Advanced Environmental Solutions

Firewater Risk Assessment Report

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TOBIN CONSULTING ENGINEERS

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REPORT

PROJECT: **Firewater Risk Assessment Report**

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EXECUTIVE SUMMARY

This firewater risk assessment Report has been prepared to comply with Condition 3.9 of Waste Licence No. W0240-01 for Advanced Environmental Solution's (AES) Waste Transfer facility in Nenagh, Co Tipperary.

The purpose of this Report is to assess both the environmental contamination risk and potential firewater volume in the event of a fire at the facility. As part of this Report it is necessary to calculate the required firewater retention capacity for the site and if necessary advise on the installation of additional capacity to provide adequate confidence that the site will meet regulatory requirements and perform satisfactory when in service.

This Report was carried out by TOBIN Consulting Engineers (hereafter referred to as TOBIN) on behalf of AES Limited. In conducting this Report particular attention was paid to the Environmental Protection Agency's (here after referred to as the Agency) Draft Guidance Note to Industry on the Requirements for Firewater Retention Facilities, Building Regulations 2006 (Part B), The National Guidance Document in the Provision of Water for Fire Fighting – Water UK (2002 and 2007) and British Standards 5588 and 9999.

1 INTRODUCTION

A waste transfer station has been operating at Solsborough since 1994, AES took over operations at the facility in July 2001. AES offers a wide range of waste collection, processing and disposal services nationwide. The following waste related processes are permitted at the AES Nenagh facility under Waste Licence W0240-01:

- Shredding, crushing, baling and bulking processes,
- Non-hazardous C&D waste recovery (incl. sorting, blending),
- Storage of waste,
- Recovery of dry recyclables,
- Bulking and transfer.

This facility acts as a waste transfer terminal where non-hazardous municipal waste is separated and sorted by mechanical means before being transported off site for reprocessing or disposal.

A waste licence was issued with conditions by the Environmental Protection Agency (EPA) on the 29th July 2009, Reg No: W0240-01.

Condition 3.9 of the licence is as follows:

3.9.1 The licensee shall carry out risk assessments to determine if the activity should have a firewater retention facility. The licensee shall submit the assessment and a report to the Agency on the findings and recommendations of the assessment within six months of the date of the grant of this licence.

3.9.2 In the event that a significant risk exists for the release of contaminated firewater, the licensee shall, based on the findings of the risk assessment, prepare and implement, with the agreement of the agency, a suitable risk management programme. The risk management programme shall be fully implemented within three months of date of notification by the agency.

3.9.3 The licensee shall have regard to the Environmental Protection Agency Draft Guidance Document Note to industry on the requirements for Fire-water Retention Facilities when implementing Conditions 3.9.1 and 3.9.2 above.

This Report sets out to provide a risk assessment of firewater at the facility as requested by the Agency in Conditions in 3.9.1, 3.9.2 and 3.9.3 in Waste Licence W0240-01.

According to the EPA Draft Guidance Note to Industry on the Requirements for Firewater Retention Facilities, the Nenagh facility is covered in section II of Appendix A, where the facility's waste activity is described as "The disposal or recovery of non-hazardous waste". There is a storm water discharge from the site to surface water and there are agricultural lands bordering the site. The discharge point is upstream of Lough Derg, which is described as recreational waters. The facility is located greater than 5km from any area of environmental concern.

2 SCOPE

This Report presents a detailed risk assessment of the potentially harmful effects that firewater runoff from the facility could have on the surrounding soils and water sources in the event of a fire. This Report is based on an on site assessment carried out by a TOBIN engineer on the 7th December 2009, plans and documents from AES and discussions with relevant AES employees.

The scope of the Report has relevance to Condition 3.9 of waste licence W0240-01 and specific reference to the EPA Draft Guidance Document Note to Industry on the Requirements for Firewater Retention Facilities. This Report lists the major activity areas and processes within the Nenagh site. It also describes the materials used on site, fire fighting facilities and drainage systems (storm and foul). A key objective of this Report is to calculate the potential quantity of firewater that would be applied in the event of a fire at the Nenagh facility. This is calculated in accordance with methods described in the EPA Draft Guidance Note to Industry on the Requirements for Firewater Retention Facilities, the Building Regulations 2006 (Part B) and conditions set by the EPA.

The facility's firewater requirement is calculated in adherence with the Building Regulations 2006 – Part B, BS 5588 (part 11), BS 9999 and The National Guidance Document in the Provision of Water for Fire Fighting – Water UK (2002 and 2007). As none of the site buildings exceed 1000m^2 provision is only required for one hydrant at the entrance to the site and there is no requirement for static water capacity on site.

Reference to the EPA Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision show that the AES Nenagh Facility has an environmental sensitivity classification of Category 2, as stated in the decommissioning plan prepared as per Condition 10 of waste licence W0240-01.

3 PROCESS FACILITIES

The AES waste transfer station at Nenagh, Co Tipperary is classified as a "dry Plant" because its activities are not dependant on the addition or removal of water. Industrial chemicals are not used in the waste separation process and are only found in small quantities for vehicle servicing and in the bin sanitation process (see Appendix A).

The facility is primarily used as a waste transfer station with several ancillary activities pertaining to this process also taking place on site. Additional works taking place within the site include fabrication and repair of waste haulage trailers, servicing of AES plant and refuelling of mobile site plant. A large diesel tank located at the northern section of the main shed is used for fuelling AES waste transfer vehicles. Administrative activities take place in the prefabricated buildings in the southern section of the site and a bin sanitation area is also located in the southern section of the site.

The principal working areas on site are:

- **Main Shed** - waste separation and transfer
- **Fuelling Area** - fuelling of AES transport vehicles
- **Workshop** - vehicle servicing, haulage equipment repair and light engineering/fabrication, fuelling of mobile plant
- **Bin Wash Area** - skip and bin power washing/sanitation
- **Administrative Buildings** - prefabricated front office building, manager's office and reception
- **Weighbridge** - truck weighbridge and prefabricated office building
- **Quarantine area** - bunded area for hazardous substances removed during waste separation process

3.1 PROCESS

According to waste licence W0240-01 the waste transfer process at the Nenagh facility is described as both waste disposal and recovery. The on site waste processing is described below:

- Waste delivery into the site and recording of weight at weighbridge
- Waste tipped in the tipping area
- Waste separation by mechanical equipment – removal of potential hazardous waste to quarantine area
- Individual waste types segregated and placed in separate haulage trailers for transport off site
- General administrative works – reception, site manager's office, weighbridge
- Fuel oil distribution to both mobile plant and AES waste transport vehicles
- Bin/skip sanitation

The process of waste transfer at the Nenagh facility initially involves weighing of incoming waste and tipping onto the tipping floor for mechanical separation. A large track machine with a hydraulic arm separates the municipal waste into individual waste groups such as dry recyclables, hazardous waste (batteries, gas canisters etc), metals, inert (C&D waste) and biodegradable waste. Another important process occurring at this facility is the combination of waste from smaller collection vehicles and bulking into larger haulage vehicles for transport to other facilities. Waste transport vehicles are also fuelled from the large diesel tank to the rear of the main shed.

The site is comprised of 7 main process areas – main shed, administration buildings, fuelling station, workshop, quarantine area, bin wash, services and machinery.

3.2 MAIN SHED AND WASTE STORAGE

The main shed is located in the central section of the site and consists of a concrete slab, pitched roof, steel frame structure with a large reinforced concrete retaining wall approx 1.5m high in the southern section, increasing to approximately 2.5m in the northern section of the shed. The roof and sidewalls above 2.5m consist of galvanised cladding with some transparent perspex for natural illumination. The tipping floor has two access points to the south and east and a sloping floor falling to a central collection gully which discharges into the foul system. There is a dedicated waste collection area in the northern section of the main shed. This collection area has an internal retaining wall to keep it separate from the tipping floor. Large waste haulage trailers are reversed into this section of the main shed through the eastern access door and loaded with segregated waste (see Appendix B).

The main shed is independent of any other permanent site buildings and there is approximately a 6m buffer between the main shed and the workshop. However the main shed is located approximately less than 3m from the weighbridge office, which is a prefabricated building.

Waste material is tipped, separated and stored for a period of less than 48hrs on the floor area of the main shed. Waste is handled internally within the main shed by mechanical means and transferred to appropriate haulage containers within the dedicated collection area in northern section of the main shed. Small quantities of hazardous waste such as batteries, gas canisters, unidentified chemicals are removed from the main shed and transferred to the quarantine area prior to their removal from the site to an appropriately licensed facility.

Small quantities of leachate from the waste seep into the central gully via the centrally sloping floor of the main shed. From the central gully leachate is gravity fed into a silt trap/oil interceptor before discharging to the foul sewer system.

3.3 ADMINISTRATION BUILDINGS AND WEIGHBRIDGE

Administrative offices and reception are located in the southern section of the site and consist of prefabricated buildings (see Appendix B). These offices provide technical assistance to AES customers and provide management services and general site administration. The weighbridge is located approximately less than 5m to the south of the main shed and it records the tonnages of waste entering and exiting the transfer station.

3.4 FUELLING STATION

The fuelling point for AES waste transport vehicles is located in the northern section of the site, to the rear of the main shed (see Appendix B). The fuelling point consists of a large 44,000 litre diesel tank that is bunded to 125% of the tank's capacity. Fuel is distributed via suitable nozzles to vehicle fuel tanks to eliminate spillage. The fuel distribution infrastructure can be secured when not in use to curtail inappropriate/unauthorised distribution.

3.5 WORKSHOP

The workshop is located in the southeastern section of the site and consists of a block wall and steel frame structure with partial perspex, asbestos and galvanised cladding roof. The workshop has two access points, one to the east and the other to the north (see Appendix B). The workshop is independent of any other site buildings and there is approximately a 1m buffer between it and the quarantine area. The workshop is used for carrying out light engineering, general maintenance and repairs on haulage equipment, vehicle servicing and fuelling of mobile plant.

3.6 QUARANTINE BUILDING

The quarantine building is a newly constructed building approximately 1m north of the workshop. It is a bunded building and is accessed via a ramp on the western side (see Appendix B). Quarantined materials are stored in large plastic bins, which provide additional containment of hazardous materials. Quarantine building details are contained in Appendix C.

3.7 BIN WASHING AREA

The bin wash area consists of an open hardstanding area, which gradually slopes towards a central gully. This gully gravity feeds into the foul water system and into a central foul system oil interceptor/silt trap, from here it discharges into the foul sewer (see Appendix B). Activity at the bin wash incorporates power washing of all bin types, including skips.

Small quantities of solvents, detergents and cleaning products are used for sanitation purposes during this process. As a result of the cleaning process leachate and waste solids are removed as scum from the bins/skips and are discharged to the dedicated gully. The sanitation products are stored in the metal bunded area within the workshop.

3.8 SERVICES, UTILITIES AND MACHINERY

Vehicles and machinery on site include:

Table 3.8-1 Vehicle Register

Vehicle Type*	No of Vehicles
Articulated Lorry	*2*
Artic Lorry (yard use)	*1*
REL Skip Eater	*1*
RCV 8	*4*
RCV 6	*4*
Rigid 4	*2*
RCV 4	*2*
Skip – Chain	*4*
Skip Hook	*1*
Van	*3*
Skip Trailer	*1*
Nissan Forklift	*1*
Cat 312C	*1*
Bobcat 753 Skid steer	*1*
Total	**28**

* A full fleet register is available in Appendix D.

Additional equipment/machinery provided on site includes air compressors, welders and cutting torches. All equipment is operated by competent persons who must obtain hot work permits and wear appropriate personal protective equipment (PPE).

4 MATERIALS

On site activity includes the use of chemicals and materials that are potentially harmful to the environment. Any chemicals brought onto or stored on site are accounted for in the Material Safety Data Sheets (MSDS), see Appendix A.

4.1 MATERIAL VOLUMES ON SITE

All materials and wastes are stored in areas designated as bunded areas.

Table 4.1-1 Material Type and Volume On Site

Type of Material*	Quantity	
Diesel	44,000	***Litres***
Green Diesel	1,150	***Litres***
Disinfectant & Detergents	35	***Litres***
Engine Oil	850	***Litres***
Hydraulic Oil	700	***Litres***
Grease	120	***Kg***
Odour Block	75	***Litres***

Ad Blue	850	***Litres***
AFT	70	***Litres***

* Further details of Materials are contained in the MSDS sheets in Appendix A

Table 4.1-2 Risk Phrase and Chemical Hazard Analysis

Material	Hazard Description	CAS No	Risk Phrase Rating	Quantity Stored (Tonnes)
Diesel Oil	Harmful Carcinogenic Category 3. Dangerous for the environment.	68334-30-5	R401/R651/R661/R511/R53*	37.31 tonnes*
AFT – (transmission Fluid)	This material has no known health hazards under applicable laws. Do not discard to the environment.	Mixture 64742 – 54 - 7	NA	0.0597 tonnes
Ad-Blue	Toxic to fish, notify environmental agency in any case of pollution of SW or BHs.	Mixture 7732 – 18 - 5 57-13-6	NA	0.926 tonnes
Hydraulic oil 32	Analysis for ecological effects has not been conducted on this product. However, if spilled, this product and any contaminated soil or water may be harmful to human, animal, and aquatic life. Also, the coating action associated with petroleum and petroleum product can be harmful or fatal to aquatic life and waterfowl.	Mixture 64741 – 89 – 5 64741 – 88 – 4 64742 – 54 – 7 64749 – 42 - 3	NA	0.621 tonnes
Odourblock 320 E	No experimental toxicology values available, substance is inherently biodegradable	NA	R36/R38	0.075m^3
Casterol GTD Magnatech 10w-40	This preparation is not classified as dangerous according to Directive 1999/45/EC as amended and	NA	R36/38	0.739 tonnes

	adapted. However Zinc dialkyl dithiophosphate has an R phrase rating.			
Cadence	Chemical concentrate containing sequesterant and cationic surfactants.	NA	R36	0.361 tonnes
Total Coolant Diluted	Contains Monoethylene. Toxic to fish if released to waters.	NA for Ad-Blue. Monoethylene 107-21-1	R22	0.207 tonnes
Grease	This material is expected to have adverse affects on marine and plant life. Spills may contaminate drinking water.	NA	NA	0.12 tonnes

R53* - EPA Limit value for required firewater retention is 1000 tonnes
NA = none available
Full list of MSDS Sheets contained in Appendix A

5 FIRE SAFETY MANAGEMENT SYSTEM

Fire safety management at the AES Nenagh transfer facility is comprised of the following:

- Fire prevention
- Fire containment
- Fire detection
- Fire suppression
- Response in event of fire
- Response in event of an alarm

5.1 FIRE PREVENTION

Fire Prevention at the Nenagh facility is achieved by:

- Safe storage of combustible and flammable materials
- Prevention of mobile sources of ignition in areas with combustible and flammable materials
- Suitable equipment
- Hot work permits
- Good housekeeping
- Regular maintenance and competent repair of equipment
- Efficient emergency response and communications plan
- Regular safety audits

5.1.1 Storage of Combustible and Flammable Materials

At the AES Nenagh facility the following principals govern the storage of combustible materials and flammable liquids.

- Good housekeeping and prompt removal of dry recyclables off the site to prevent the build up of combustible materials
- Regular inspection of on site machinery for leaks and other miscellaneous problems to prevent spillage of flammable liquids
- Removal of any gas containers or unidentified liquids/chemicals from the waste tipping area to the quarantine area upon immediate detection
- Large diesel storage tank is contained within an appropriately bunded tank which is reinforced to prevent breach incase of collision with mobile plant machinery

5.1.2 Control of Sources of Ignition

At the AES Nenagh facility the following controls are in place to minimise sources of ignition:

- No smoking policy within the site area
- Diesel Tank has an appropriate distribution nozzle to ensure safe refuelling of vehicles
- Hot work permit system in place throughout the site
- Authorised personnel are only permitted within the active compound area
- Secure site access and 24 hour site security to prevent unauthorised entry

5.1.3 Safety Audits

Internal safety audits are carried out fortnightly. The AES Nenagh waste transfer facility is currently in the process of applying for ISO18001 Certification.

5.2 FIRE DETECTION

The fire detection system/alarm at the Nenagh facility is referenced as Emergency Response Plan – 03 (ERP-03) and consists of the following:

- 24hr security on site,
- Fire alarm or security officer will alert the emergency response team (ERT) in the event of a fire,
- The site manager is site incident controller, with responsibility for assessing the scale of an incident, informing fire service, directing localised rescue and fire abatement services. In the absence of the site manager, the deputy manager shall assume the roll of site incident controller. If an incident occurs outside operating hours, security will contact the relevant authorities and the person on call, who's details are located on the Facility Notice Board at the entrance to the site,
- The Nenagh fire brigade will be contacted by the ERT or security officer if necessary,
- The fire detection system will be activated by:
    - Manual stations per building.

5.3 FIRE SUPPRESSION

The capacity for fire suppression at the Nenagh facility is provided for by:

- On site - Fire fighting equipment and emergency response plans
- Off site – Fire Service

5.3.1 On Site Fire Suppression Facilities

The on site fire abatement equipment is:

- Fire Extinguishers x 21
- Fire Horns x 3
- Hose reels
- Hydrant

Water is taken from a mains water supply at the southern entrance to the facility. If required a North Tipperary County Council fire hydrant is located at the southern site entrance. This hydrant will be the main source of water for a fire fighting operation at the facility. As the facility's buildings are less than 1000m^2 only one fire hydrant is required for the site, as per the building regulations 2006 (part B). North Tipperary County Council conducted hydrant pump testing in the vicinity of the site in 2005. The closest hydrant to the facility in 2005 was approximately 350m east of the site along the old N7. Pump tests for this hydrant gave a flow rate of 14litres/sec (50.4m^3/hr). This test is 5 years old and flow rates may have fluctuated since then. The new fire hydrant located at the southern entrance to the facility provides a suitable water source for fire suppression so there is no need for on site static water storage.

5.3.2 Off Site Fire Suppression Facilities

Nenagh Fire Service has fire tenders with the ability to bring water to site. The volume of water brought onto site varies depending on number of tenders or tankers arriving on site. According to the Nenagh Fire Service approximately 2 fire tenders with 1.82m^3 capacity each are sent to site as standard in the event of a fire. A fire hydrant at the southern entrance to the facility is the main fire fighting water source. Additional water sources such as static water tanks or surface water sources are deemed unnecessary for the facility, as per the Building Regulations 2006 (Part B).

6 DRAINAGE SYSTEM

There are two drainage systems available at the facility:

- Surface water discharge,
- Process effluent/domestic sewage.

6.1 SURFACE WATER

The surface water system gathers water from gullies in hard standing areas such as car parks, internal haul routes, the weighbridge and other paved areas, it also gathers surface water runoff from building roofs within the site boundary which discharge via downpipes directly into the storm water system (see Appendix E).

All surface water runoff passes through a silt trap and oil interceptor system (capacity 41000m^3) in the northeast corner of the site before being discharged to the unnamed stream that rises at the northeast site boundary.

The storm water outfall discharges into a drainage ditch in the northeast corner of the site. This drainage ditch is a seasonal stream and is a tributary of the unnamed stream (EPA Ref: 25-3773), which is a tributary of the Ardgregane Stream (EPA Ref: 25-3686), which ultimately releases into Lough Derg.

Waste licence W0420-01 sets the following conditions for storm water discharge to surface water[1]:

[1] No Limits at time of issuing this Report

Table 6.1-1 Storm Water Discharge Conditions As Per W0240 - 01

Parameter	Monitoring Frequency (Note 1)	Analysis Method/Technique
PH	Weekly	pH Electrode Meter
COD	Monthly	Digestion/Colorimetry
Ammonia	Quarterly	Colorimetry/Ion Selective Electrode
Conductivity	Weekly	Conductivity probe/meter
Visual Inspection	Daily	Sample and examine for odour and colour
Suspended Solids	Weekly	Standard method
Mineral Oils	Quarterly	Standard method

***Note 1*:** Samples Taken at from the storm water outfall as per Appendix E

Waste Licence W0240 – 01 states that there shall be no emissions to water of any environmental significance.

6.2 EFFLUENT (FOUL SEWER)

The process effluent from the facility consists of effluent drained from several locations across the site. These areas include the central leachate gully within the main shed, and effluent from the bin wash area. All effluent is gravity fed into a 5000 litre oil interceptor/silt trap located in the centre of the site. Domestic sewage from the administrative buildings at the southern end of the site is gravity fed north where it connects with the outfall from the central foul water silt trap/oil interceptor. After the leachate and domestic sewage have mixed they are gravity fed in a northeast direction to an underground pump station. From here the effluent is pumped via a rising main to a North Tipperary County Council foul sewer, located at the southern entrance to the site (see Appendix E).

Waste licence W0420 – 01 sets the following limits for discharge to sewer:

Table 6.2-1 Sewer Discharge Limits As Per W0240 - 01

Parameter	Emission Limit Value W0240 - 01
pH	6 - 10
	mg/l
Ammonia as N (Nitrogen)	50
BOD	1000
COD	3000
Suspended Solids	1000
Detergents	100
Fats, Oils, Grease	100
Sulphates	500

Volume to be emitted: **Daily Max = 5m^3/day**

7 FIREWATER APPLICATION AND RUNOFF

As per Condition 3.9 of water licence W0240-01 the quantity of potential firewater from a fire at the Nenagh facility must be calculated. From this calculation an assessment of required containment capacity can be undertaken.

7.1 FIREWATER CALCULATION PARAMETERS

The firewater application and runoff rate is calculated by using the following parameters:

Table 7.1-1 Firewater Calculation Parameters

Fire Fighting Unit	Capacity	
Hydrant	**1500**	**litres/min***
Sprinkler Systems	***N/A***	**litres/min - m^2 (mm/min)**
Fire Tender	**1.82 m^3 per tender**	**m^3**
Rainfall x Site Area	**0.05 x 6855m^2 = 343m^3**	**50mm or 20yr 24hr Event****
Fire Duration	**45**	**Minutes *****
Fire Area	**Area of Building**	**m^2**
SW Sources of H_2O	**N/A**	**m^3**
Individual Building Response Acceptable as Combined Volumes Not Required		

***** Figure suggested in BS5588 (1500 litres/min), Water UK Document suggests 1200litres/min for buildings less than 1 hectare. Pump tests conducted approximately 350m from the facility in 2005 gave a pump rate 840 litres/min (North Tipperary County Council).
****** 30 year 24 hr greatest event at Birr, Co Offaly was 47.1mm - See Appendix F.
******* BS 5588 assessed timeframe for water pumping duration.

7.2 FIREWATER CALCULATIONS

Firewater volume calculations are completed for the main shed, workshop, administration buildings and fuelling area to determine which has the greatest potential for firewater production. As it is not stipulated in the fire safety certificate it is not necessary to combine/group firewater volumes for all site areas in the overall firewater calculation. The source of the largest firewater volume can be selected as the worst-case scenario and will be used for the overall firewater calculation for the site. Rainwater volumes will then be added to this figure to give an overall firewater volume for the site.

7.2.1 Water from local authority hydrants

BS 5588 suggests a hydrant capacity of 1.5m^3/min for 45mins, this requirement has been changed in BS9999, where hydrants must be capable of delivering a sufficient flow of water to enable effective fire fighting. The UK National Guidance 2002 (Appendix 5.3) sets the required water hydrant capacity for an industrial unit less than 1 hectare as 20 Litres/Sec.

Required water volumes as per BS5588 = 1 (hydrant) x 1.5m^3/hr x 45mins = 67.5m^3

The recorded flow rate from a hydrant 350m from the facility in 2005 was 50.4m^3/hour. This figure is not used in the calculation as fluctuations in pump rates could have occurred due to new and expanding development in the area or leaking pipes. Instead the 1.5m^3 rate is used to establish a worst-case scenario for firewater volumes at the facility.

7.2.2 Firewater from outside sources

Tender Vehicles have a capacity of 1.82m^3 and two tender vehicles are the standard Nenagh Fire Service deployment in the event of an industrial fire.

2 x 1.82m^3 = 3.64m^3

7.2.3 Rainfall calculation

Rainfall Volume for entire paved site:

0.05m (30yr event) x 6855m^2 x 1 (Paved100%) = 342.75m^3

Rainwater Volume per building if internally bunded:

Workshop = 0.05m x 375m2 x 1 = 18.75m^3
Administration = 0.05m x 66m2 x 1= 3.3m^3
Main shed = 0.05m x 675m2 x 1 = 33.75m^3
Quarantine Building = 0.05 x 17.64 x 1 = 0.88m^2

7.2.4 Workshop Area

Table 7.2-1 Workshop Firewater Calculation

Ref	Dimension	Calculated Capacity
A	Area of Building	375 m^2
B	Bund Height	0 m
C	Containment + Pit Area = ((A x B) + 17 m^3)	17 m^3
D	Material (% of Floor)	0 m^3
E	Available containment (C-D)	17 m^3
F	Tender Vehicle Capacity x 2	3.64 m^3
G	Time of Fire	0.75 hours
H	Hydrant rate of delivery	90 m^3/hour
I	Firewater (F + (G x H)) =	71.14 m^3
J	Rainfall 24 hrs	0.05 m
K	Rainfall volume (A x J) =	18.75 m^3
L	Total potentially contaminated water (I+K)	89.89 m^3
M	Required Additional Capacity (L-E)	89.89 – 17= 72.89 m^3

7.2.5 Administrative Buildings

Table 7.2-2 Administrative Building Firewater Calculation

Ref	Dimension	Calculated Capacity
A	Area of Building	66 m^2
B	Bund Height	0 m
C	Containment	0 m^3
D	Material (% of Floor)	0 m^3
E	Available containment (C-D)	0 m^3
F	Tender Vehicle Capacity x 2	3.64 m^3
G	Time of Fire	0.75 hours
H	Hydrant rate of delivery	90 m^3/hour
I	Firewater (F + (G x H)) =	71.14 m^3
J	Rainfall 24 hrs	0.05 m
K	Rainfall volume	3.3 m^3
L	Total potentially contaminated water (I+K)	74.44 m^3
M	Required Additional Capacity (L-E)	74.44 m^3

7.2.6 Quarantine Building

Table 7.2-3 Quarantine Building Firewater Calculation

Ref	Dimension	Calculated Capacity
A	Area of Building	17.64 m^2
B	Bund Height	0.2 m
C	Containment	3.5 m^3
D	Material (0% of Floor)	0 m^3
E	Available containment (C-D)	3.5 m^3
F	Tender Vehicle Capacity x 2	3.64 m^3
G	Time of Fire	0.75 hours
H	Hydrant rate of delivery	90 m^3/hour
I	Firewater (F + (G x H)) =	71.14 m^3
J	Rainfall 24 hrs	0.05 m

K	Rainfall volume	0.88 m^3
L	Total potentially contaminated water (I+K)	72.02 m^3
M	Required Additional Capacity (L-E)	68.52 m^3

7.2.7 Mainshed

Table 7.2-4 Mainshed Firewater Calculation

Ref	Dimension	Calculated Capacity
A	Area of Building	675 m^2
B	Bund Height	0 m
C	Containment (within foul system)	0.2 m^3
D	Material (30% of Floor) (A x 0.3)	202.5 m^3
E	Available containment *(Wont be affected by materials as containment is within foul system)*	0.2 m^3
F	Tender Vehicle Capacity x 2	3.64 m^3
G	Time of Fire	0.75 hours
H	Hydrant rate of delivery	90 m^3/hour
I	Firewater	71.14 m^3
J	Rainfall 24 hrs	0.05 m
K	Rainfall volume (A x J)	33.75 m^3
L	Total potentially contaminated water (I+K)	104.89 m^3
M	Required Additional Capacity (L-E)	104.69 m^3

7.2.8 Fuelling Tank

The fuelling tank is contained within a Bund approximately 125% of the tank's capacity. Bund integrity testing was carried out and certified by Bord na Móna engineers in December 2009. Fire suppressant foam will be used during a fire event and this will be contained within the bunded area. Any fugitive emissions will be retained on site.

7.2.9 Bin Wash Area

The bin wash area does not contain any above ground structures or store any combustive materials. For these reasons it is not deemed necessary to provide a potential firewater volume for this process area.

7.3 FIREWATER RETENTION PROVISION FOR THE SITE

Firewater retention provision for the site is calculated on a per building basis, as the risk of fire spread is considered low. The potential firewater generation is greatest at the main shed (104.69m^3), due to its larger floor area (675m^2) and rainwater allocation.

The main shed has little internal firewater retention capacity. Firewater volumes cannot be contained within the process building so ancillary external retention capacity must be put in place. As retention capacity is required outside the process building rainwater volumes for the entire paved area on site must be included in the retention capacity calculations.

Table 7.3-1 Required Retention Calculation for External Retention of Firewater

Ref	Dimension	Calculated Capacity
A	Total Site Rainwater Potential (Site Area x Rainwater Potential)	342.75 m^3
B	Potential Firewater from Main Shed	71.14 m^3
C	Less Main Shed Containment (B – 0.2 m^3)	70.94 m^3
D	Total Volume of Water Requiring Retention (A + C) = D	413.69 m^3
E	Uniform depth of water on site (D / 6855 m^2) =	0.06 m

If the Nenagh facility was a level site with surrounding retaining walls then the depth of firewater throughout the site would be 0.06m. However this is not possible on the Nenagh site as the site slopes in a northeast direction, resulting in greater water volumes in this section of the site.

8 CONTAINMENT

No dedicated firewater retainment capacity is provided for on site. The site is relatively level at the southern site boundary before gradually sloping towards the northeastern site boundary. In the event of the application of firewater the surface water and foul sewer emergency shutoff valves will be closed. Some containment will be provided for by the internal capacity of the surface water drainage system, foul sewer system and kerbed site boundary. However seepage over the existing paved site boundary may occur during a fire event.

The large fuel oil tank has a bund capacity of at least 125% of the tanks volume. A pit area within the workshop will provide containment for 17m^3 of firewater.

Small quantities of hazardous waste material are stored in the quarantine area before removal off site to an approved reprocessing or disposal location. These materials are contained in individual mobile bins within the designated quarantine building in the central east section of the site approximately 15m east of the warehouse and 1m north of the workshop. It is not envisaged that this material could come in contact with firewater from other site buildings, as the containment bins are mobile, elevated and watertight up to approximately 1.3m. This material may come into contact with firewater if a fire event occurred within the quarantine area. The quarantine area is bunded and access is gained via a ramp on the western side. The internal capacity of this area is approximately 3.5m^3.

8.1 REMEDIAL MEASURES

To provide retention capacity at the site it is proposed to construct a dwarf retaining wall along the entire northern site boundary and along sections of the east and west site boundaries. This dwarf wall

will act as a dam and in effect prevent contaminated firewater from breaching the facilities kerbed boundary.

The dwarf firewater retention wall will be built to an approximate height of 57.65mOD, this will provide a retention capacity on site for 493m^3 of firewater. The dwarf wall will be constructed along the entire northern site boundary, which is approx 77m. The dwarf wall will also continue along the western site boundary for approximately 26m and along the eastern site boundary for approximately 20m, both east and west walls will connect to the northern site boundary (see Appendix G).

The required retention capacity for the site is 414m^3, and the proposed dwarf wall retention system will have a capacity of 493m^3 allowing for approximately 20 percent contingency on the required firewater retention capacity (see Appendix G).

In the event of fire all emergency shutoff valves will be closed. Any firewater will flow in a northeastern direction via the storm water system and site slope. Firewater can accumulate in the northeast corner where it can be retained during the fire event and removed by tanker at a later stage to an appropriate treatment facility.

9 RISK ASSESSMENT

Risk to the surrounding environment is assessed by subjectively taking into account the following factors:

- Fire load, or quantity of combustible material contained on site
- Fire risk, or likelihood of fire occurring at the facility
- Environmental load, or risk to the surrounding environment due to a fire event at the facility

9.1 FIRE LOAD

Consists of the type of combustible materials present and the likely rate of combustion of this material. To conduct this assessment a broad classification system to assess this fire load has been used:

Table 9.1-1 Fire Load

Low Load	Quantities of poorly combustible material
Medium Load	Significant quantities of combustible materials
High load	Substantial quantity of combustible materials, or large quantity of flammable liquids

9.2 FIRE RISK

The risk of fire is calculated based on the following factors:

- Risk of ignition
- Risk of non-detection
- Risk of failure to extinguish correctly/quickly

The risk of ignition is lowest where there are no flammable or highly flammable materials such as liquids or gases, or their presence is only in small quantities.

The risk of non-detection is highest where an area is unoccupied/unmonitored for a prolonged period of time and when there is no automated fire detection system or capable sprinkler system.

The risk of failure to extinguish a fire quickly and fully is dependant on quick detection and appropriate fire extinguishing techniques. If detected promptly and corrective action is taken then the fire risk is said to be low. If not detected quickly then the fire risk is said to be medium.

Table 9.2-1 Fire Risk Assessment

Low Risk	Where fire is an unlikely risk
Medium Risk	Where fire is a possible risk
High Risk	Where a fire has feasible potential

9.3 ENVIRONMENTAL LOAD

The environmental load is an assessment of the total potential for environmental degradation to surrounding soils, air, surface and groundwater. The severity of this environmental load depends on the characteristics and quantities of materials that have the potential for degradation to any receiving environmental body. The main assessment of the potentially pollutant material includes:

- BOD
- Acute toxicity effects
- Persistence of the pollutant
- Risk of bio-accumulation

Table 9.3-1 Environmental Load Assessment

Low Load	Minor potential for degradation of receiving air/soil/water
Medium Load	Potential for minor degradation and/or long term effects to receiving soils/waters
High Load	Potential for major degradation and long term effects to receiving air/soil/water

9.4 ENVIRONMENTAL RISK

The risk to the environment from a potential fire is the risk and extent of a fire, the environmental load of the fire and the area at risk. The area at risk includes:

- The extent of air/soil/water polluted
- Use of receiving air/soil/water (Crop production, potable water, livestock water, irrigation, fishing, wetlands/wildlife habitat or public amenity use)

Table 9.4-1 Environmental Risk Assessment

Low Risk	Not a significant risk, protective measures may be required in the long term
Medium Risk	Discernible risk, where proactive remedial works or protective works may be required
High Risk	Extremely hazardous risk of significant environmental degradation and preventative action is required immediately

9.5 FIRE EVENT

There are no on site automatic sprinkler systems at the Nenagh facility. This does not allow for a predetermined, accurate flow rate calculation for automated fire extinguishment. This calculation is usually included in the manufacturer's specifications for a sprinkler/fire abatement system. Instead the water requirements for fire abatement and extinguishment are based on:

- Risk of fire spreading to different areas within the facility
- Pump value of hydrants
- Site area
- Water brought to site by tender
- 50mm of rainfall or 20yr/24hr average if higher (only 30yr/24hr data available)
- If surface water will be utilised by fire service

10 ENVIRONMENTAL RISK ASSESSMENT OF THE SITE

Firewater from all external areas of the site would discharge to the storm water system, with the exception of firewater within the main shed and bin wash area, which would enter the foul water system. In the event of a fire all emergency shutoff valves will be closed containing firewater inside the site boundary. Remedial works put in place will prevent any breaching of the paved site boundary. This infrastructure has an internal capacity to retain 493m^3 of firewater, which is in excess of the requirements.

10.1 MATERIALS

All materials currently in use on site are contained in Table 4.1-1 above. The Risk Phrase hazards contained on site includes R401/R651/R661/R511/R53/R36/R32 and R22. However all materials on site are contained in small quantities, diesel (R53 - described as a risk to the environment) is the only substance in significant quantity (37.31 tonnes), however this is considerably below the EPA Guidance (1000 tonnes) for quantities requiring dedicated firewater retention.

10.2 MAIN SHED

The main shed is used for sorting and storage of waste prior to transport off site for disposal or recovery. As per waste licence W0240-01 waste is stored for a maximum period of 48hrs on site. The main waste types stored in the main shed are domestic waste, C&D waste, metal wastes, dry recyclables.

Quantity of firewater
Potential quantity of firewater generated from this area is 104.89m^3 (Table 7.2-4). Additional on site firewater retention capacity will be required for 104.69m^3.

Destination
In the event of fire the storm water and foul water interceptors will be shutoff to prevent contaminated firewater exiting the site untreated. Some Firewater retention capacity is available in the foul water interceptor and pipe network adjacent to the main shed. This retention capacity is estimated to be approximately 0.2m^3. This capacity is inadequate for the predicted firewater load. Firewater from the main shed will exit the building and enter either the storm water drainage system or follow the slope of the site in a northeast direction. Firewater retention will be provided by a dwarf wall that runs along the northern, east and west site boundary. Rainwater for the whole site must be included in this calculation, as there is not enough retention capacity within the building and contamination with rainwater from the site is a possibility.

Fire Load
The fire load for the main shed is low due to short-term storage of wastes and their low volumes. The main shed building is constructed from inert materials and poses little combustible potential.

Fire Risk
The fire risk is low. Sources of ignition within the main shed are low and confined to mobile plant or transport vehicles. Municipal waste tipped and stored in the facility in general has a high moisture content and has minimal potential for combustion. Localised fire equipment contained on site will extinguish most fires within a short period of time. As the main shed is a stand-alone building the risk of fire spread is minimal.

Environmental Load
The environmental load from this area is low. The contaminant potential of the waste product stored in the main shed is low as there is only minimal quantities of materials that could be described as dangerous to the aquatic environment. Furthermore, a fire event resulting in loss of containment of firewater is highly improbable, as on site retention capacity will be specified to deal with a worst-case scenario event.

Environmental Risk
Taking all the above factors into consideration the environmental risk from the main shed area is judged to be low.

10.3 QUARANTINE AREA

The quarantine area is located approximately 1m north of the workshop. Any hazardous materials that are recovered from the tipping area are removed and stored here for removal off site to an appropriate facility. All materials are stored in large mobile bins within the dedicated quarantine building.

Quantity of firewater
Potential quantity of firewater generated from this area is 72.02m^3 (Table 7.2-3). Additional on site firewater retention capacity will be required for 68.52m^3.

Destination
In the event of a fire both emergency shut off valves from the storm water and foul sewer will be sealed. Approximately 3.5m^3 of firewater will be retained within the confines of the quarantine area. Any excess firewater that breaches the internal bunding will discharge to the storm water system or follow the site slope to be retained in the northeast corner by the dwarf retention wall. Rainwater for the whole site must be included in this calculation as there is not enough retention capacity within the building and contamination with rainwater from the site is a possibility.

Fire Load

The fire load at the quarantine area is low due to the small volume and short holding time of hazardous waste on site. The quarantine area consists of mobile bins and a building constructed from concrete, steel beams and PVC cladding.

Fire Risk
Sources of ignition at the quarantine area are low as it is isolated from all other buildings and no significant works take place within close proximity of the quarantine area. The quarantine area consists of mobile bins allowing material to be moved in the event of a fire, reducing any risk of fire spread. Localised fire equipment contained on site will extinguish most fires at the quarantine building.

Environmental Load
The environmental load from the quarantine area is medium. The contaminant potential of the waste product stored in the quarantine area is medium as there is only minimal quantities of materials that could be described as dangerous to the aquatic environment. A fire resulting in loss of containment from the bunded area is highly improbable due to the low volume of material stored and the mobile nature of the storage bins. It is envisaged that the surface water drainage system and dwarfed retention wall in the northeast corner will be capable of containing any firewater volumes from the quarantine area.

Environmental Risk
Taking all the above factors into consideration the environmental risk from the quarantine area is judged to be low as the potential for fire, volume of stored combustible material, risk of fire spread and potential for fugitive emissions of firewater are minimal.

10.4 WORKSHOP AREA

The workshop area is located in the southeast corner of the site. Hazardous materials within the workshop are contained within metal bunds and the diesel tank is self-bunded. An aspect of environmental concern is the fact that approximately 50 percent of the workshop roof is asbestos. In the event of a fire this provides potential for degradation of both air, soil & water sources.

Quantity of firewater
Potential quantity of firewater generated from this area is 89.89m^3 (Table 7.2-1). Additional on site firewater retention capacity will be required for 72.89m^3.

Destination
In the event of a fire both outfall points from the storm water and foul sewer will be sealed. Firewater from this area will initially remain within the confines of the workshop. There is a large pit for servicing vehicles in the workshop and it is envisaged that in the event of a fire a percentage of firewater would drain here. Any excess firewater will discharge to the storm water system. Once in the storm water system the firewater will flow to the northeast corner where it will be contained in the storm water system or by the retaining dwarfed wall. Rainwater for the whole site must be included in this calculation, as there is not enough retention capacity within the building and contamination with rainwater from the site is a possibility.

Fire Load
The fire load for the workshop is medium due to storage of low volumes of flammable chemicals and fuel within the building. The workshop building is constructed from inert materials such as Iron, concrete and sheet metal that are inert.

Fire Risk
The fire risk for the workshop area is medium as some hot works are carried out here and vehicle servicing. There is also the presence of inflammable liquids within the workshop that could provide a quick source of ignition. Hot work permit system enforced to reduce potential ignition risk.

Environmental Load
The environmental load from the workshop is assessed as high due to the presence of hydrocarbons and hazardous chemicals. Approximately 50 percent of the workshop roof is asbestos, this has the potential to become a significant environmental load in the event of a fire.

Environmental Risk
Taking all the above factors into consideration the environmental risk from the workshop area is judged to be medium as the potential for a fire, volume of combustible material and the potential environmental load are discernible risks. However the risk of fugitive emissions of firewater to the environment is minimal as emergency shut off valves will be closed and adequate provision for firewater retention put in place.

10.5 ADMINISTRATION BUILDINGS

The administrative buildings are located in the south of the site. The buildings are prefabricated and domestic waste leaves the building via the foul sewer. Some stationary supplies are maintained within these buildings but not in significant quantities.

Quantity of firewater
Potential quantity of firewater generated from this area is 74.44m^3 (Table 7.2-2). Additional on site firewater retention capacity will be required for 74.44m^3.

Destination
Any firewater from the administrative buildings will fall directly onto the hard standing before entering the storm water drainage system. In the event of a fire at the administrative buildings the storm water and foul sewer outfalls will be shut off to eliminate any fugitive emissions. Rainwater for the whole site must be included in the calculation, as no dedicated bunding exists for this area.

Fire Load
The fire load at the administration building is considered to be medium. Stationary stores within the building will not provide a real source of significant fire load. The prefabricated structures themselves have a potential fire load, however due to their relative small size their potential as a combustion source is medium.

Fire Risk
The fire risk for the administrative buildings is low as there is no significant source of ignition within the buildings. A potential source of fire is an electrical fault, however this is extremely unlikely.

Environmental Load
The environmental load from the administrative buildings is low. There are no significant sources of hazardous materials. Any potential firewater from the buildings could be contained within the facilities storm water system and dwarfed retention wall in the northeast corner.

Environmental Risk
Taking all the above factors into consideration the environmental risk from the administrative buildings is judged to be low.

10.6 FUELLING AREA

The main fuelling area is located to the rear of the main shed. In the event of a fire the emergency shutoff valves will be closed to prevent any discharge from site. The external diesel tank has a capacity of 44,000 litres and is contained within an individual bund that is 125% the capacity of the storage tank. The bunded area surrounding the tank will provide adequate provision for retention of liquids in the event of a fire.

Destination
Any firewater from the fuelling area will be retained within the bunded area, and splash from the bunded area will be retained within the storm water system or at the dwarfed wall in the northeast corner.

Fire Load
The fire load at the fuelling area is considered to be high due to the flammable nature of hydrocarbons. The storage tank and concrete bund would provide no additional fire load.

Fire Risk
The fire risk at the fuelling area is considered to be low as safety procedures in place on the site eliminate potential ignition sources. Procedures include hot work permits, no smoking within the site, securing of fuel nozzles when not in use, fuelling of vehicles and filling of the storage tank by authorised personnel only.

Environmental Load
The potential environmental load from the fuelling area is high. Fuel oil contained within the storage tank is characterised as Risk Phrase 52, indicating it has the potential to cause large-scale environmental degradation. Fuel oil can contaminate soil, surface and groundwater.

Environmental Risk
Taking all the above factors into consideration the environmental risk from the fuelling area buildings is judged to be medium.

10.7 RAINWATER

The effect of rainwater is normally taken into account in firewater containment studies. It is unlikely that heavy rainfall event would coincide with a fire at the facility. Only rainfall on paved areas of sites is taken into consideration as part of the firewater retention plan, 100 percent of this facility is paved.

10.8 SUMMARY

The largest volume of firewater that could arise in the event of a fire will be approximatly 414m^3. The capacity of the fire hydrant, heavy rainfall event and water brought to site by fire tender could achieve this amount.

It is subjectively assessed that the installation of ancillary retention facilities described in 9.1 above and Appendix G will provide sufficient firewater retention for the site.

In the event of a fire at the fuelling area, on site cleanup procedures will be implemented to prevent fugitive emissions. Oil booms and spill mats stored on site will be used to curtail any leaks or spills from this area.

11 CONCLUSIONS

This firewater retention plan has been prepared to comply with Condition 3.9 of the Waste Licence for Advanced Environmental Systems (Ireland) Limited W0240 - 01.

- The risk of fire is low due to extensive precautions taken by AES to minimise risk of fire and fire spread. There is a minimal quantity of flammable liquids in the process areas and potential fugitive emissions are eliminated by appropriate bunding.
- The risk of fire spread is low due to the separate nature of the buildings and the low quantities of dry recyclables stored on site.
- The quantities of on site materials with risk phrases R50, R51, R52 and R53 are low, only diesel (R53) is present onsite (see Appendix A). Although R53 is present on site it is not in sufficient quantity (>1000 tonnes) to fall into section I of Appendix A from the EPA Draft Guidance Note to Industry on the Requirements for Firewater Retention Facilities.
- The maximum quantity of firewater that could arise in the case of a fire at the facility is 413.89m^3.
- The combined area of the onsite buildings is 1116m^2.
- The area of the site is 6855m^2, with 100% of the area paved.
- The quantity of rainwater that could fall on the site when using the 30yr 24hr greatest daily rainfall event = 0.047m x 6855m^2 = 322.18m^3
- The quantity of rainwater that could fall on the site in a day by using the standard 50mm = 0.05m x 6855m^2 = 342.75m^3
- The probability of heavy rainfall of this magnitude and coinciding with a fire event at the facility is low.
- There is a higher environmental load from contaminated firewater from the workshop and fuelling area. Asbestos from the garage roof and the R53 fuel contained at both the workshop and fuelling area are potential risks to the environment in the event of a fire.
- Some remedial firewater retention works are required to eliminate discharge to the surrounding environment. It has been decided that an open-ended dwarfed wall will be constructed at the north, west and eastern site boundary to act as a dam. During a fire event applied firewater will flow through the storm water system and also along the natural site contours towards the northern site boundary.

12 RECOMMENDATIONS

The purpose of this firewater assessment is to identify any potential environmental degradation caused by firewater from the AES Nenagh facility. When potential firewater generation volumes were analysed it was deemed that there was insufficient retention capacity within the facility's existing storm water system, silt traps, oil interceptors, foul sewer and facility buildings to contain potential firewater volumes.

As there is insufficient capacity within individual buildings to retain firewater remedial firewater retention works must be put in place, for the site as a whole. It is envisaged that a retaining dwarf wall will be constructed in the northeast corner of the site to provide adequate firewater retention capacity. This dwarf wall will have a damming effect on water that reaches the northern site boundary either by the storm water drainage system or along the natural site slope that falls in a northeastern direction. As the wall will be constructed to a suitable height it will prevent breaching and fugitive firewater emissions from the site.

The required retention capacity of the facility is 414m^3. Using site topographical survey data (see Appendix G) it has been calculated that a retaining wall at approximately 57.65mOD, constructed along the entire northern site boundary (77m) and sections of the east (20m) and west (26m) boundary will provide retention for 493m3 of firewater. This will allow for approximately 20 percent contingency capacity on site.

The installation of this firewater retention feature will provide complete containment of firewater and adequate environmental protection should a fire event occur at the facility. Prior to construction of this retention facility a more detailed survey should be commissioned to eliminate any unforeseen site issues. Some site specific specifications will be necessary to ensure a sealed retention area can be achieved.

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