Agency (EPA).

### 1.1 SITE DESCRIPTION

When constructed the facility will consist of c. 24.2 hectares (ha) in total. The existing campus will accommodate 4 no. data storage facilities (Buildings A, B, C and D). The extended campus, currently under construction, will accommodate 2 no. data storage facilities (Buildings E and F).

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 is shown on Drawing CSE-00-XX-DR-C-4004 Site Plan.

# 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 expected to be 24 hours a day, 7 days a week.

Once all data storage facility buildings are operational, each of the six buildings when completed will have up to c. 50 full time employees present on site during the day in each building, inclusive of third-party staff, maintenance contractors and visitors, as required, with up to 7 no. additional staff on night shifts each day per building. A total of 342 personnel over the entire site each day (including night shifts).

The facility operational hours are expected to be 24 hours a day, 7 days a week. Operational Details are set on in Attachment 4-8-1 included as part of this licence application.

## 2.2 UTILITIES AND PROCESSES

### 2.2.1 Emergency Backup Generators (Generation Compound)

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.

The facility, once fully operational, will have comprise a total of; 103 no. 6.49 $MW_{th}$ diesel powered emergency back-up generators; 2 no. 2.19 $MW_{th}$ diesel powered emergency back-up generators and 4 no. 0.450 $MW_{th}$ diesel powered fire pumps.

The emergency backup generators are housed within a container with various designed control measures in place including acoustic attenuation, exhaust silencers 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. The tanks are 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).

### 2.2.2 Water

Potable Water Supply

Water is required for cooling equipment, cleaning, general potable supply for drinking and sanitary facilities. This is sourced from mains water supply via a metred connection.

Water is supplied to the site in a pressurised pipe system to potable cold-water storage tanks. Supply is provided from the existing 150mm watermain on the site which is fed from the public 350mm diameter uPVC watermain on the IDA estate road to the south of the site. Water supply to Buildings E and F on the extended campus will be supplied via a connection to the existing 150mm watermain that serves the existing campus.

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

Firewater Main

A 250-300mm fire ring main is in place across the existing campus to provide firefighting water to the site. The sprinkler pump house is equipped with 2 diesel fired pumps (one duty, one standby) for the supply of firefighting water. These then feed into the internal fire main which feeds the sprinkler system for all four data storage facilities on the existing campus.

The sprinkler tank in the pump house has an effective capacity of 400m$^3$ which is fed from the water main will be filled on building occupation and have infrequent top-ups thereafter. There is no addition of water treatment chemicals to this water.

The fire water ring main will be extended within the site to provide firefighting water to the extended campus. The fire main will supply a new sprinkler tank and pumphouse containing 2 no. diesel fired pumps (one duty, one standby) which will be located in the extended campus to support Buildings E and F.

The Hydrants are in accordance with BS 750 and BS EN14339.

### 2.2.5 Surface Water Drainage

*Existing Campus (Buildings A to D)*

Rainwater runoff from building roofs, yards and the road network is collected in the onsite storm water drainage network consisting of 225mm to 600mm diameter pipes.

The Attenuation Pond 1 (4,200m$^3$ capacity) is located in the west and receives the majority of the rainwater runoff. The attenuated stormwater in Attenuation Pond 1 is discharged from the pond via a flow control device (hydrobrake) and passed through a Class 1 Bypass Oil Separator (NPBP006 type with an oil capacity of 90 litres) to ensure that the quality of the stormwater discharge is controlled. The hydrobrake controls the flow to the allowable greenfield run off rate of 55.2 l/s. After the hydrobrake and Oil Separator the attenuated waters pass to an existing 375mm diameter connection which then discharges into the existing 750mm diameter concrete public stormwater sewer within the Business Estate Road along the southern boundary of the site. This located is labelled Emission Point SW1). All adjacent business and industrial

developments discharge to this public stormwater sewer, which flows east, then south and ultimately outfalls to the Santry River.

Attenuation Pond 2 (600 $m^3$ capacity) is located directly to the north of the Darndale Substation and is designed to drain the northern portion of the site including the 110kV Darndale Substation and sprinkler compound. Prior to the attenuation pond the stormwater passes through one of 2 no. Class 1 by-pass hydrocarbon interceptors (1 no. for drainage from the transformer compound, 1 no. for drainage from the remaining areas). These are NSBP003 type interceptors with an oil capacity of 45 litres each. The interceptors are equipped with oil warning alarms that connect to the Building Management System (BMS)/Electrical Power Management System (EPMS) critical alarm.

The stormwater from Attenuation Pond 2 is then pumped via a 100 mm diameter rising main back into the stormwater drainage network for the existing campus to flow into Attenuation Pond 1.

*Extended Campus (Buildings E and F)*

Rainwater runoff from building roofs, yards and the proposed road network will be collected in a newly constructed stormwater drainage network consisting of 225 mm to 675 mm diameter pipes. A self-cleaning velocity of 1.0m/s will be achieved throughout this network. The stormwater will then be diverted to an underground attenuation system and overground detention pond (Attenuation Storage 3). A total of 2,150$m^3$ temporary storage has been provided in the attenuation system. The underground attenuation system comprises 1,668$m^3$ and the detention basin provides 482$m^3$ temporary storage.



The drainage design for the development includes a Class 1 bypass petrol interceptor immediately upgradient of the attenuation to ensure the quality of stormwater discharge is controlled prior to attenuation and discharge offsite. The interceptor will be equipped with level detection and will connect to the BMS/EPMS critical alarm.

The attenuated stormwater will be pumped via a stormwater rising main at a controlled rate of 16.6l/s (the equivalent greenfield runoff rate for the site) to a stand-off manhole and then by gravity feed to the existing stormwater sewer along the Business Estate Road via the existing 375mm diameter connection in the existing campus.

The stormwater from both the new and the existing campus therefore exit the site at shared Emission Point SW1.

The drainage layout for the site is shown in Drawing CSE-00-XX-DR-C-4206 Surface Water Layout included as part of the licence application.

### 2.2.6 Diesel Storage Areas (Existing Campus)

The stormwater sumps at the diesel unloading bays and in the bulk diesel tank/top up tank concrete bunds contain probes which alarm and automatically shut off drainage from these areas 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 Building A and B bulk tank farm is equipped with a Class 2 by-pass interceptor NSBP003 type with oil capacity of 45 litres and drainage from the Building

C and D bulk tank bund is equipped with a Class 2 by-pass interceptor NSBP006 type with oil capacity of 90 litres.

The hydrocarbon interceptors are and will be equipped with an oil warning system which will be connected to the BMS/EPMS critical alarm.

### 2.2.7 Foul Water Drainage

Domestic effluent arising from occupation of the data storage facilities will be discharged from both campuses to the public foul sewer which ultimately discharges to the municipal wastewater treatment plant (WWTP) at Ringsend.

### 2.2.8 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.

### 3.1.1 Bedrock Geology

Mapping from the Geological Society of Ireland (GSI) indicates that the site is underlain by Dinantian Upper Impure Limestones of the Lucan Formation.

## 3.2 SOILS AND SUBSOILS

The GSI geological web viewer shows the existing campus and extended campus is primarily underlain by made ground, with and limestone till to the north and north-west.

The subsoil has been classified as limestone till (Carboniferous). This is the dominant subsoil type in the region and is a glacial deposit which is known as Dublin Boulder Clay.



### 3.2.2 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.

### 3.2.3 Groundwater Wells

There are no source protection areas relating to group water schemes or public water supplies within 3km of the site, i.e., zones surrounding a groundwater abstraction area.

### 3.2.4 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”.

## 3.3 HYDROLOGY

There are no streams on the site itself or along its boundaries. Stormwater run-off will be collected and discharged to the IDA storm sewer which eventually discharges to the Santry River.

## 3.4 FLOODING

No historic flooding of the site has been identified from the floodmaps.ie website.

The Planning Application (DCC Reg. Ref.: 4185/18) for Building D includes a Site-Specific Flood Risk Assessment for the development site entitled *‘Flood Risk Assessment For Proposed Data Storage Facility Development Clonshaugh Business*

*And Technology Park Dublin 17'* that was prepared by AWN Consulting (October 2018). The Site-Specific Flood Risk Assessment concluded that:

- *The proposed development is located in an area with no flood hazard thereby avoiding flood risk and adhering to the first stage of the sequential approach, a Stage 1 assessment was undertaken with no requirement for a justification test.*
- *The development resides within Flood Zone C and is not at risk of flooding from a 1% or 0.1% AEP event.*
- *As drainage is designed to adhere to the Local Authority requirements, the Greater Dublin Strategic Drainage Study and has incorporated SuDS measures, it is not expected that the proposed development would adversely impact on flood risk for other neighbouring properties.*

The Planning Application (DCC Reg. Ref.: 3803/20) for Building E and Building F included a site-specific flood risk assessment (FRA) carried out by the project engineers OCSC (OSCS), the potential risk of flooding on the site was also assessed through a review of the OPW CFRAM mapping for the area. The Site-Specific Flood Risk Assessment concluded that:

- *The Proposed Development site is within Flood Zone C for tidal and fluvial flooding meaning the site has a less than 0.1% or a 1 in 1000 chance of flooding from rivers, estuaries or the sea in any one year per the OPW Guidelines for Planning Authorities for flood risk management.*
- *The areas adjacent to the site are subject to potential overland flow and ponding arising from pluvial, drainage infrastructure and watermain infrastructure sources.*
- *The provision of finished floor levels (FFLs) of the proposed buildings at a level higher than the surrounding levels will be effective in mitigating these risks to the site.*
- *The flood risk arising from the proposed drainage infrastructure is negligible and no further mitigation is required. It also concludes that the flood risk represented by ground water is negligible with no further mitigation required.*



## 3.5 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).

There are no streams on the site itself or along its boundaries. Stormwater run-off will be collected and discharged to the IDA storm sewer which eventually discharges to the Santry River.

The site is significantly remote from designated ecological sites and so would not be expected to impact them in any way. There are no direct hydrological links, although the Santry River does flow c.300m to the south of the site.

# 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 |

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

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

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

| Hazard Statement | Storage Quantity (tonnes) |
|---|---|
| H400<br>H410 | 1 |
| H401<br>H411 | 10 |
| H402<br>H412 | 100 |
| H413 | 1000 |

Table 4.3 specifies total onsite storage for specific hazard statements.

***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) |
|---|---|---|---|---|
| Diesel | 68334-30-5 | 1,323 | H226, H304, H351, H332, H315, H373, H411, | Yes |
| R410A Refrigerant | 75-10-5 | 0.9 | H220, H221, H280 | No |



## 4.2 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 minimum 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.

ADSIL will adopt fire detection and firefighting infrastructure such that all buildings have smoke and/or heat 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.



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 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. |

## 6.1 ENVIRONMENTAL RISK ASSESSMENT OF THE SITE

### 6.1.1 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 will be installed on the surface water drainage system following grant of the IE Licence, 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 |

### 6.1.2 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 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 |



### 6.1.2 Area 3 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 these areas. 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 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 |



### 6.1.3 Area 4 Waste Management Areas

This area 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*

This area is not used to store large volumes of hazardous wastes. Small volumes of lab chemicals are present in the self-bunded chemstores however the volumes are not significant. 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 4 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 |

### 6.1.4 Area 5 Building A and B Fill Tank Fuel Storage Area

Bulk diesel is supplied to generators at Buildings A and B from 5 no. steel bulk storage tanks (3 no. 75,000 litre tanks and 2 no. 115,000 litre tank) located in a bunded tank farm to the east of Building A. The bund for the 2 x 115,000 litre tanks is 343.57m$^3$ and the bund for the 3 no. 75,000 litre tanks is 542.84 m$^3$. Both bunds are equipped with an alarm which connects to the BMS/EPMS and issues a critical alarm if diesel is detected by the sump probe. 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.

Each of the generators at Buildings A and B are accompanied by a double skinned day tank (4000 litres each) for immediate supply to the generator. Each tank has a high/low level alarm (90% high-high, 80% high, 30% low, 20% low-low) which connects to the 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 emergency generators at the nearby data storage buildings. 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 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 (high-high (90%), high (80%), Low (30%), low-low (20%) and a high-level switch at 95% which alarm to the BMS/EPMS critical alarm.

A diesel unloading bay is located adjacent to the Building A and B Fill Tank Fuel Storage Areas. 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 5 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 |

### 6.1.5 Area 6 Building C and D Fill Tank Fuel Storage Area

At Buildings C and D bulk diesel will be supplied to the generators from 1 no. 40,000 litre bulk 'top up tank' located to the south of the Building C in a bunded compound. The bund is designed to be 138.6m$^3$ (9m x 7m x 2.2m). 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. have high/low level alarms (95% high, 20% low based on analogue level sensor) and a high-level switch at 95% which alarm to the BMS/EPMS critical alarm.

Each generator for Buildings C and D will be accompanied by a double skinned 17,000 litre belly tank and a double skinned 1,000 litre day tank. The belly tanks will be equipped with a float type digital indicator with automated high/low alerts (95% high high, 90% high, 50% low, 45% low low). The day tanks will also be equipped with level gauges and high/low level alarms (90% high high, 80% high, 30% low, 20% low low) similar to the existing day tanks; these will alarm to BMS/EPMS critical alarm.

These bulk tanks will be fitted with automated level gauges and the online readings from the gauges will feed back into the facility's BMS/EPMS.



*Significance of the Fire Event*

There is the potential for heat/ignition sources in this area due to the presence of emergency generators at the nearby data storage buildings. 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 the Building C and D Fill Tank Fuel Storage Area. 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 6 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 |

### 6.1.6 Area 7 Building E Fill Tank Fuel Storage Area

At Buildings E bulk diesel will be supplied to the generators from 1 x 40,000 litre bulk 'top up tank' located adjacent to the loading bay in the south west corner of Buildings E.

The bund is designed to be 138.6m$^3$ (9m x 7m x 2.2m). 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.



The bulk tank will be fitted with automated level gauges and the online readings from the gauges will feed back into the facility's BMS/EPMS. The bulk tanks will also have high/low level alarms (95% high, 20% low based on analogue level sensor) and a high-level switch at 95% which alarm to the BMS/EPMS critical alarm.

Each of the emergency backup generators for Buildings E will be equipped with a 1,000 litre double skinned day tank for top-up supply to the 17,000 litre double skinned belly tanks on each of the generator units. As with Buildings C and D, these will be 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 emergency generators at the nearby data storage buildings. 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.

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 7 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 |



### 6.1.7 Area 8 Building F Fill Tank Fuel Storage Area

At Buildings F bulk diesel will be supplied to the generators from 1 x 40,000 litre bulk 'top up tank' located adjacent to the loading bay in the north west corner of Buildings F.

The bund is designed to be 138.6m$^3$ (9m x 7m x 2.2m). 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.

The bulk tank will be fitted with automated level gauges and the online readings from the gauges will feed back into the facility's BMS/EPMS. The bulk tanks will also have high/low level alarms (95% high, 20% low based on analogue level sensor) and a high-level switch at 95% which alarm to the BMS/EPMS critical alarm.

Each of the emergency backup generators for Buildings E will be equipped with a 1,000 litre double skinned day tank for top-up supply to the 17,000 litre double skinned belly tanks on each of the generator units. As with Buildings C and D, these will be 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 emergency generators at the nearby data storage buildings. 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.

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

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

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

### 6.1.8 Area 9 Emergency Backup Generator and Fire Pump Day Tanks

Fuel will be supplied from the bunded diesel tanks to the day tanks via distribution lines, these are double lined when underground. Leak detection systems are installed on all below ground fuel delivery lines which alarm to the BMS/EPMS critical alarm.

The day tanks will be equipped with level gauges and high/low level alarms (90% high high, 80% high, 30% low, 20% low low) similar to the existing day tanks; these will alarm to BMS/EPMS critical alarm.

Building A has 17 no. 4,000 Litre Day tanks 1 no. associated with each generator (68,000 L).

Building B has 18 no. 4,000 Litre Day tanks 1 no. associated with each generator (72,000L).

Building C and Building D each have 18 no. 1,000 Litre Day tanks 1 no. associated with each generator.

Building E and Building F each have 17 no. 1,000 Litre Day tanks 1 no. associated with each generator.

Fire Sprinkler Pump Room located to the northeast of Building A 2 no. 1,000 Litre Day tanks 1 no. associated with each fire pump

Fire Sprinkler Pump Room located south of Building E and Building F 2 no. 1,000 Litre Day tanks 1 no. associated with each fire pump



*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.

The generators are housed within a container with various designed control measures in place there are drip trays at the diesel fill point for the generator belly tank. The individual belly tanks are double skinned tanks, with level gauges (high and low) within the fuel tanks connected to an onboard controller which will alarm to prevent overfilling and identify a sudden loss of fuel within the tank. The fire significance (S) rating is ***S3-High.***

*Environmental Hazard Potential*

Diesel is classified as H411, toxic to aquatic life with long-lasting effects. 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 9 is classified as at risk and firewater retention is therefore required.

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

| Category | Rating |
|---|---|
| Significance of Fire Event (S) | S3 |

| | |
|---|---|
| Environmental Hazard Potential (H) | H1 |
| Overall Firewater Run-off Risk (R) | R1 |

### 6.1.9 Area 10 Emergency Backup Generator Belly Tanks

Fuel will be supplied from the bunded diesel tanks to the emergency back-up emergency backup generator units via distribution lines, these are double lined when underground. Leak detection systems are installed on all below ground fuel delivery lines which alarm to the BMS/EPMS critical alarm.

Building A and Building B are not served by belly tanks.

Building C and Building D each have 18 no. 17,000 Litre belly tanks for each generator.

Building E and Building F each have 16 no. 1,000 Litre belly tanks for each generator.

*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.

The generators are housed within a container with various designed control measures in place there are drip trays at the diesel fill point for the generator belly tank. The individual belly tanks are double skinned tanks, with level gauges (high and low) within the fuel tanks connected to an onboard controller which will alarm to prevent overfilling and identify a sudden loss of fuel within the tank. The fire significance (S) rating is ***S3-High.***



*Environmental Hazard Potential*

Diesel is classified as H411, toxic to aquatic life with long-lasting effects. 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 10 is classified as at risk and firewater retention is therefore required.

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

| 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

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. The sewer system will ensure that any spillages will be contained within the foul system and will not be discharged to the local environment.

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 5 BUILDING A AND B FILL TANK FUEL STORAGE AREA

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 2 fire 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.

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 20m$^3$ has therefore been included.
- The total volume of diesel in the largest tank (80% fill) at any one time has been estimated at 92,000L.
- 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 largest diesel fill tank – worst case scenario ($V_T$) | 92m$^3$ |
| Foam likely to be used ($W_E$) | 20 m$^3$ |
| 6 hour rainfall contribution ($R_W$) = 0.0610m x 200m$^2$ (bund areas) | 12.0 m$^3$ |
| **The total required retention volume ($V_T$ + $W_E$)** | **124.0 m$^3$** |

## 7.2 CALCULATIONS FOR AREA 6 BUILDING C AND D FILL TANK FUEL STORAGE AREA

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 2 fire 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.

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 (80% fill capacity) 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 largest diesel fill tank – worst case scenario ($V_T$) | 32m$^3$ |
| Foam likely to be used ($W_E$) | 10 m$^3$ |
| Rainfall contribution ($R_W$) = 0.0610m x 63m$^2$ (bund areas) | 3.6 m$^3$ |
| **The total required retention volume ($V_T$ + $W_E$)** | **45.6 m$^3$** |

The bund is designed to be 138.6m$^3$ (9m x 7m x 2.2m). 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.

## 7.3 CALCULATIONS FOR AREA 7 BUILDING E FILL TANK FUEL STORAGE AREA

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 tender. 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 largest diesel fill tank – worst case scenario ($V_T$) | 32m³ |
| Foam likely to be used ($W_E$) | 10 m³ |
| Rainfall contribution ($R_W$) = 0.0610m x 63m² (bund areas) | 3.6 m³ |
| **The total required retention volume ($V_T$ + $W_E$)** | **45.6 m³** |

The bund is designed to be 138.6m³ (9m x 7m x 2.2m). 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.

## 7.4 CALCULATIONS FOR AREA 8 BUILDING F FILL TANK FUEL STORAGE AREA

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 tender. 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 largest diesel fill tank – worst case scenario ($V_T$) | 32m³ |
| Foam likely to be used ($W_E$) | 10 m³ |
| Rainfall contribution ($R_W$) = 0.0610m x 63m² (bund areas) | 3.6 m³ |
| **The total required retention volume ($V_T$ + $W_E$)** | **45.6 m³** |

The bund is designed to be 138.6m³ (9m x 7m x 2.2m). 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.

## 7.5 CALCULATIONS FOR AREA 9 EMERGENCY BACKUP GENERATOR AND FIRE PUMP DAY TANKS

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. 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 the largest Day tank at any one time has been estimated at 3,200L.
- 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 F. Under this scenario the firewater calculations would be as follows:



| | |
|---|---|
| Contribution from the day tank – worst case scenario ($V_T$) | $3.2m^3$ |
| Foam likely to be used ($W_E$) | $0.5\ m^3$ |
| 6 hour rainfall contribution ($R_W$) = 0.0610m x $5m^2$ (bund areas) | $0.3\ m^3$ |
| **The total required retention volume ($V_T$ + $W_E$)** | **$4.0\ m^3$** |

## 7.7 CALCULATIONS FOR AREA 10 EMERGENCY BACKUP GENERATOR BELLY TANKS

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. 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 the largest tank at any one time has been estimated at 13,600L.
- 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 I. Under this scenario the firewater calculations would be as follows:



| | |
|---|---|
| Contribution from the day tank – worst case scenario ($V_T$) | $13.6m^3$ |
| Foam likely to be used ($W_E$) | $2\ m^3$ |
| 6 hour rainfall contribution ($R_W$) = 0.0610m x $5m^2$ (bund areas) | $0.3\ m^3$ |
| **The total required retention volume ($V_T$ + $W_E$)** | **$\underline{15.8\ m^3}$** |

## 8.0 FIREWATER RETENTION OPTIONS

Onsite bunds can be used to provide firewater retention when the content of the bund is directly involved in the fire event. There is adequate bund capacity on site to contain material spills, overflows or flange leakage in process areas, and to contain the contents of a tank in the event of a tank rupture.

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 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 bunds in Area 5 for the 2 x 115,000 litre tanks is 343.57m$^3$ and the bund for the 3 no. 75,000 litre tanks is 542.84 m$^3$, therefore further retention is not required.

The bund in Area 6 is designed to be 138.6m$^3$ (9m x 7m x 2.2m) respectively, therefore further retention is not required.

The bund in Area 7 is designed to be 138.6m$^3$ (9m x 7m x 2.2m) respectively, therefore further retention is not required.

The available bund volume within for each of the largest double skinned day tanks is 4.4 m$^3$, therefore further retention is not required.

The available bund volume within the containerised emergency generator for each belly tank is 18.7 m$^3$, therefore further retention is not required.

## 10.0 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.

There are no direct emissions to surface water bodies from the site. 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 the areas assessed were deemed to be ***R0 – Not at Risk***.

Area 5, Area 6, Area 7, Area 8, Area 9 and Area 10 contain bulk storage of hazardous material, exceeding the thresholds set out in Table 4.2, and so received a rating of ***R1 – at Risk*** on this basis.

There is existing bund capacity on site to contain hazardous firewater produced in Area 5, Area 6, Area 7, Area 8, Area 9, and 10 should the largest diesel tanks in each area rupture. The resulting hazardous material, the foam / powder suppressants, as well as 6 hours' worth of rainfall will be fully contained within the existing bunds.

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

## 10.2 RECOMMENDATIONS

Containment

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

Operational Procedures

- The Emergency Response Plan (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.

## 11.0 REFERENCES


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

2. Health and Safety Executive, (1995), The control of firewater from Control of Industrial Major Accident Hazards (CIMAH) sites to prevent environmental damage, Document No. EH70, HSE.

3. CFRAM (2021) - Catchment Flood Risk Assessment and Management; Available on-line at www.cfram.ie; [Accessed: 18-11-2021].

4. EPA, (2021). Environmental Protection Agency, on-line mapping; Available on-line at: http://gis.epa.ie/Envision [Accessed: 18-11-2021].

5. GSI, (2021). Geological Survey of Ireland; Available on-line at: www.gsi.ie [Accessed: 18-11-2021].

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7. OPW, (2021). The National Preliminary Flood Risk Assessment (PFRA) Overview Report; Flood Relief & Risk Management Division, Engineering Services, Office of Public Works (OPW).

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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, | 49.2, | 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, | 47.4, | 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, | 89.8, | 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, | 97.2, | 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, | 140.4, | 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