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ENVIRONMENTAL LIABILITY RISK ASSESSMENT

ERAS ECO LIMITED

FOXHOLE

YOUGHAL

CO. CORK

INDUSTRIAL EMISSIONS LICENCE NO. W0211-02

Prepared For: -

ERAS ECO Ltd
Foxhole
Youghal
Co. Cork

Prepared By: -

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Project		Environmental Liability Risk Assessment		
Client		ERAS ECO Limited		
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1. INTRODUCTION

1.1 Activity Details

The ERAS ECO Ltd (Eras Eco) biological treatment plant at Foxhole, Youghal operates under an Industrial Emissions Licence (W0211-02) issued by the Environmental Protection Agency (Agency).

Under the original licence Eras Eco accepted municipal sewage sludge and industrial wastewater treatment plant sludges for treatment. The treatment process comprised drying, with the treated sludge then exported. In July 2018 Eras Eco stopped accepting and drying sludges and does not intend to resume this activity. The current licence approves the operation of an Anaerobic Digestion Plant and this is the only waste activity that is on-going.

Condition 12.3 of the licence requires Eras Eco to arrange for the revision, by an independent and appropriately qualified consultant, of a comprehensive and fully costed revised Environmental Liabilities Risk Assessment (ELRA) that addresses the liabilities from past and present activities. An ELRA was submitted to the Agency in 2017 and Eras Eco requested O'Callaghan Moran & Associates to revise and update the ELRA to reflect operational changes.

1.2 Methodology

The assessment was based on the Agency's *'Guidance on assessing and costing environmental liabilities'* (March 2014). The ELRA has been prepared to accurately reflect the risks of unplanned, but plausible incidents occurring.

The assessment included:

- An assessment of site operations, including materials and product handling and storage practices; production processes; process waste management; emission control and management (infrastructural and procedural); accident prevention policy and emergency response procedures;
- Determining the environmental setting and the identification of any particular sensitive receptors that could be impacted in the short, medium and long term by the site operations;
- Establishment of the site history and regulatory compliance performance.

2. SCOPING

The ELRA addresses the liabilities from past and present activities. In this regard, all aspects of the historic and the licensable activities licence that pose a plausible risk to the environment are described and evaluated.

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3. RISK IDENTIFICATION

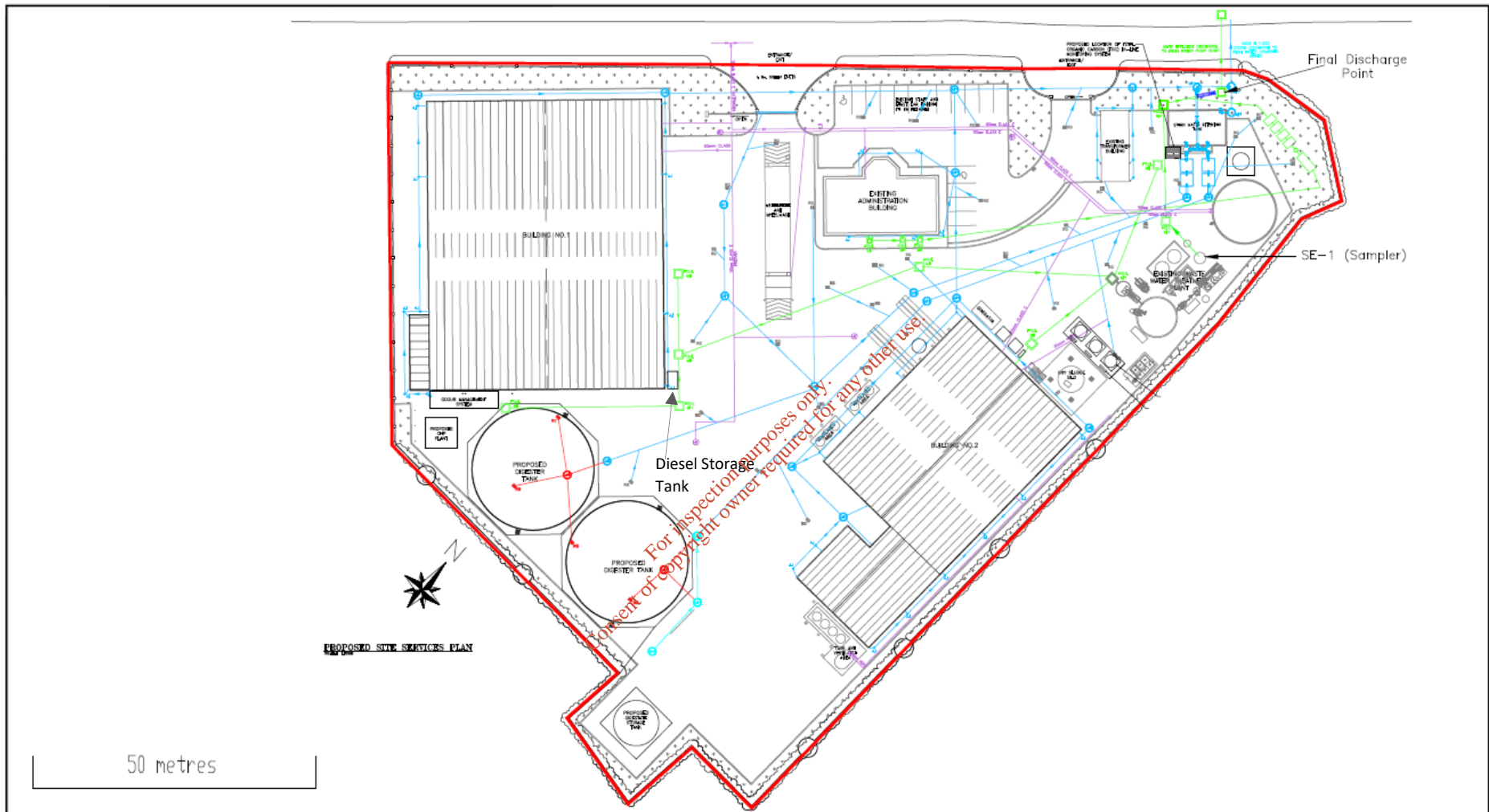
3.1 Site Operation


3.1.1 Size and Nature of the Activity

The installation occupies almost 1.6 hectares and is approximately 2km from Youghal, adjacent to the former Youghal Landfill. The current Licence authorises the acceptance of 65,000 tonnes of waste per year of non-hazardous sludge and off specification food ingredients, landfill leachate and mixed dry recyclables. The site layout is shown on Drawing N. 15-193-02 Rev B and details of the infrastructure are presented in Table 3.1.

Table 3.1 – Site Infrastructure

Ref	Infrastructure	Details
1	Building 1 – Processing Building (Anaerobic Digestion Feed Area)	Area 2,140m ² . Steel portal frame with 300mm reinforced concrete floor slabs. 1.8 high mass concrete wall on top of which are wall cladding on multibeam purloins bolted to the cantilevered steel frame. The roof cladding has skylights and are bolted to seating angles. Roof mounted smoke detection system. Four liquid storage tank (100 tonnes each) a feed hopper and conveyor, two pasteuriser tanks (each 25m ³) and a quarantine tank (80 tonnes). Odour abatement system comprising an air extraction fan, wet scrubber and activated carbon filter.
2	Building 2 – Processing Building (Former Sludge Drying)	Area 1,243m ² . Steel portal frame with 300mm reinforced concrete floor slabs. External wall and roof cladding and internal floor to ceiling blockwork wall separating the dryer, the biomass boiler and the waste reception, mixing bin areas and odour abatement systems. Sludge drying has stopped and the plant equipment and abatement systems are decommissioned.
3	Site Office	Area. 460m ² – No Internal drains. Used for administrative offices, canteen and changing rooms, washing machines. Two storey structure with a structural masonry (100mm) outerleaf with 100mm cavity and 215mm concrete block inner leaf and suspended ceilings. Smoke detection system with control panel in reception.
4	Transformer Building Grid Connection	Area. 46m ² .
5	Anaerobic Digesters 2 No	Each has 2,500 tonnes storage capacity and both fitted with pressure monitors, pressure release valves and odour abatement systems.
6	Digestate Storage Tank	1,000 tonnes storage capacity.
7	Combined Heat & Power Units and Transformers	2 No. Combined generating capacity 1.8MW 2 No. Transformers
8	Gas Flare	1 No. Back-up to control gas pressure in digesters when CHP units shut down for maintenance.
9	Dried Sludge Silo	Not in use and decommissioned.
10	Wastewater Treatment Plant	Not in use and decommissioned.
11	Above Ground Diesel Tanks	1 No 2,600 litre 1 500 litre
12	Water Storage Tanks	Firewater Storage Tank (475m ³), Storm Water Retention Tank (120m ³).
13	Electrical Substation	Controlled by utility company and not accessible by Eras Eco.



 <p>O'Callaghan Moran & Associates. Unit 15 Melbourne Business Park Model Farm Road, Cork, Ireland. Tel. (021) 4345366 email: info@ocallaghanmoran.com</p>	CLIENT	Eras Eco	DRAWING No. 15-193-02
	TITLE	Site Services	REV. B

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3.1.2 Site History

Historical reclamation work in this area has resulted in made ground with a proven thickness of up to 3m. Site investigations identified the made ground to be predominately clay with small portion of construction and demolition waste.

The site was initially used by Youghal Town Council to store diesel for vehicles operating on the adjacent Youghal Landfill. It is understood the tanks were located in the vicinity of the current site entrance.

Youghal Waste Disposal & Recycling Ltd acquired a 35-year lease the landowners Youghal Town Council, before subletting it to AVR Environmental Solutions Ltd. In 2001, planning permission was granted for the construction of a waste transfer station (Ref N. S/00/7093, 30th August 2001) and in 2005 permission was granted for the construction of a sludge treatment facility (Ref N. S/04/7531 04th February 2005).

ERAS ECO was established to compensate for the lack of recovery facilities within Ireland at the time. In particular, its focus was the treatment of wastewater treatment plant (WWTP) sludges and the recovery of commercial and industrial (C&I) wastes.

ERAS ECO acquired the plant in 2006. The original Waste Licence was granted in November 2006 and the facility was constructed and commissioned in 2007. In 2013 ERAS ECO suspended the acceptance and transfer of C&I wastes. A revised Industrial Emissions licence was granted in July 2018. Also in July ERAS ECO stopped accepting and drying/stabilising WWTP sludges.

3.1.3 Site Processes

The waste activities authorised by the licence are:

- Sludge Drying
- Processing of non-hazardous mixed dry recyclables (MDR).
- Anaerobic Digestion (AD)

Eras Eco has not accepted MDR since 2013 and there are no short term plans to restart this activity. In July 2018 Eras Eco stopped accepting and drying sludges and does not intend to resume this activity. The operation of the AD Plant is the only waste activity that is on-going.

3.1.4 Sludge Drying

Sludge drying was carried out in Building 2 using a rotary drier heated by steam produced from an on-site boiler fuelled by biomass (wood chip). Condensate from the drier was treated in the on-site wastewater treatment plant (WWTP), with the treated effluent discharged to the estuary.

The WWTP was designed to treat condensate from the sludge drier, landfill leachate and wash water from the wheel wash. It comprises a balance tank with an air diffuser, a dissolved air floatation tank, carbon and sand filters, lamella settlement unit, hypochlorite treatment and a sludge storage tank.

Sludge drying stopped in 2018 and it is not intended to restart. The sludge drying plant (reception and mixing bins and rotary drier) and associated WWTP have been decommissioned. It is understood that the sludge reception and mixing bins and the rotary drier will be removed from the site, but that the biomass fired boiler and decommissioned WWTP will be retained. Eras Eco has informed the Agency

of its intention to alter the licensed area to exclude Building 2 and the associated open yard areas from the licence.

3.1.5 AD

The AD plant comprises four liquid storage tanks, a feed hopper and conveyor, two pasteuriser tanks and a quarantine tank located in Building 1 and two digester tanks and a digestate storage tank located in the south of the site. The digesters are enclosed and heated to 37°C and are continuously agitated and fed with sludge, organic sludge from the food and beverage industry and household and commercial food waste.

This process produces a biogas and a digestate. The biogas contains approximately 65% methane, which is currently treated (scrubbed) and used as a fuel in two on-site combined heat and power units. It is envisaged that in the future the gas will be exported to the national grid. Methane has a lower explosive level of 5% and an upper explosive level of 15%.

Where the feed stock includes animal by-products, the digestate is pasteurised to facilitate its use as a fertiliser. The temperature in the pasteurisers is raised to the required level (71C⁰) using water heated by the CHP engines. The pasteurised digestate is stored in the quarantine tank pending the results of the confirmatory testing.

The digestate is then transported from the facility in road tankers and applied to farm land as an alternative to artificial fertilisers. The application rates are based on nutrient management plans prepared for the spreadlands.

3.2 Site Security

There is a concrete block wall along part of the eastern boundary and the remainder of the site is surround by a fence. The fence is inspected regularly and any damage observed is repaired promptly. The site is accessed via electric security gates. There is a security alarm on the administration building.

3.3 Services

The open yards are paved with concrete and surrounded by a kerb. There is a concrete block wall along part of the eastern boundary. Rainwater run-off from roofs and paved areas is collected in the surface water drainage system that connects to two silt/oil interceptors (Class 1) and a storm water retention tank. The outlet valve from the tank is normally closed and only opened to release water to the estuary after an inspection confirms that water quality is satisfactory.

Process wastewater is not generated and sanitary wastewater from the offices is treated in a proprietary treatment system (Puraflo ©) adjacent to the northern site boundary, before being discharged to the Irish Water foul sewer that outfalls to the municipal wastewater treatment plant in Youghal.

3.4 Inventory of Raw Materials and Wastes

3.4.1 Raw Materials

Flammable materials handled on site are diesel oil, virgin and waste oils, lubricant and hydraulic oils. There are two above ground double skinned plastic diesel storage tanks, one 2,600 litre tank located at the south-eastern edge Building 1 (Photograph 1 in Appendix 1) and the second at the western side of Building 2 (Photograph 2). Only the tank outside Building 1 is in use.

Engine oil and hydraulic oil are stored in 1,000 litre Intermediate Bulk Containers (IBC) on bunds inside Building 1 (Photograph 3). Waste oils generated during plant maintenance are collected in drums and stored on spill pallets inside Building 1. Gas cylinders used in equipment repair are stored upright and in a secured location inside Building 1 (Photograph 4).

The wet scrubber on the odour control system uses sulphuric acid, sodium hydroxide, ferric solution and hypochlorite and these are stored in IBC on bunds adjacent to the scrubber (Photograph 5). The types and volumes of flammable and hazardous materials on site at any one time is in Table 3.2.

Table 3.2 – Volume of Flammable & Hazardous Materials

Products	Quantity Stored litres	Location
Diesel Oil	2,600	Tank at south-eastern side of Building 1
Engine/Hydraulic Oil	2,000	2 N IBC on bunded pallets in Building 1
Sulphuric Acid	1,000	Adjacent to scrubber
Sodium Hydroxide	1,000	Adjacent to scrubber
Hypochlorite	2,000	Adjacent to scrubber
Ferric Solution	4,000	Adjacent to Scrubber

3.4.2 Wastes

The majority of the wastes accepted are either solid, semi-solid or liquid organic wastes that are not combustible. Combustible waste includes off specification palm oil and food ingredients e.g. milk powders. The palm oils are delivered in IBCs and food ingredients are typically delivered in 25kg bags on pallets.

The wastes are stored in designated areas inside Building 1, as shown on the current Waste Storage Plan in Appendix 2, which includes the List of Waste (LoW) codes. The bays are delineated by large portable concrete blocks (Photograph 6). The maximum amount of waste on-site at any one time is 6,820 tonnes, comprising approximately 6,530 tonnes of liquid and semi-solid organic wastes and 290 tonnes of other materials and waste as shown in Table 3.3.

Table 3.2 Max Quantity of Wastes On-Site Any One Time

Waste Types-	Tonnes	Location
Organic Material (Input)	6,400	Digesters, Digestate Holding Tank, Liquid Waste Storage Tanks, Pasteurisers and Quarantine Tank.
	130	Solid Feed Hopper
Waste Oil	4	Building 1
Butter Oil/Palm Oil/ Sunflower Oil	20	Building 1
Packaging Waste (plastic, paper)	16	Building 1
Milk Powder/Cheese	250	Building 1
Total	6,820	

The maximum storage time for any particular waste type before it is fed into the digesters is 16 weeks.

3.5 Environmental Emissions

There is one (1 No.) emission point to the surface water (SW-1). There is one (1 No.) authorised treated process waste water emission point to sewer (SE-1), but as described in the Table 3.1 and Section 3.1.4 the wastewater treatment plant associated with the sludge drying operation has been decommissioned and consequently there is discharge of process wastewater to sewer.

There are seven (7 No.) authorised point emissions to air, which are the boiler stack, the biofilter, the odour control units in Buildings 1 and 2, the two stacks on the CHP engines and the back-up gas flare. Sludge drying has ceased and the drying plant and associated wastewater treatment unit have been decommissioned, therefore there are no emissions from the boiler stack, biofilter and odour control unit in Building 2.

Site operations are a source of noise and the licence specifies noise emission levels for the nearest noise sensitive locations. Operations are also a potential source of dust emissions and the licence specifies dust deposition limits.

3.6 Emergency Response

Eras Eco has adopted an Emergency Response Procedure (ERP) that identifies potential hazards at the site that may cause damage to the environment and also specifies the roles, responsibilities and actions required to deal quickly and efficiently with all foreseeable major incidents and to minimise environmental impacts.

3.7 Operator Performance

3.7.1 Facility Management & Staffing Structure

The Facility Manager has over 14 years' experience in Waste Management and holds a Certificate in FAS Waste Management Training Course. The Environmental, Health & Safety Manager has 7 years' experience in EHSQ and holds a BSc in environmental management, a Certificate in Safety & Health

and a NEBOSH Safety Diploma. All operatives are provided with the appropriate and necessary training to complete their assigned tasks.

3.7.1 Compliance History

In 2019 Eras Eco received notifications of 12 non-compliances with the licence conditions relating to *inter alia* odours and the maintenance of bunds.

3.7.2 Enforcement History

On 1st of November 2019 Eras Eco Limited pleaded guilty to breaches of conditions of its licence by:

- Failing to comply with Condition 5.2 of its Industrial Emissions Licence, in that emissions of odours from the activities carried on at the site resulted in an impairment of, or an interference with amenities or the environment beyond the facility boundary within the period commencing on the 7th June 2018 and ending on the 4th July 2018.
- Failing to comply with Condition 8.6 of its Industrial Emissions Licence, in that they failed to ensure that waste was stored in designated areas, protected as may be appropriate against spillage and leachate run-off, on the 4th July 2018, and
- Failing to comply with Condition 3.24.1 of its Industrial Emissions Licence, in that they failed to ensure that all doors to the waste recovery and transfer buildings were kept closed where possible on the 3rd July 2018.

3.7.3 Incidents History

In 2019 there were four incidents relating to exceedances of emission limit values.

3.7.4 Complaints

In 2019 seven odour complaints were received regarding odour, all of which were investigated and subsequently closed out.

3.8 Environmental Sensitivity

3.8.1 Surrounding Land Use

The installation is approximately 2km from Youghal, adjacent to the former Youghal Landfill. The site and the surrounding area are situated on low lying land reclaimed from the Blackwater Estuary which is known locally as Youghal Mudlands. The northern and western boundaries of the site are defined by a public access road and an adjacent development respectively. The lands to the south and west are undeveloped.

3.8.2 Hydrology

The site is located on reclaimed land to the west of the estuary of the Blackwater River. The Tourig River enters the Blackwater to the north of the site. A drainage ditch, which runs adjacent to the access road to the north-west of the site, receives run-off from the access road and from reclaimed land to the north-west. There are a number of other drains to the east and south-east of the site, all of which enter the estuary.

Rainwater run-off from roofs and non-waste storage paved areas is collected in the surface water drainage system that connects to two silt/ oil interceptors (Class 1) and a storm water retention tank.

The run-off is reused on-site when possible and the surplus water discharges to the estuary via a non-return valve.

3.8.3 *Geology & Hydrogeology.*

The soils comprise up to 3m of made ground, comprising gravelly clay soils with fragments of plastic (4-5%), wood (1%), glass (2%) and ceramics (2-3%). It is underlain by a stiff gravelly clay that is more than 14m thick. The bedrock underlying the site is Waulsortian Limestone, which consists of massive, unbedded mounds of calcareous deposits in the form of mudstones, wackestones and packstones.

The Geological Survey of Ireland (GSI) has classified the bedrock that underlies the site as a Locally Important Karstified Aquifer. A search of the GSI well database identified one well used for water supply located approximately 5km west of the site (i.e. up-gradient) and has a reported yield of 979m³/d.

The aquifer vulnerability rating shown on the GSI Vulnerability Map is "High"; however, a site investigation completed in 2007 encountered up to 14m of gravelly clays beneath the site, giving a site specific vulnerability rating of Moderate. The groundwater flow direction is to the south-east towards the estuary at low tide, but the direction could vary during high tide.

A baseline assessment report was prepared in 2017 as part of the licence review application. This established the baseline soil and groundwater conditions.

3.8.4 *Designated Sites*

The Blackwater River and estuary is designated a Special Protected Area (SPA), a Special Area of Conservation (SAC) and a proposed Natural Heritage Area (pNHA). The installation is located outside the designated areas; however, surface water run-off and treated effluent from the installation discharges to the estuary via the Irish Water combined sewer.

4. RISK ANALYSIS

4.1 Installation Design and Operation

The licence conditions require the provision of mitigation measures, both infrastructural and procedural, that effectively minimise the risk of environmental liabilities associated with unplanned events. Such measures and the additional actions implemented by Eras Eco include:

- Provision of an appropriately experienced Facility Management Team and implementation of appropriate staff training programmes. The Facility Manager has received training in ATEX procedures and is responsible for implementing the inspection and maintenance measures specified in the site specific explosion risk assessment document;
- Implementation of a site specific Environmental Management System (EMS), including an Environmental Management Programme (EMP);
- Adoption of site specific Accident Prevention Policy and Emergency Response Procedures (ERPs), which are reviewed annually;
- Provision of impermeable concrete surfaces in areas where wastes are stored and handled;
- Rainwater run-off from the building roofs and open yards areas passes oil interceptors and a retention tank before discharge to the estuary;
- Collection of water from the wheel wash;
- Provision of appropriate secondary containment for the diesel, engine and hydraulic oil and the odour control treatment chemicals and routine integrity testing of these to ensure that they are fit for purpose;
- Provision and maintenance of appropriate spill response and clean-up equipment in areas where there is a risk of spills occurring;
- Completion of a Fire Prevention Risk Assessment, a copy of which is in Appendix 3;
- Completion of an explosion risk assessment that identified the areas where there is a risk of biogas emissions. These are classified as 'Danger Zones' in accordance with ATEX Directive 1999/92/EC based on likelihood and persistence and identified using the appropriate signage (Ex). The zones are protected from ignition sources through the use of equipment and protective systems that meet the requirements of the ATEX Product Regulations;
- Provision of blast roofs on the digesters to minimise the risk of catastrophic failure in the event of an explosion;
- Provision of a perimeter boundary kerb and the completion of a Fire Water Retention Risk Assessment, a copy of which is in Appendix 4;
- Regular site inspections.

4.2 Risk Identification

Environmental liabilities arise from contamination or damage to environmental media (air, surface water, soils and groundwater), which can act as pathways to sensitive receptors. The Agency, in reaching a decision to grant the current licence, concluded that the installation, if designed and operated in accordance with the licence conditions, will not give rise to environmental liabilities.

Therefore, for the purposes of this ELRA, future environmental liabilities are confined to incidents such as fires, explosions, spills and leaks. The receptors that are potentially susceptible to adverse impacts associated with such incidents include, air, soils, groundwater, surface water and nearby commercial activities and residences.

4.3 Plausible Risks

The plausible risks identified at the site are presented in Table 4.1. These take into account the facility history, the controls and mitigating measures that are already in place, as listed in Section 4.1, with due regard for those controls to contain incidents and for the potential failure of the controls.

Table 4.1 Risks

Risk ID	Process	Potential Hazards/Risks
1	Diesel Storage	Accidental release of diesel from storage tanks due to tank rupture/pipe leak -surface water contamination
2		Accidental release of diesel from storage tank due to tank rupture/pipe leak –soil and groundwater contamination
3		Accidental release of diesel during deliveries and dispensing - surface water contamination.
4		Accidental release of diesel during deliveries and dispensing – soil and groundwater contamination.
5	Odour Control Chemicals Storage	Accidental spill when filling and emptying the IBC - surface water contamination.
6		Accidental spill when filling and emptying the IBC - soil and groundwater contamination.
7	Fire in Office, Building 1, Building 2	Smoke emissions to air.
8		Contaminated firewater generated and released to estuary – surface water contamination.
9		Contaminated firewater generated and released to yard – soil and groundwater contamination.
10		Contaminated firewater generated and enters foul sewer – impact on Irish Water WWTP
11	AD Digesters/Digestate Tanks	Release of liquor to surface water drains due to tank rupture following explosion/pipe leak-surface water contamination.
12		Release of liquor to ground due to tank rupture following explosion/ pipe leak-soil and groundwater contamination.
13		Accidental spill of liquor to surface water drains when transferring to trucks-surface water impact.
14		Accidental spill of liquor to ground when transferring to trucks - soil and groundwater contamination.
15	Feed Stock/Pasteuriser/Quarantine Tanks	Accidental release of liquor to floor inside Building 1 due to tank rupture /pipe leak materials transfer-soil and groundwater contamination.

4.4 Risk Analysis

An assessment of the risks presented by the facility operations was completed taking consideration of site specific characteristics and the Classification Tables for Likelihood and Consequence in the Agency Guidance Document (Ref Table 4.2a and 4.2b).

Table 4.2a – Risk Classification Table (Likelihood)

Risk	Category	Description
1	Very Low	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring
3	Medium	Medium chance of hazard occurring
4	High	High chance of hazard occurring
5	Very High	Very high chance of hazard occurring

Table 4.2b– Risk Classification Table (Consequence)

Risk	Category	Description
1	Trivial	No damage or negligible change to the environment
2	Minor	Minor/localised impact or nuisance
3	Moderate	Moderate damage to the environment
4	Major	Severe damage to the environment
5	Massive	Massive damage to a large area, irreversible in the medium term

The Risk Analysis Form is presented in Table 4.3. The assignment of the severity rating scores takes into consideration the mitigation measures that are already in place and which are described in the 'Basis of Likelihood' column. OCM does not consider it plausible that all of the containment and control measures already in place would fail at the time of an incident, as this would require:

- a) Eras Eco to wilfully disregard the licence conditions regarding bund integrity testing; accident prevention and emergency response provisions; inspection and repair of paved areas; maintenance of plant and equipment; staff levels and training, and
- b) a failure by the Agency to properly regulate the facility to such an extent that allowed all the control and containment measures to fail.

Table 4.3 Risk Analysis Form

Risk ID	Process	Potential Risks	Environmental Effect	Likelihood	Basis of Likelihood	Consequence	Basis of Severity
1	Diesel Storage	Uncontrolled release from above ground storage tank due to tank rupture that escapes the bund and enters the surface water drains.	Contamination of the estuary	1	The diesel tank and bund design and construction complies with licence requirements and has more than 110% capacity of the tank. The bund is subject to regular visual inspection and routine integrity testing and repaired as required. Oil interceptor and shut off-valve on storm water system discharging at SW1. ERP will ensure rapid response to incident, including closing of shut off valves on storm water outlet. The risk is Very Low .	2	Surface water run-off from facility passes through an oil interceptor. In addition, the activation of the shut off valve will contain oil contaminated runoff within the site. Given the limited amount of oil stored on site, the rapid response to an incident and presence of the interceptor, the amount of oil entering the storm sewer and consequently the estuary would be negligible. The severity of the impact would be Minor .
2	Diesel Storage	Uncontrolled release from above ground storage tank due to tank rupture that escapes the bund	Infiltration through damaged paving and soil and groundwater contamination	1	The area around the storage unit is paved and subject to regular inspection and repair as required. Perimeter kerb around the operational area. Site staff fully trained in spill prevention and clean-up. ERP will ensure rapid response to incident. The risk is Very Low	1	Subsoils are made ground and not water bearing. Aquifer vulnerability is moderate to low. Bedrock aquifer is Locally Important. Given the rapid response to an incident, the condition of the paving, the amount of oil that would infiltrate to ground would be small. The severity of the impact would be Trivial
3	Diesel Storage and Handling	Spill of diesel to surface water drainage system during filling/dispensing	Contamination of the estuary	1	Oil stored in banded areas. Documented procedure on refuelling tanks, staff fully trained in spill prevention and clean-up. Oil interceptor and shut off-valve on system discharging at SW1. ERP will ensure rapid response to incident, The risk is Very Low .	1	The activation of the shut off valve at the retention tank will contain contaminated runoff within the site. Given the limited amount of oil that would be released, the rapid response to an incident and presence of the interceptor, the amount of oil entering the storm sewer and consequently the estuary would be limited. The severity of the impact would be Trivial

Risk ID	Process*	Potential Risks	Environmental Effect	Likelihood	Basis of Likelihood	Consequence	Basis of Severity
4	Diesel Storage and Handling	Spill of diesel to ground during filling/dispensing	Infiltration through damaged paving and soil and groundwater contamination	1	Area around the tank is fully paved and subject to regular inspection and repair as required. Site staff fully trained in spill prevention and clean-up. ERP will ensure rapid response to incident. The risk is Very Low .	1	Subsoils are made ground and not water bearing. Aquifer vulnerability is moderate to low. Bedrock aquifer is Locally Important. Given the rapid response to an incident, the condition of the paving, the amount of oil that would infiltrate to ground would be small. The severity of the impact would be Trivial
5	Odour Control Unit Treatment Chemicals	Escape of chemicals to ground during filling/emptying the tank that enters the surface water system	Contamination of the estuary.	1	Chemicals stored in banded pallets The area around the storage unit is paved. Perimeter kerb around the operational area Shut-off valve on the surface water drainage system. Site staff fully trained in spill prevention and clean-up. ERP will ensure rapid response to incident. The risk is Very Low .	1	The activation of the shut off valve at the retention tank will contain contaminated runoff within the site. Given the limited amount of chemicals stored on site, the rapid response to an incident and the amount of chemicals that would enter the estuary would be limited. The severity of the impact would be Trivial
6	Odour Control Unit Treatment Chemicals	Escape of chemicals to ground during filling/emptying the tank	Infiltration through damaged paving and soil and groundwater contamination.	1	The area around the storage unit is paved and subject to regular inspection and repair as required. Perimeter kerb around the operational area. Site staff fully trained in spill prevention and clean-up. ERP will ensure rapid response to incident. The risk is Very Low .	1	Subsoils are made ground and not water bearing. Aquifer vulnerability is moderate to low. Bedrock aquifer is Locally Important. Given the rapid response to an incident, the condition of the paving, the amount of chemicals that would infiltrate to ground would be small. The severity of the impact would be Minor
7	Fire	Smoke emission	Air pollution	5	The ERP ensures rapid response to incident. Staff trained in emergency response measures. However if it occurs the risk of smoke emissions is Very High .	1	Smoke presents a potential health risk. Surrounding land use primarily commercial. Could be significant disruption during incident, but no long term effect. The severity of the impact would be Trivial .

Risk ID	Process*	Potential Risks	Environmental Effect	Likelihood	Basis of Likelihood	Consequence	Basis of Severity
8	Fire	Entry of firewater to surface water drainage systems.	Contamination of the estuary	3	Perimeter kerb around the operational area. Staff trained in emergency response measures. Shut off valve on the surface water system. ERP will ensure rapid response to incident, including closing of shut off valve Firewater retention capacity not yet confirmed. The risk is Medium .	3	The shut off valve on the surface water drain will contain runoff within the drainage system. In the absence of confirmation of the firewater retention capacity it is possible run-off would overtop the perimeter kerb and flow overland towards the estuary. Given the nature of the wastes processed at the site the ecotoxicity loading would be low and the firewater would receive significant dilution in the estuary. The severity of the impact would be Moderate .
9	Fire	Firewater on ground.	Infiltration through damaged paving and soil and groundwater contamination	2	All operational areas are paved with concrete and surrounded by a perimeter kerb. The yard is subject to regular inspection and repair as required. The risk is Low .	2	Subsoils are made ground and not water bearing. Aquifer vulnerability is moderate to low. Bedrock aquifer is Locally Important. Given the rapid response to an incident, the condition of the paving, the amount of firewater that would infiltrate to ground would be small. The severity of the impact would be Minor .
10	Fire	Entry of firewater to foul sewer	Impact on Irish Water WWTP	2	Shut off valve on foul sewer. ERP will ensure rapid response to incident, including closing of shut off valve. The risk is Low	3	Given the nature of the wastes processed at the site the ecotoxicity loading would be low and the volume entering the sewer would be limited. The severity of the impact would be Moderate .

Risk ID	Process*	Potential Risks	Environmental Effect	Likelihood	Basis of Likelihood	Consequence	Basis of Severity
11	AD Digesters/ Digestate Tanks	Uncontrolled release due to tank rupture/valve failure that allows contents to enter the surface water drains.	Contamination of the estuary	1	The tanks were constructed in 2017 and are fitted with blast roofs and ATEX rated equipment. All operational areas are paved with concrete and surrounded by a perimeter kerb. Vales subject to regular inspection. Shut off-valve on storm water system. ERP will ensure rapid response to incident, including closing of shut off valves on storm water outlet. The risk is Very Low .	3	The activation of the shut off valve will contain the tank contents within the surface water drains, but in the absence of confirmation of the retention capacity it is possible for the contents to overtop the perimeter kerb and flow toward the estuary. The severity of the impact would be Moderate .
12	AD Tanks/ Digestate tanks	Uncontrolled release due to tank rupture/valve failure that allows contents to flow onto the yard.	Infiltration through damaged paving and soil and groundwater contamination	1	All operational areas are paved with concrete and surrounded by a perimeter kerb. Routine inspection and repair of damaged paved areas. The tanks were constructed in 2017. The tanks and pipework are subject to regular inspection and integrity testing, which will identify any damage and facilitate quick repair. Tanks fitted with a blast release roof to minimise damage in event of explosion. The risk is Very Low	2	Subsoils are made ground and not water bearing. Aquifer vulnerability is moderate to low. Bedrock aquifer is Locally Important. Given the rapid response to an incident, the condition of the paving, the amount of liquid that would infiltrate to ground would be small. The severity of the impact would be Minor
13	AD Tanks & Digestate Storage Tanks	Accidental release of digestate to surface water drains when transferring to storage tanks and transport tankers.	Contamination of estuary	1	Documented procedure on digestate transfer, staff fully trained in spill prevention and clean-up. Shut off-valve on drainage system. ERP will ensure rapid response to incident, The risk is Very Low .	1	The activation of the shut off valve at the retention tank will contain contaminated runoff within the drainage system. Given the limited amount of liquor that would be released, the rapid response to an incident. The amount of liquor entering the estuary would be limited. The severity of the impact would be Trivial .

Risk ID	Process*	Potential Risks	Environmental Effect	Likelihood	Basis of Likelihood	Consequence	Basis of Severity
14	AD Tanks & Digestate Storage Tanks	Accidental release of digestate to ground when transferring to storage tanks and transport tankers	Infiltration through damaged paving and soil and groundwater contamination	1	All operational areas are paved with concrete and surrounded by a perimeter kerb. Routine inspection and repair of damaged paved areas. Documented procedure on digestate transfer, staff fully trained in spill prevention and clean-up. ERP will ensure rapid response to incident, The risk is Very Low.	1	Subsoils are made ground and not water bearing. Aquifer vulnerability is moderate to low. Bedrock aquifer is Locally Important. Given the rapid response to an incident, the condition of the paving, the amount of liquor that would infiltrate to ground would be small. The severity of the impact would be Trivial
15	Feed Stock/ Pasteuriser/ Quarantine Tanks	Accidental release of liquor to floor inside Building 1 due to tank rupture /pipe leak materials transfer-	Infiltration through damaged paving and soil and groundwater contamination	1	The floor is paved and subject to regular inspection and repair as required. Site staff fully trained in spill prevention and clean-up. ERP will ensure rapid response to incident. The risk is Very Low.	1	Subsoils are made ground and not water bearing. Aquifer vulnerability is moderate to low. Bedrock aquifer is Locally Important. Given the rapid response to an incident, the condition of the paving, the amount of liquor that would infiltrate to ground would be small. The severity of the impact would be Trivial

5. RISK EVALUATION

The risks associated with the operation of the facility fall into four categories:

- 1 Risk of surface water and/or soil and groundwater contamination associated with diesel storage and handling.
- 2 Risk of surface water and/or soil and groundwater contamination associated with a fire.
- 3 Risk of surface water and/or soil and groundwater contamination associated with the storage and handling of digestate and liquid feed stocks.

Each of the risks have been ranked to assist in the prioritisation of treatment and these are presented in Table 5.1. Only those risks with a risk score greater than 2 have been included.

Table 5.1 Risk Ranking

Risk ID	Process	Potential Risk	Consequence	Likelihood	Risk Score
7	Fire	Air Pollution	1	5	5
8	Fire	Firewater run-off contamination of the estuary	3	3	9
9	Fire	Infiltration to ground-soil and groundwater contamination	2	2	4
10	Fire	Firewater run-off impact on Irish Water WWTP	2	3	6
11	AD Tank/Digestate Tank Rupture	Accidental release of liquor to the estuary	3	1	3

A colour coded risk matrix (Table 5.2) has been prepared to provide a broad indication of the critical nature of each risk and is a visual tool for regular risk reviews since the success of mitigation can be easily identified.

Table 5.2 Risk Matrix

Likelihood

V. High	5	7				
High	4					
Medium	3			8		
Low	2		9	10		
V. Low	1			11		
Consequence		Trivial	Minor	Moderate	Major	Massive
		1	2	3	4	5

Red – High-level risks requiring priority attention.

Amber – Medium-level risks requiring treatment, but not as critical as a High risk.

Green – Lowest-level risks that do not need immediate attention but there is a need for continuing awareness and monitoring on a regular basis.

There are no risks in the red zone and one risk in amber zone that requires either priority attention or treatment. The remaining risks are in the green zone indicating a need for continuing awareness and monitoring on a regular basis. A risk treatment programme has been prepared and is presented in Section 6.

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6. RISK TREATMENT

The risk management programme for the installation is set out in Table 6.1

Table 6.1 –Risk Management Plan

Risk ID	Potential Risk	Risk Score	Mitigation Measures	Outcome	Action	Person Responsible
8	Firewater run-off contamination of the estuary	9	Shut off valve on the surface water system Operational area contained by a combination of perimeter kerb. ERP prepared and staff trained in emergency response	Firewater Retention Assessment has established the volume of firewater that will be generated. It is likely that the existing site design can provide the required retention capacity, but this needs to be confirmed.	Complete site survey to confirm the available retention capacity. If the existing capacity is less than the estimated firewater volumes, then additional measures may be required, for example the provision of ramps at the building doorways and at the site entrances. Completion Date Q2 2020	Facility Manager
7	Fire: Air Pollution	5	The ERP ensures rapid response to incident. Staff trained in emergency response measures.	No infrastructural works required	On-going staff training in fire prevention and ERP	Facility Manager
9	Fire: Infiltration to ground soil/groundwater contamination	4	The ERP ensures rapid response to incident. Staff trained in emergency response measures	No infrastructural works required. Integrity testing of the storm water drains required	On-going staff training in fire prevention and ERP. Integrity testing to be completed by Q2 2020.	Facility Manager

Risk ID	Potential Risk	Risk Score	Mitigation Measures	Outcome	Action	Person Responsible
10	Fire: Firewater run-off to Irish Water WWTP	6	The ERP ensures rapid response to incident. Staff trained in emergency response measures	No infrastructural works required	On-going staff training in fire prevention and ERP	Facility Manager
11	AD Tank Rupture: Release of liquor to estuary		The ERP ensures rapid response to incident. Staff trained in emergency response measures	No infrastructural works required	On-going staff training in fire prevention and ERP	Facility Manager

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7. IDENTIFICATION OF PLAUSIBLE WORST CASE SCENARIO

The risk analysis identified one risk (ID 8) with a moderate consequence and these considered to be the 'worst case' scenario for the facility. It is considered that a fire in Building 1 is the worst possible case as it could have the 'knock on effect' of damage to the liquid feed stock, pasteuriser and quarantine tanks tank (ID 14) smoke emissions (ID 5) and damage to the diesel tank (ID 4) and scrubber treatment chemicals (ID 7) . Given the distance between the building and the digesters the fire will not have any effect on these structures.

7.1 Source-Pathway-Receptor

7.1.1 Sources

The source of firewater run-off is a fire in Building 2.

7.1.2 Pathways

Potential pathways for the smoke is the atmosphere. The pathway for the contaminated firewater is the stormwater drain and overland flow. The pathway for contaminated firewater and digestate to soil/groundwater is damaged paving and underlying subsoil.

7.1.3 Receptors

Potential receptors that could be affected by the fumes are facility staff and the occupants of the adjoining landfill. Given the distance to the nearest private residence it is possible it would have to be evacuated, depending on the wind direction. The potential receptors for the contaminated run-off are the storm sewer and the estuary.

Surface Water

The activation of shut-off valve on the discharge point from the facility will retain firewater and digestate within the drainage system and the site boundary. The kerbs and block wall around the paved areas provide retention capacity, however the volume has not been established.

Soil & Groundwater

Contaminated run-off and digestate could infiltrate to ground via damaged paving. The subsoils above the bedrock are made ground, clay and gravel up to 14 m below ground level. The aquifer is classified as Locally Important however the vulnerability at the site is considered to be Moderate to Low. There is only one well within the aquifer, which is located approximately 5 km upgradient of the facility.

7.2 Impacts and Remedial Measures

The potential impacts are on human health, surface water, groundwater or soils. The potential remedial measures include spill containment; demolition and removal of damaged buildings or tanks, surface water quality monitoring and ecological compensatory measures, excavation and removal of contaminated soils and reinstatement, monitoring and possible installation and monitoring of groundwater quality and/or possibly groundwater remediation.

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8. QUANTIFICATION & COSTING

The costs, which are presented in Table 8.1, are based on the following assumptions:

- The fire service will be on site within 20 minutes of the alarm being raised. The fire will be fought over one day by four fire crews, with one crew remaining on site for 12 hours after the fire has been extinguished.
- The surface water shut-off valve will be closed before the emergency services arrive at the site.
- The rates applied for the removal and off-site disposal of wastes and the contaminated firewater run-off are those currently charged by hazardous waste contractors and include transport and treatment costs.
- Following the incident a soils and groundwater assessment will be carried out. It is assumed that groundwater monitoring wells will be required to determine the nature and extent of the impacts. Given the current uncertainty of the integrity of the sewer lines provision is made for the remediation of impacted soils.
- Provision is made for surface water quality monitoring and an ecological assessment of the Blackwater Estuary and the implementation of compensatory measures.
- It is not possible to quantify the losses to the atmosphere, but an air quality impact assessment will be carried out following the incident to determine the likely extent, if any, of the impacts associated with emissions to air.
- Given the current operations and the environmental sensitivity of the site, it is considered that a contingency of 25% is appropriate.

Table 8.1 Worst Case Costs

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate (€)	Cost (€)	Source of unit rates
Response to Risk ID 8- Fire and knock-on Risk ID 7, and ID 14	Facility Management and Security.	6	Week	6,000	36,000	ERAS ECO
	Fire Services Attendance on Site	1.5	Day	60,000	90,000	OCM
	Spill containment consumables (extinguishers, booms).	1	Incident	5,000	5,000	ERAS ECO
	Testing of contaminated firewater ¹	4	Sample	250	1,000	OCM
	Transport and off site treatment of contaminated firewater ²	1,345	m ³	350	470,750	OCM
	Demolition of Building ³	21,175	m ³	20	423,500	OCM
	Removal and off-site disposal of fire damaged materials ⁴	300	Tonnes	375	112,500	OCM
	Plant and Equipment Hire	3	Day Rate	5,000	15,000	ERAS ECO
	Removal and disposal non-hazardous building debris ⁵	1,200	Tonne	100	120,000	OCM
	Cleaning yards	2	Day Rate	1,000	2,000	ERAS ECO
	Cleaning drains. ⁶	Item	Jet Vac	9,750	9,750	OCM
	Drain integrity survey.	Item		3,500	3,500	OCM
	Air quality assessment.	1	Fees	3,000	3,000	OCM
	Surface water quality monitoring in storm sewer and Blackwater Estuary	12	Sample	250	3,000	OCM
Remediation of the Blackwater Estuary <ul style="list-style-type: none"> • Sediment monitoring • Modelling extent of impact • Developing remedial programme • Implementing programme • Monitoring effectiveness of programme 	Item		500,000	500,000	OCM	

¹ Includes for laboratory analysis, consultants fees itemised separately

² Derived from firewater retention assessment for the current site. Assessment to be revised following change to licence boundary

³ Building 1 (2,140m²)

⁴ Based on tonnage in Building 1 listed in the Table 3.2 and assumes all is fire damaged, but none consumed by the fire. Liquid feed stock will be released from the damaged tanks onto the floor.

⁵ Based on the non-hazardous nature of the waste in the Shed, the debris will be classified as non-hazardous

⁶ Includes use of Jet Vac tankers and transport and off-site treatment costs.

	Monitoring in foul sewer	12	Sample	250	3,000	OCM
	Remedial works on Irish Water foul sewer/WWTP	Item			50,000	OCM
	Soil borings.	10	Boring	100	1,000	OCM
	Soil monitoring.	20	Sample	200	4,000	OCM
	Soil excavation, transport and disposal ⁷ .	120	Tonnes	250	30,000	EPA Guidance
	Reinstatement of excavated area, including repaving.	120	Tonnes	20	2,400	OCM
	Groundwater wells.	3	Borehole	2,500	7,500	OCM
	Groundwater samples ⁸	36	Sample	250	9,000	OCM
	Consultancy Services ⁹ .	40	Day	500	20,000	OCM
Total (€)					1,921,900	
Contingency (30%¹⁰)					576,570	
Total Including Contingency (€)					2,498,470	

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⁷ Site is paved and subject to regular inspection and repair. Only pathway to soil is damaged paving and leaking drains. Quantity based on and estimated impacted area of 800m² to a depth of 0.1m

⁸ Includes for three years post incident monitoring at quarterly intervals

⁹ Includes for Structural Engineer and Environmental Consultant

¹⁰ Based on environmental sensitivity of the site.

9. CONCLUSION

This ELRA was carried out in accordance with Agency's Guidance (March 2014). The cost associated with the 'worst case' scenario, is €2,498,470. These costs will be recouped under Eras Eco's insurance policy.

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APPENDIX 1

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Photograph 1: Diesel Storage Tank Building 1



Photograph 2: Diesel Storage Tank Building 2



Photograph 3 : Engine and Hydraulic Oil



Photograph 4 : Gas Cylinder Storage



Photograph 5: Scrubber Treatment Chemicals Storage

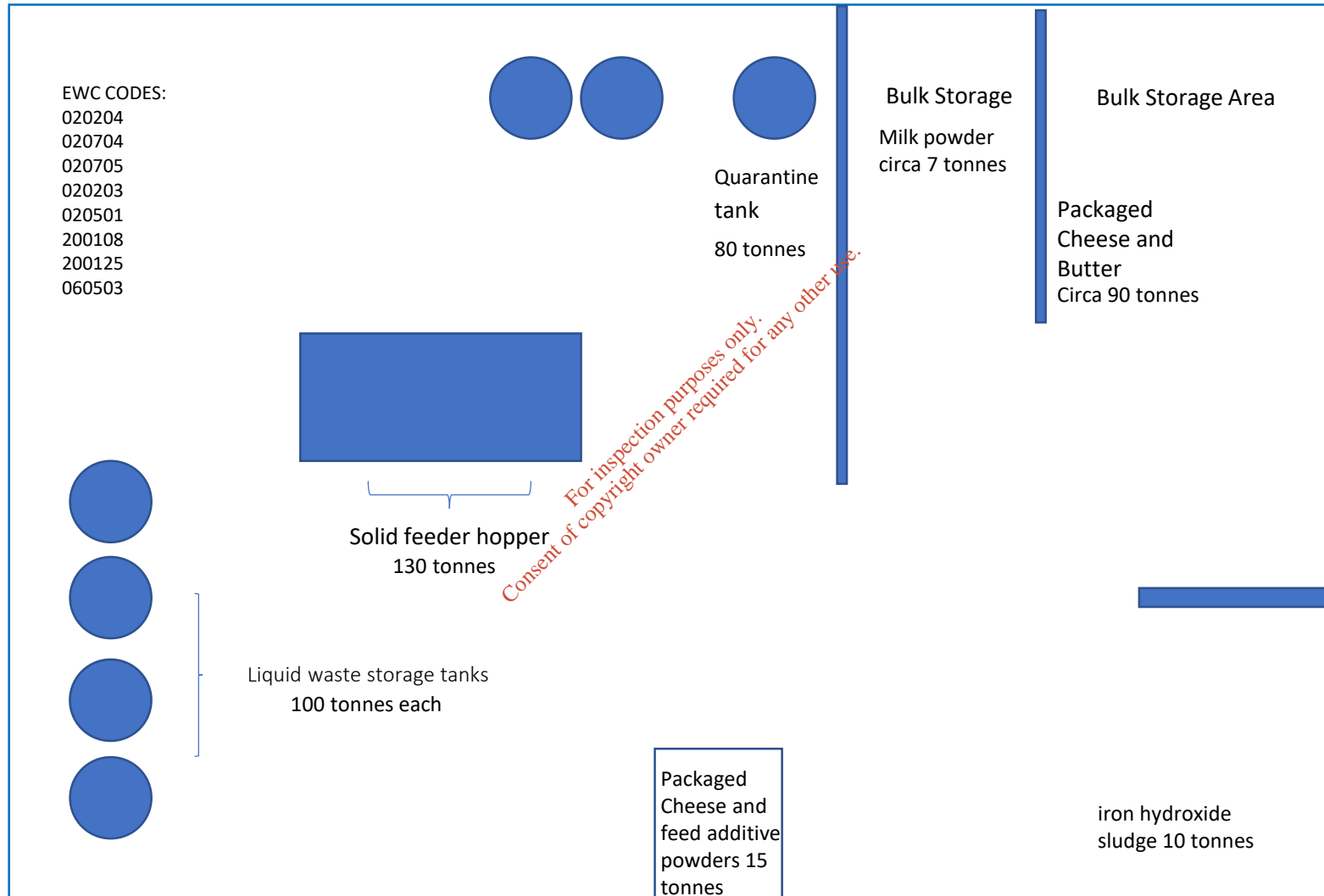


Photograph 6: IBC Storage Building 1

APPENDIX 2

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Eras Eco W0211-02 Material Intake Building Waste Storage Plan



APPENDIX 3

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FIRE RISK ASSESSMENT

ERAS ECO LIMITED

FOXHOLE

YOUGHAL

CO. CORK

INDUSTRIAL EMISSIONS LICENCE NO. W6211-01

Prepared For: -

ERAS ECO Ltd
Foxhole
Youghal
County Cork

Prepared By: -

O' Callaghan Moran & Associates
Unit 15 Melbourne Business Park
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June 2019

Project		Fire Risk Assessment: Foxhole, Youghal		
Client		Eras Eco Ltd		
Report No	Date	Status	Prepared By	Reviewed By
191930203	05/06/2019	Draft Initial Client Review	Austin Hynes BSc	Jim O'Callaghan MSc, CEnv, MCIWM, IEMA
	21/06/2019	Final		

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1. INTRODUCTION

ERAS ECO Ltd (Eras Eco) operates its biological treatment plant at Foxhole, Youghal under an Industrial Emissions Licence (W0211-02) granted by the Environmental Protection Agency (Agency) in July 2018.

Under the original licence Eras Eco accepted municipal sewage sludge and industrial wastewater treatment plant sludges for treatment. The treatment process comprised drying, with the treated sludge then exported. In July 2018 Eras Eco stopped accepting and drying sludges and does not intend to resume this activity. The revised licence approves the operation of an Anaerobic Digestion Plant and currently this is the only waste activity that is on-going.

Condition 9.5 of the licence requires the preparation of a fire risk assessment for the installation. The assessment shall examine all relevant factors on site that impinge on fire risk and prevention and should have regard to the Guidance Note: Fire Safety at Non-Hazardous Waste Transfer Stations, 2013. Eras Eco commissioned O'Callaghan Moran & Associates (OCM) to prepare the assessment.

1.1 Methodology

OCM visited the site on 3rd May 2019. A tour of the entire site was completed, relevant documentation relating to fire safety was reviewed and site staff were interviewed. The findings formed the basis for the completion of the assessment, which had regard to the following guidance documents and regulations:

- Agency's Guidance Note – Fire Safety at Non-Hazardous Waste Transfer Stations (2013);
- Agency's Guidance on Fire Risk Assessment for Non-Hazardous Waste Facilities (2016);
- Guidelines for Anaerobic Digestion in Ireland (Cré 2018);
- UK Environment Agency Reducing fire risk at sites storing combustible materials: Technical Guidance Note 7.01 (2013);
- HSA Guide to Risk Assessment & Safety Statements, and
- Safety, Health and Welfare at Work (General Application) Regulations 2007- Part 8: Explosive Atmospheres at Places of Work.

2. FACILITY DESCRIPTION

2.1 Location

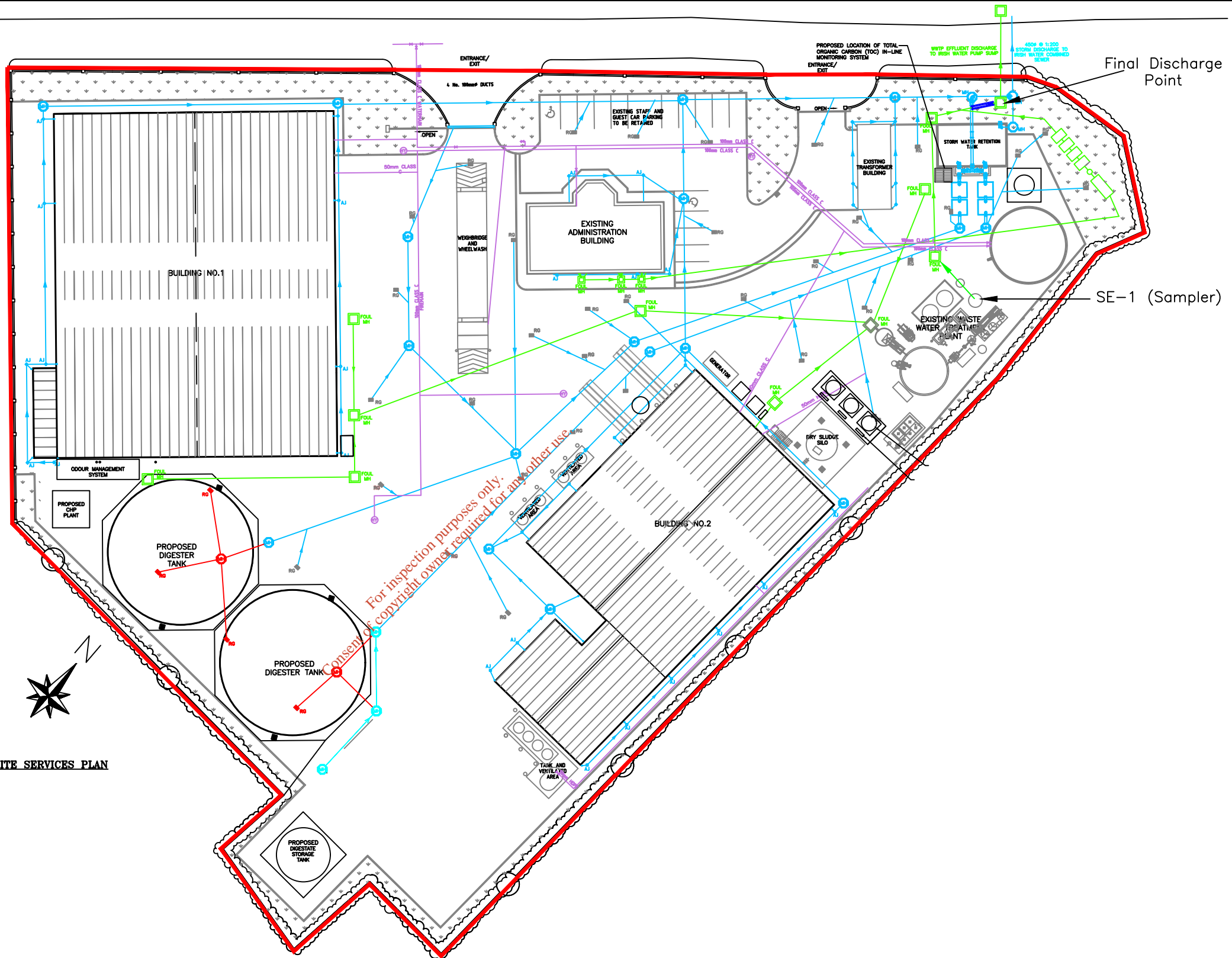
The facility is approximately 2km from Youghal. The surrounding lands have a variety of commercial uses including Cork County Council's Youghal Landfill and Civic Amenity Site, the Youghal NCT Centre, the Foxhole IDA Industrial Estate and the Foxhole Business Park.

2.2 Layout

The site layout is shown on Drawing 15-193-02. It encompasses approximately 1.6 hectares (ha) and the infrastructure details are shown on Table 2.1, with photographs in Appendix 1.

Table 2.1 – Site Infrastructure

Ref	Infrastructure	Details
1	Building 1 - Processing Building (Anaerobic Digestion Feed Area)	Area 2,140m ² . Steel portal frame with 300mm reinforced concrete floor slabs. 1.8 high mass concrete wall on top of which are wall cladding on multibeam purlins bolted to the cantilevered steel frame. The roof cladding has skylights and are bolted to seating angles. Roof mounted smoke detection system Odour abatement system comprising an air extraction fan, wet scrubber and activated carbon filter.
2	Building 2 - Processing Building (Former Sludge Drying)	Area 1,243m ² . Steel portal frame with 300mm reinforced concrete floor slabs. External wall and roof cladding and internal floor to ceiling blockwork wall separating the dryer, the biomass boiler and the waste reception and mixing bin areas. Sludge drying has stopped and the plant and equipment are being decommissioned.
3	Site Office	Area. 460m ² – No Internal drains. Used for administrative offices, canteen and changing rooms, washing machines. Two storey structure with a structural masonry (100mm) outerleaf with 100mm cavity and 215mm concrete block inner leaf and suspended ceilings. Smoke detection system with control panel in reception.
4	Transformer Building Grid Connection	Area. 46m ² .
5	Anaerobic Digesters 2 No	Each has 2,500 tonnes storage capacity and both fitted with pressure monitors, pressure release valves and odour abatement systems.
6	Digestate Storage Tank	1,000 tonnes storage capacity.
7	Combined Heat & Power Units and Transformers	2 No. Combined generating capacity 1.2MW 2 No. Transformers
8	Gas Flare	Back Up to control gas pressure in digesters when CHP units shut down for maintenance.
9	Dried Sludge Silo	Not in use and being decommissioned.
10	Wastewater Treatment Plant	Not in use and being decommissioned.
11	Above Ground Diesel Tanks	1 No 2,600 litre 1 500 litre
12	Water Storage Tanks	Firewater Storage Tank (475m ³), Storm Water Retention Tank (120m ³).
13	Electrical Substation	Controlled by utility company and not accessible by Eras Eco.



PROPOSED SITE SERVICES PLAN
SCALE 1:500



50 metres



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CLIENT

Eras Eco

DRAWING No.
15-193-02

TITLE

Site Services

REV.
B

This drawing is the property of O'Callaghan Moran & Associates and shall not be used, reproduced or disclosed to anyone without the prior written permission of O'Callaghan Moran & Associates and shall be returned upon request.

2.3 Services

The open yards are paved with concrete and surrounded by a kerb. There is a concrete block wall along part of the eastern boundary. Rainwater run-off from roofs and paved areas is collected in the surface water drainage system that connects to two silt/oil interceptors (Class 1) and a storm water retention tank. The outlet valve from the tank is normally closed and only opened to release water to the estuary water after an inspection confirms that water quality is satisfactory.

Process wastewater is not generated and sanitary wastewater from the offices is treated in a proprietary treatment system (Puraflo ©) adjacent to the northern site boundary, before being discharged to the Irish Water foul sewer that outfalls to the municipal wastewater treatment plant in Youghal.

2.4 Waste Activities

The waste activities authorised by the licence are:

- Sludge Drying
- Processing of non-hazardous mixed dry recyclables (MDR).
- Anaerobic Digestion (AD)

Eras Eco has not accepted MDR since 2013 and there are no short to medium term plans to restart this activity. In July 2018 Eras Eco stopped accepting and drying sludges and does not intend to resume this activity. The operation of the AD Plant is the only waste activity that is on-going.

2.4.1 Sludge Drying

Sludge drying was carried out in Building 2 using a rotary drier heated by steam produced from an on-site boiler fuelled by biomass (wood chip). Condensate from the drier was treated in the on-site wastewater treatment plant (WWTP), with the treated effluent discharged to the estuary.

The WWTP was designed to treat condensate from the sludge drier, landfill leachate and wash water from the wheel wash. It comprises a balance tank with an air diffuser, a dissolved air floatation tank, carbon and sand filters, lamella settlement unit, hypochlorite treatment and a sludge storage tank.

Sludge drying stopped in 2018 and it is not intended to restart. At the time of the OCM inspection the sludge drying plant (reception and mixing bins and rotary drier) and associated WWTP were being decommissioned. It is understood that the sludge reception and mixing bins and the rotary drier will be removed from the site, but that the biomass fired boiler and decommissioned WWTP will be retained.

2.4.2 AD

The AD plant comprises four liquid storage tanks, a feed hopper and conveyor, two pasteuriser tanks and a quarantine tank located in Building 1 and two digester tanks and a digestate storage tank located in the south of the site. The digesters are enclosed and heated to 37°C and are continuously agitated and fed with sludge, organic sludge from the food and beverage industry and household and commercial food waste.

This process produces a biogas and a digestate. The biogas contains approximately 65% methane, which is currently treated (scrubbed) and used as a fuel in two on-site combined heat and power units. It is envisaged that in the future the gas will be exported to the national grid. Where the feed stock includes animal by-products, the digestate is pasteurised to facilitate its use as a fertiliser. The temperature in the pasteurisers is raised to the required level (71C⁰) using water heated by the CHP engines. The pasteurised digestate is stored in the quarantine tank pending the results of the confirmatory testing.

2.5 Raw Materials & Waste Types

2.5.1 Raw Materials

Flammable materials handled on site are diesel oil, virgin and waste oils, lubricant and hydraulic oils. There are two above ground double skinned plastic diesel storage tanks, one 2,600 litre tank located at the eastern edge Building 1 and the second at the western side of Building 2.

Small quantities of hydraulic and engine oil were stored in spill tray inside Building 2. Waste oils generated during plant maintenance are collected in drums and stored on spill pallets. Gas cylinders used in equipment repair are stored upright and in a secured location inside Building 1.

The wet scrubber on the odour control system uses sulphuric acid, sodium hydroxide, ferric solution and hypochlorite and these are stored in Intermediate Bulk Containers (IBC) on spill pallets adjacent to the scrubber. The types and volumes of flammable and hazardous materials on site at any one time is in Table 3.1.

Table 3.1 – Volume of Flammable & Hazardous Materials

Products	Quantity Stored litres
Diesel Oil	3,500
Engine/Hydraulic Oil	2,000
Sulphuric Acid	1,000
Sodium Hydroxide	1,000
Hypochlorite	2,000
Ferric Solution	4,000

2.5.2 Wastes

The majority of the wastes accepted are either solid, semi-solid or liquid organic wastes that are not combustible. Combustible waste includes off specification palm oil and food ingredients e.g. milk powders. The palm oils are delivered in IBCs and food ingredients are typically delivered in 50kg bags on pallets.

The wastes are stored in designated areas inside Building 1, as shown on the Waste Storage Plan in Appendix 2. The bays are delineated by large portable concrete blocks. The maximum amount of waste on-site at any one time is 6,820 tonnes, comprising approximately 6,530 tonnes of liquid and semi-solid organic wastes and 290 tonnes of other materials and waste as shown in Table 3.2.

Table 3.2 Quantity of Wastes On-Site

Waste Types-	Tonnes	Location
Organic Material (Input)	6,530	Building 1
Waste Oil	4	Building 1
Butter Oil/Palm Oil/ Sunflower Oil	20	Building 1
Packaging Waste (plastic, paper)	16	Building 1
Milk Powder	250	Building 1
Total	6,820	

The maximum storage time for any particular waste type before it is fed into the digesters is 16 weeks.

2.6 Fire Safety Training

The Facility Manager is the nominated Fire Safety Manager and he has received training in this role and in ATEX regulation requirements. The Facility Manager and Deputy Manager have also received training in the correct use of fire extinguishers.

The induction training for new staff or contractors includes instructions on fire safety and what to do if a fire is discovered at the site. Staff receive regularly updated training to ensure that they remain familiar with fire precautions and the actions to be taken in the event of a fire. Fire drills are conducted regularly and records maintained.

2.7 Fire Prevention

To prevent/reduce risk of arson there is a security fence around the entire facility and the entrance gates are locked during non-operational hours. The site boundaries are kept clear of combustible materials.

Members of the public do not have access to the facility and only authorised personnel are permitted inside the waste processing building. Site visitors are informed of the safety and fire prevention procedures that must be followed while they are on site. The site has a policy of only smoking in designated areas.

Safe systems of work are in place including 'hot works' procedures. Outside contractors are obliged to undergo safety inductions before being allowed access to operational areas. The inductions covers fire procedures, behaviour on site, housekeeping and specific high risk jobs i.e. hot works procedure & permits.

The electrical systems in the buildings are not subject to inspection. The use of portable electrical heaters is avoided as far as practicable and restricted to the offices, where oil filled units are provided; however a risk assessment has not been completed. Electric panels are located in designated areas. There is no policy in place regarding the use of personal electrical equipment and the management of trailing leads and adaptors.

Given the nature of the waste accepted, the probability of an incompatible non-conforming waste with the potential to act as ignition sources e.g. gas bottles, drums, containers, with labels, i.e. flammable, corrosive, oxidising, and hazardous is low. Staff have received training on how to identify non-conforming materials and removing them to the quarantine area.

The biogas produced in the digesters is a mix of flammable methane (CH₄), carbon dioxide (CO₂), with smaller levels of hydrogen sulphide (H₂S) and presents a risk of suffocation and the formation of an explosive atmosphere.

An explosive atmosphere means a mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture. An explosive atmosphere does not always result in an explosion, but if it caught fire, the flames would quickly travel through it. If this happens in a confined space (e.g. in plant or equipment) the rapid speed of the flames or rise in pressure could also cause an explosion¹.

The explosive range of biogas is between 6 and 22% volume/volume (concentration in the atmosphere). An explosion is likely at this range if there is the presence of an ignition source. In the case of pure methane the explosive range is between 4.4 and 16.5% v/v.

Regulation 169 of the Safety, Health and Welfare at Work (General Application) Regulations 2007- Part 8: Explosive Atmospheres at Places of Work requires that, where an explosive atmosphere is or is likely to be present at or may, from time to time, arise in a workplace, make a suitable and appropriate assessment of the risk arising.

The suppliers of the digestion plant completed an explosion risk assessment and a report is maintained on-site. The assessment identified the areas where there is a risk of biogas emissions. These have been classified as 'Danger Zones' in accordance with ATEX Directive 1999/92/EC² based on likelihood and persistence and identified using the appropriate signage (Ex).

The zones are protected from ignition sources through the use of equipment and protective systems that meet the requirements of the ATEX Product Regulations. Employees working in zoned areas are provided with adequate work clothing that does not create an electrostatic risk. The Facility Manager has received training in ATEX procedures and is responsible for implementing the inspection and maintenance measures specified in the explosion risk assessment document.

The following is forbidden inside the danger zone:

- Mobile electronic device
- Smoking
- Working with electric or pneumatic tools, and
- Works that produces ignition sources such as sparks, hot surfaces, flames, hot gasses etc.

¹ https://www.hsa.ie/eng/Publications_and_Forms/Publications/Retail/Gen_Apps_Explosive_Atmospheres.pdf

² <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:31999L0092&from=GA>

A back-up gas flare has been provided and is used to control gas pressures in the digesters by flaring the biogas when the gas engines are shut off as part of the annual maintenance programme.

Eras Eco implements a scheduled preventative maintenance programme on the digestion plant and the CHP engines. The objective is to identify and address in a timely manner conditions that could lead to plant malfunction and or fire/explosion. A copy of the Maintenance & Performance Manual is in Appendix 3.

The transfer of the powdered ingredient from the bags into the feed hopper can generate dusts to such an extent that it triggers the fire alarm system inside Building 1. The dust has the potential to accumulate on the ground and on plant and equipment.

2.8 Fire Spread

The separation distances between Building 1, Building 2, the office and the digesters means that a fire outbreak in one will not spread to any of the others.

Wastes are only stored in Building 1. Liquid wastes are stored in the tanks and IBCs. Semi-solid wastes are transferred directly to the feed hopper. Solid waste are typically delivered in bags on pallets and stored pending transfer to the feed hopper.

The storage areas are delineated by portable concrete blocks, however the IBCs and bags are stored in the same stockpile. The IBCs are stacked two high and the bagged solid waste is stored three pallets high. A number of IBCs were within 3m of the quarantine tank and the front loading shovel was parked within 2m of IBCs.

IBCs have become very widely used, not just in transport for which they were originally designed, but also for longer-term storage. Plastic or composite IBC's containing non-aqueous liquids typically fail rapidly when exposed to an engulfing fire³. After failure, IBCs release their contents in a few tens of seconds and spreading of the liquid released can lead to rapid involvement of more containers. Where the liquids are combustible large volumes of free burning liquid may be produced and fire may spread very rapidly.

The carbon filter in the on-site odour abatement system which is adjacent to the side of Building 1 pose a significant fire spread risk. If a fire occurs in the building there is a risk of smoke, hot air and products of combustion being drawn into the carbon beds and acting as a source of carbon ignition.

2.9 Fire Detection

The office and Building 1 are provided with smoke detectors that are linked to a centralised alarm system, with wall mounted sirens in all of the buildings. The fire control panel is located in the office reception. It is subject to quarterly inspection by a fire safety contractor (Firecrest). In addition there are 'break glass' alarm points at strategic locations in all of the buildings that can be activated by staff members. There is no formalised system for testing the alarm.

Outside of operational hours the fire alarm system is monitored by a security company that alerts Eras Eco staff that the alarm has been activated.

³ <http://www.chemical.org.uk/wp-content/uploads/2018/11/IBC-GUIDANCE-ISSUE-2-2018-1.pdf>

The Facility Manager and Deputy is the designated Fire Safety Manager, with responsibility for assessing the scale of an incident and, alerting the fire service. This responsibility is defined in the Emergency Response Procedure.

2.10 Fire Suppression

On detection of smoke or fire, staff first raise the alarm and evacuate the area. Depending on the severity of the issue, the Fire Warden will decide as to whether site staff could deal with the incident or whether the Emergency Services should be called.

Fire extinguishers are positioned at strategic locations throughout the site, including the office, Building 1 and Building 2 and the locations are recorded in the Fire Register. The extinguishers are subject to annual inspection and replenishment/replacement as required by a fire safety contractor.

Site staff are trained to extinguish small fires with appropriate hand held fire extinguishers as per the site Fire Explosion Procedure. Staff members shall only attempt to fight a fire if it is safe to do so.

If staff members cannot tackle a fire safely and effectively, the evacuation of all personnel is the primary priority. Emergency exit doors are provided in all of the buildings, are clearly labelled and fitted with emergency exit signs with back-up lighting. Eras Eco conducts daily inspections of the doors to ensure they are functioning properly and not obstructed.

In the event of an emergency call out, Cork Fire Service tenders will attend the site. The Fire Service has visited the site to familiarise themselves with the site layout and location of the hydrants. In February 2019 they conducted a fire exercise in Building 2. A 'Fire and Emergency Information' pack that contains a copy of the Emergency Response Procedure and a Site Layout Plan has been provided to the Cork Fire Service.

The firewater storage tank serves two hydrants located in the yard. The water level in the tank is regularly checked and topped up as required from the mains supply. The hydrants are not subject to regular testing. There are hose reels located outside and inside Buildings 1 and 2 and these are connected to the fire water storage tank which is fed from the mains supply.

3. CONCLUSIONS & RECOMMENDATIONS

3.1 Conclusions

Although the facility is authorised to dry industrial and municipal sewage sludge, accept and process mixed dry recyclables and operate an anaerobic digestion plant, the only waste activity that is on-going is anaerobic digestion.

At the time of OCM's site inspection the sludge drying equipment in Building 2 and the associated wastewater treatment plant were being decommissioned and it is understood Building 2 will not be used for waste related activities in future.

The assessment of site operations identified a range of activities, plant and equipment that are potential fire hazards through a combination of potential ignition sources and the presence of flammable/combustible materials.

Eras Eco has completed an explosion risk assessment of the anaerobic digestion plant and has adopted the appropriate controls to minimise the risk of explosion. Eras Eco has also put in place fire prevention, detection and suppression systems that minimise the risk of fire outbreak and, in the event that one does occur, ensure a rapid and appropriate response.

The risk assessment has identified a number of procedural and infrastructural issues that need to be addressed. These include:

- The electrical systems are not subject to regular inspection and there is no policy regarding the site wide use of personal electrical equipment and trailing leads and adaptors. It was not possible to ascertain if lighting system protection measures (earthing and surge protection) are in place.
- While the use of portable electrical heaters is restricted to the office a risk assessment of their use has not been completed.
- The layout of the waste storage areas inside Building 1, where the separation distances between the different waste stockpiles and the separation distances between the stockpiles and potential sources of ignition are not consistent with the Agency's guidance.
- There is the potential for dust to accumulate on plant and equipment inside Building 2 which could be a source of fire outbreak if there is an ignition source.
- The fire hydrants are not tested to confirm the water delivery rate.
- Although the fire detection system is subject to quarterly inspections by a specialist fire safety company, regular fire alarm tests are not conducted.

3.2 Recommendations

An electrical contractor should be retained to carry out an inspection of the electrical systems in the buildings and to confirm the presence/absence of lighting system protection measures.

A policy document should be prepared on the site wide use of personal electrical equipment, trailing leads and adaptors.

A risk assessment on the use of portable electrical radiators in the office should be completed.

IBCs should be stored separately from the pallets. There should be a minimum separation distance of 5m between the IBCs and the pallets. The maximum area of each stockpile should be 300m². The IBC and pallet stack height should not exceed 4m.

A minimum separation distance of 6m should be maintained between the stockpiles and fixed potential ignition sources e.g. electrical pumps on the quarantine and pasteurisation tanks.

The interior of Building 1 should be regularly cleaned to prevent the accumulation of dusts on plant and equipment that are potential ignition sources.

The fire hydrants should be tested every six months to confirm they remain fit for purpose.

The fire alarms should be tested in conjunction with the fire drills.

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APPENDIX 1

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Photograph 1: Smoke Detectors in Office



Photograph 2 : Fire Extinguishers in Office



Photograph 3 Fire Blanket in Canteen



Photograph 4 : Emergency Exit Plan-Office



Photograph 5: Emergency Exit Signage-Office



Photograph 6: Emergency Break Glass, Door Release and Exit Inspection Sheet-Office



Photograph 7 WWTP and Sludge Silo



Photograph 8; Electrical Substation and Firewater Storage Tank



Photograph 9: Building 2 on left, digesters in centre and Building 1 on right



Photograph 10: Back-Up Gas Flare



Photograph 11 : CHP Engines



Photograph 12: Warning Signage



Photograph 13: 'Danger Zone' Condensate Pit



Photograph 14 : 'Danger Zone' Digester Pressure Release Valves



Photograph 15 : Above Ground Diesel Storage Tank & Spill Kit



Photograph 16 : Fire Hydrant



Photograph 17 : Hose Reel outside Building 2



Photograph 18 : Transformers



Photograph 19 : Odour Control Unit on Building 1



Photograph 20 : Interior Building 1



Photograph 21 : Bulk Liquid Waste Storage Tanks Building 1



Photograph 22 : Waste Storage Bays Building 1



Photograph 23 : Waste Storage Bays Building 1



Photograph 24 : Front Loading Shovel Building 1



Photograph 25 : IBCs Stored at Quarantine Tank



Photograph 26 : Gas Bottle Storage Building 1



Photograph 27 : Waste Oil Storage Building 2



Photograph 28: Biomass Boiler Building 2



Photograph 29 : Residual Wood Chip in Biomass Boiler Feed Hopper Building 2



Photograph 30 :Rotary Drier Building 2



Photograph 31 : Emergency Exit Door Building 2

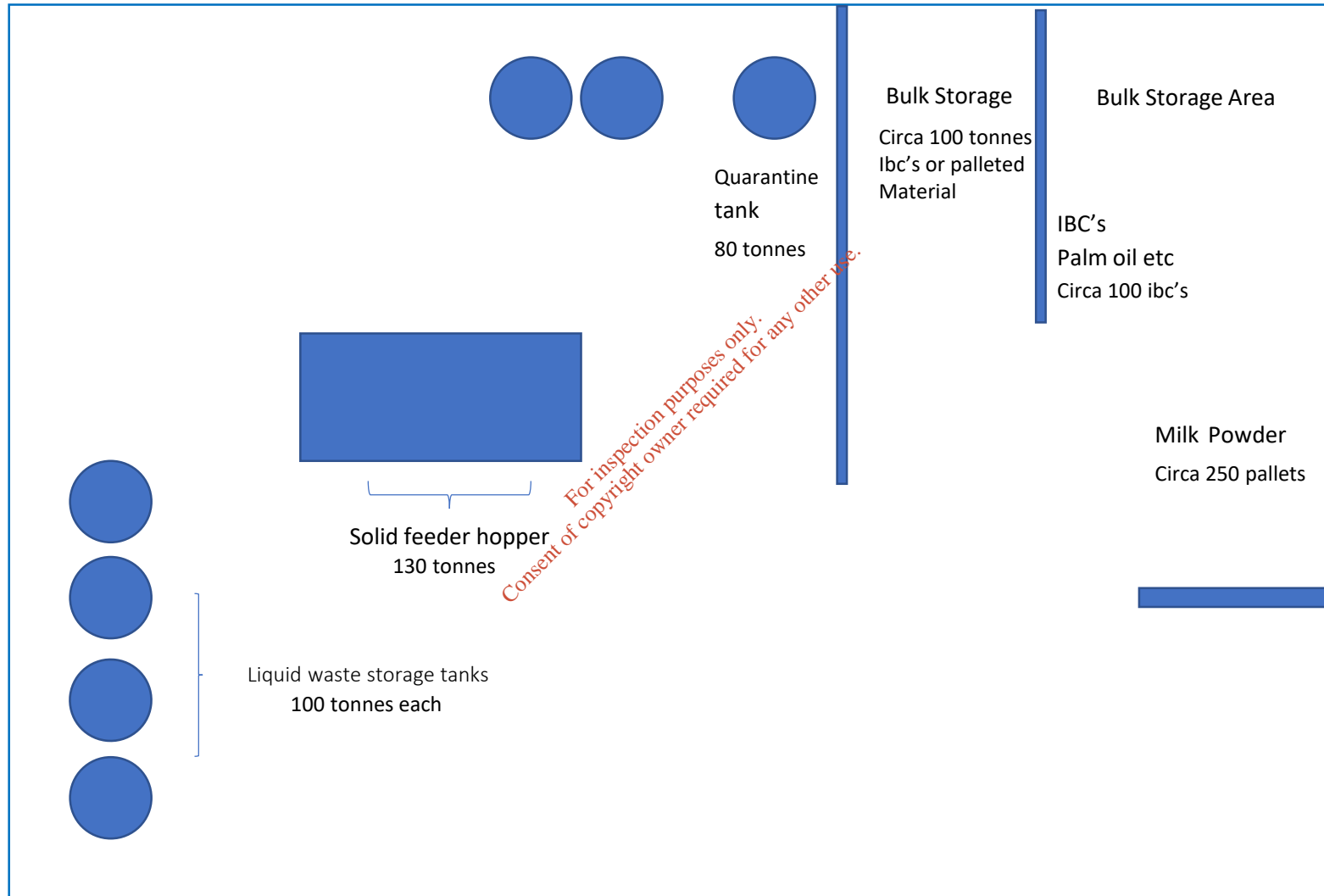


Photograph 32 : Hose Reel Building 2

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Eras Eco W0211-02 Material Intake Building Waste Storage Plan



Appendix 3

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Eras Eco Ltd

Licence Register Number: W0211-02

Maintenance & Process Control

Manual

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1.0 Introduction

This manual has been prepared to comply with Conditions 2.2.2.14 and 2.2.2.15 of the Waste Licence. The purpose is to identify the maintenance and process control measures required to ensure that all items of plant and equipment are maintained in accordance with the instructions issued by the manufacturer/supplier and ensure there is adequate control of processes under all modes of operation.

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2.0 Maintenance

The maintenance programme shall be based on and be consistent with the Master List prepared by HOST, a copy of which is in Appendix 1.

Weekly checks shall be carried out and the findings recorded in the weekly site inspection sheets, a copy of which is in Appendix 2.

Monthly checks shall be carried out and the findings recorded in the monthly site inspections sheet, a copy of which is in Appendix 3.

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3.0. PERFORMANCE MONITORING

3.1 Anaerobic Digestion Plant

The anaerobic digestion process is controlled via a fully integrated Supervisory Control and Data Acquisition (SCADA) system. The biogas generation and utilisation processes are continuously monitored with the data displayed on screens. There is an alarm system to notify operators of exceedances of tolerance levels and plant malfunction both during and outside the hours when the site is manned. .

The SCADA system provides for the centralised management of all process parameters and safety controls. The key process parameters and plant items that are continuously monitored include:

- pH
- Temperature
- Biogas content-methane, carbon dioxide and oxygen
- Gas pressures,
- Mixing conditions
- Valves and pump operations
- Digester and storage tank levels
- Digester and after storage tank roof pressures

APPENDIX 1

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Maintenance list master		100	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
Polem tank												
Type B & C 4 kW Motor	Oil change											
Digester Concrete tanks												
Tank												
Digester Roof system												
Flexolutions												
Airblown cover												
Condensate stoppers	Drain											
Outer membrane	Clean											
Inner membrane	Visual inspection for damage or cracks											
	Visual inspection for sagging											
Blower												
Examine readiness for working	Free permeability at air openings											
	Control fix bolt joints											
	Control running without vibrations											
	Examine legibleness of type plate											
	Examine accessories											
Examination of the electric supply	Check plastic parts											
	Check electric wires and supply terminals for corrosion											
	Check current consumption											
Over- and under pressure valve												
	Check fluid level											
	Check function											
Paddle mixer Steverding												
Transmission	Oil change											
	Re-grease bearing with 2 strokes											
General	Visual inspection for leakages and irregularities											
	Check bleed screw for soiling											
	Grease sealing unit 1 stroke											
	Clean seal on concrete wall with water											
	Grease bearing 2 strokes											
	Grease seal 5 strokes											
	Check bearing and sealing unit by skilled fitter											
Propeller mixer Top/Side entry												
Jongia												
Oil change												
Seal inspection												
Lubricate shaft bearings												
Visual inspection												
Overall visual inspection												
Jongia type RWm												
Oil change												
Seal inspection												
Lubricate shaft bearings												
Visual inspection												
Overall visual inspection												
Pump Vogelsang												
Lobbe pump VX136Q												
	Sperchamberoil											
	Transmission oil change											
	Greasing shaft seal											
Vogelsang Premix												
Vogelsang Eccentric rotor pump/progressive cavity pump premix-unit1												
blocking fluid	Inspect blocking fluid											
Inspect screws and nuts	Replace blocking fluid											
	tighten and inspect											
Vogelsang RotaCut RCX-585G premix-unit2												
blocking fluid	Inspect blocking fluid											
Inspect screws and nuts	Replace blocking fluid											
	tighten and inspect											
Vogelsang Debris Removal System, DRS premix-unit 3												
Leakage control	Check for leakage											

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Desulphurisation system - Blower																			
Bearings	Change	Every 4 years or 25000 hrs																	
Routine checks	Delivery temperature	Weekly																	
	Operating pressure	Weekly																	
	Electric motor current absorption	Weekly																	
	Vibrations	Weekly																	
Suction filter	Check and clean or replace	Weekly																	
Heating distribution circuit																			
Overall visual inspection		weekly																	
check electrical connections and pipe insulations																			
at an air-cooled condenser fins cleaning																			
checking condenser drain pipe to be free																			
control of condenser fans																			
checking the oil level																			
checking the refrigerant circuit																			
checking of the isolation of the refrigerating circuit																			
cleaning of the evaporator and the after heating condenser																			
check for corrosion and if necessary eliminate																			
checking of security organs																			
check of coolant level																			
Carbon filter Host																			
Condensate pit																			
Water level	Visual check	Weekly																	
Leakage	Visual check	Weekly																	
Condensate pump Amarex																			
Insulation resistance	Measure																		
Power cables	Check																		
Lifting chain/rope	Inspect																		
Sensors	Check																		
Mechanical seal	Change lubricant																		
Bearings	Inspect																		
	Change oil	Annually																	
	General overhaul	Once every 5 years																	
Flare MTU 800-HT BM																			
Ignition probe	Check	Monthly																	
UV-glass	Clean & Degrease	Monthly																	
UV probe	Replace																		
Flame arrestor	Clean	Yearly																	
Ignition cable & Protective hose and plug	Check	Yearly, if necessary replace																	
Gas and air nozzle for flame optimization	Check/ if needed re-regulate	Yearly																	
Check the gas valve, clean the filter and check for corrosion		Yearly																	
Dosing units JESCO																			
Diaphragm pump MEMDOS DX 75																			
Compressor																			
Function pressostat																			
Oil change																			
New oil filter																			
Visual control: V-belt, condensate																			
Air dryer																			
Dryer	check for air leaks	Daily																	
	Check electrical supply cables and conduits	Monthly																	
	Check for cyclic operation	Monthly																	
	Replace exhaust silencers and control air brass filter	Every 24-months																	
	Replace/Calibrate dewpoint transmitter	Every 3-months																	
	Replace Desiccant	36-month																	
Filtration	Check Drain operation	Every 3-months																	
	Replace inlet/outlet filter cartridge	Every 12-months																	
Gas analyser Fronova																			
Aerosol filter																			
Air filter		Replacement is only necessary if filter contamination is visible																	
Chemical filter		The filter must be replaced by a new one when the pink color of the filter material has vanished																	
Fine dust filter		The fine dust filter must be replaced when strong contamination is visible																	
housing filter		The housing filter must be replaced																	
change bearings																			
Valves																			
knife gate valve	visual inspection	Weekly																	
Pneumatic cylinder ec / ecs	visual inspection	Weekly																	

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APPENDIX 2

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ERAS BIO-GAS

WEEKLY CHECK LIST

YEAR: WEEK: DAY:

Please sign every week after checking.

DESCRIPTION/ Check	ACTION	COMMENT
COMPRESSOR		
Auto Drain	Check Operation	
Pressure	Pressure of the compressor should be between 5-8 bars.	
Oil level in compressor sight glass	If level is too low, top up with same type of oil with	
DRYER		
Check:		
Temperature	Verify temperature on control panel display	
Condensate	Visually check auto drain	
Digesters and afterstorage		
Visual check	Visual check all pipework and general condition	
SIDE ENTRY MIXERS		
Visual/Audio check		
(Mechanical) seals	Visual wear/ leakage check	
Piping & connectors	Check leaks/Wear	
Bearings	Check Noise/leaks/wear	
Shafts	Check for excessive vibrations and noise	
Bolts & nuts	Visual check for loosening	
Agitator housing	Visual check for cracks	
Paddle Mixers		
Visual Check		
Gearbox	Check oil Leaks	
(Mechanical) seal	Check for wear and leaks	
Bearings/ bolts	Audio/ Visual Check	
General	Carry out audio-visual check and operations in tank	

ERAS BIO-GAS

Description/ Check	ACTION	COMMENT
Flare		
Condition	Visual /Audio Check	
Vogelsang Pump-Truck loading point		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	
GAS ROOFS		
Protection zones	Check for the smell of gas	
Double membrane	Check condition	
Air blower	Visual examination	
Cables	Visual examination	
Safety devices	Check for functionality	
Vogelsang Pumps -AT heat-exchanger		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	
Check pipework	Check pipework for leaks and abnormalities	
CONDENSATE PITS		
Water level in the pits	Visual check	
Check for leakage in pipes	Visual check	
PRESSURE RELIEF VALVE		
Coolant	Check coolant level and for contamination	
Valve unit	Visual check	
CARBON Filters		
Drain accumulated condensate from the filter	Open valve by hand on the bottom of the filter and let the condensate water out- CAN ONLY BE DONE WHEN ENGINE IS STOPPED	
H ₂ S	Check if the H ₂ S is climbing. If yes and over >2000 PPM then change carbon	
Filter condition	Visual check to see if the filter is deforming. If yes open the bypass	

ERAS BIO-GAS

Description/Check	Action	Comment
Pronova Gas Analyser		
Visual	Open unit box and check operation	
CHILLER		
Housing, Gas & Water Pipes	Visual Check	
Water pressure	Between 1-3 bars	
Temperature	Inlet gas temperature	
Condensate drain	Clear and make sure there are no blockages	
GAS BOOSTER		
V- Bolts	Tension/Visual	
Grease	Grease cartridge- Level	
Fittings	Visual pipes & mountings	
HEATING-HEADER		
Pumps	Check for abnormal sounds/leaks	
Water pressure	Between 1-3 bars	
Pipes and cables	Check for leakages/Breaks	
Desulphurisation system		
Blower	Check operation	
Flow levels	Check	
Vogelsang Pumps-LIQUID WASTE		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	

ERAS BIO-GAS

Description/Check	Action	Comment
VOGELSANG SOLID FEED		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	
Empty stone trap		
Pasteurisers		
Pipe Work	Check for leaks and abnormalities	
Hot water supply	Check for leaks and abnormalities	
Liquid Storage Tanks		
Inlet/Outlet leakages	Pipe work, valves and general condition of tanks	
Agitators	Operation	
Tank heating	Visual check	
BIOCUT		
Buffer fluid tank	Check buffer fluid tank level	
VOGELSANG -Pasteuriser		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	
Buildings & Yards		
Welfare Facilities'	Check condition and cleanness	
Stairways/Handrails	Check Condition	
Yards	Check condition and cleanness	
Power Washer		
Fuel Level	Check level	
Audio-visual check		
Fill fork-lift	Check diesel level	
Chemical scrubbers		
Exhaust fan	Audio-visual check	
Check chemical levels		
Chemical dosing pumps	INSPECT FOR FAULTS	
Scrubber pumps	Audio-visual check	
Pipework	Check integrity	
Manual dampers	Check for tightness	

ERAS BIO-GAS

Blowdown valve	Check operation	
Chemical storage tanks	Check levels	
pH/ORP/Conductivity sensors	Inspect for faults	
Carbon filter		
check motors and general condition	Audio-visual/Check	
Check sniff-ports		

Date

Name

Signature

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MONTHLY CHECK LIST

YEAR: MONTH: DATE:

Please sign every month after checking.

DESCRIPTION/ Check	ACTION	COMMENT
COMPRESSOR		
Auto Drain	Check Operation	
Pressure	Pressure of the compressor should be between 5-8 bars.	
Oil level in compressor sight glass	If level is too low, top up with same type of oil with	
Air filter	Clean the air-filter with compressed air. The frequency of cleaning is dependent on air-pollution in workplace	
DRYER		
Check:		
Temperature	Verify temperature on control panel display	
Condensate	Visually check auto drain	
Condenser	Clean with condensed air-pack	
Digesters and After storage		
Visual check	Visual check all pipework and general condition	
SIDE ENTRY MIXERS		
Visual/Audio check		
(Mechanical) seals	Visual wear/ leakage check/Grease	
Piping & connectors	Check leaks/Wear	
Bearings	Check Noise/leaks/wear/Grease	
Shafts	Check for excessive vibrations and noise	
Bolts & nuts	Visual check for loosening	
Agitator housing	Visual check for cracks	

ERAS BIO-GAS

DESCRIPTION/ Check	ACTION	COMMENT
Paddle Mixers		
Visual Check		
Gearbox	Check oil Leaks	
(Mechanical) seal	Check for wear and leaks	
Bearings/ bolts	Audio/ Visual Check/Grease	
General	Carry out audio-visual check and operations in tank	
Flare		
Condition	Visual /Audio Check	
Vogelsang Pump-Truck loading point		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	
GAS ROOFS		
Protection zones	Check for the smell of gas	
Double membrane	Check condition	
Air blower	Visual examination	
Cables	Visual examination	
Safety devices	Check for functionality	
Vogelsang Pumps -AT heat-exchanger		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	
Check pipework	Check pipework for leaks and abnormalities	
CONDENSATE PITS		
Water level in the pits	Visual check	
Check for leakage in pipes	Visual check	
PRESSURE RELIEF VALVE		
Coolant	Check coolant level and for contamination	
Valve unit	Visual check	

ERAS BIO-GAS

DESCRIPTION/ Check	ACTION	COMMENT
CARBON Filters		
Drain accumulated condensate from the filter	Open valve by hand on the bottom of the filter and let the condensate water out- CAN ONLY BE DONE WHEN ENGINE IS STOPPED	
H ₂ S	Check if the H ₂ S is climbing. If yes and over >2000 PPM then change carbon	
Filter condition	Visual check to see if the filter is deforming. If yes open the bypass	
PRESSURE RELIEF VALVE		
Coolant	Check coolant level and for contamination	
Valve unit	Visual check	
CARBON Filters		
Drain accumulated condensate from the filter	Open valve by hand on the bottom of the filter and let the condensate water out- CAN ONLY BE DONE WHEN ENGINE IS STOPPED	
H ₂ S	Check if the H ₂ S is climbing. If yes and over >2000 PPM then change carbon	
Filter condition	Visual check to see if the filter is deforming. If yes open the bypass	
Pronova Gas Analyser		
Visual	Open unit box and check operation	
CHILLER		
Housing, Gas & Water Pipes	Visual Check	
Water pressure	Between 1-3 bars	
Temperature	Inlet gas temperature	
Condensate drain	Clear and make sure there are no blockages	

ERAS BIO-GAS

DESCRIPTION/ Check	ACTION	COMMENT
GAS BOOSTER		
V- Bolts	Tension/Visual	
Grease	Grease cartridge- Level	
Fittings	Visual pipes & mountings	
Bearings	Grease bearings on side of booster	
HEATING-HEADER		
Pumps	Check for abnormal sounds/leaks	
Water pressure	Between 1-3 bars	
Pipes and cables	Check for leakages/Breaks	
Desulphurisation system		
Blower	Check operation	
Flow levels	Check	
Vogelsang Pumps-LIQUID WASTE		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	
VOGELSANG SOLID FEED		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	
Empty stone trap		
Pasteurisers		
Pipe Work	Check for leaks and abnormalities	
Hot water supply	Check for leaks and abnormalities	
BIOCUT		
Buffer fluid tank	Check buffer fluid tank level	
VOGELSANG -Pasteuriser		
Visual/Check	Check for leaks, oil levels and condition	
Check for noise	Check for abnormal noise	

ERAS BIO-GAS

DESCRIPTION/ Check	ACTION	COMMENT
Liquid Storage Tanks		
Inlet/Outlet leakages	Pipe work, valves and general condition of tanks	
Agitators	Operation	
Tank heating	Visual check	
Buildings and yards		
Welfare Facilities'	Check condition and cleanness	
Stairways/Handrails	Check Condition	
Yards	Check condition and cleanness	
Quick roller door		
Roller door	Check and LUBRICATE with WD40	
Power Washer		
Fuel Level	Check level	
Audio-visual check		
Chemical scrubbers		
Check noise/visual		
Check chemical levels		
Carbon Filter-air handling		
Exhaust fan	Audio-visual check	
Check chemical levels		
Chemical dosing pumps	INSPECT FOR FAULTS	
Scrubber pumps	Audio-visual check	
Pipework	Check integrity	
Manual dampers	Check for tightness	
Blowdown valve	Check operation	
Chemical storage tanks	Check levels	
pH/ORP/Conductivity sensors	Inspect for faults	

Date

Name

Signature

APPENDIX 4

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FIRE WATER RISK ASSESSMENT

ERAS ECO LIMITED

FOXHOLE

YOUGHAL

CO. CORK

Prepared For: -

ERAS ECO Ltd
Foxhole
Youghal
Co. Cork

Prepared By: -

O'Callaghan Moran & Associates
Unit 15
Melbourne Business Park
Model Farm Road
Cork
T12 WR89

June 2019

Project	Firewater Retention Assessment			
Client	ERAS ECO Limited			
Report No	Date	Status	Prepared By	Reviewed By
	18/06/2019	Draft Initial Client Review	Austin Hynes BSc	Jim O'Callaghan MSc, CEnv, MCIWM, IEMA
	21/06/2019			

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APPENDIX 1

Firewater Risk Assessment Calculation Sheets

1. INTRODUCTION

ERAS ECO Ltd (Eras Eco) operates its biological treatment plant at Foxhole, Youghal under an Industrial Emissions Licence (W0211-02) granted by the Environmental Protection Agency in July 2018. The licence authorises the acceptance of organic waste municipal sewage sludge and industrial wastewater treatment plant sludges for treatment.

The organic wastes are a feed stock for the anaerobic digestion plant. The sludge treatment process comprised drying, with the treated sludge then exported. In July 2018 Eras Eco stopped accepting and drying sludges, does not intend to resume this activity and intends to apply for Technical Amendment to revise the licence boundary to exclude the area that had been used for sludge treatment.

Condition 3.18.1 of the licence requires Eras Eco to maintain a firewater retention facility and carry out a review of the risk assessment to determine if the current retention facility remains adequate. Condition 3.18.2 stipulates that if the assessment identifies there is a significant risk of the release of contaminated firewater, a suitable risk management programme must be prepared and implemented.

Eras Eco commissioned O'Callaghan Moran & Associates (OCM) to assess the current retention facility to determine if it remains adequate in the context of operational changes since the original design was completed.

1.1 Methodology

The assessment had regard to the EPA Firewater Retention Guidance (Final Draft) 2017 which is intended to provide advice to operators of EPA licensed sites in relation to firewater retention requirements. It took into consideration the findings of the Fire Risk Assessment that details the fire prevention, detection and suppression measures that are in place.

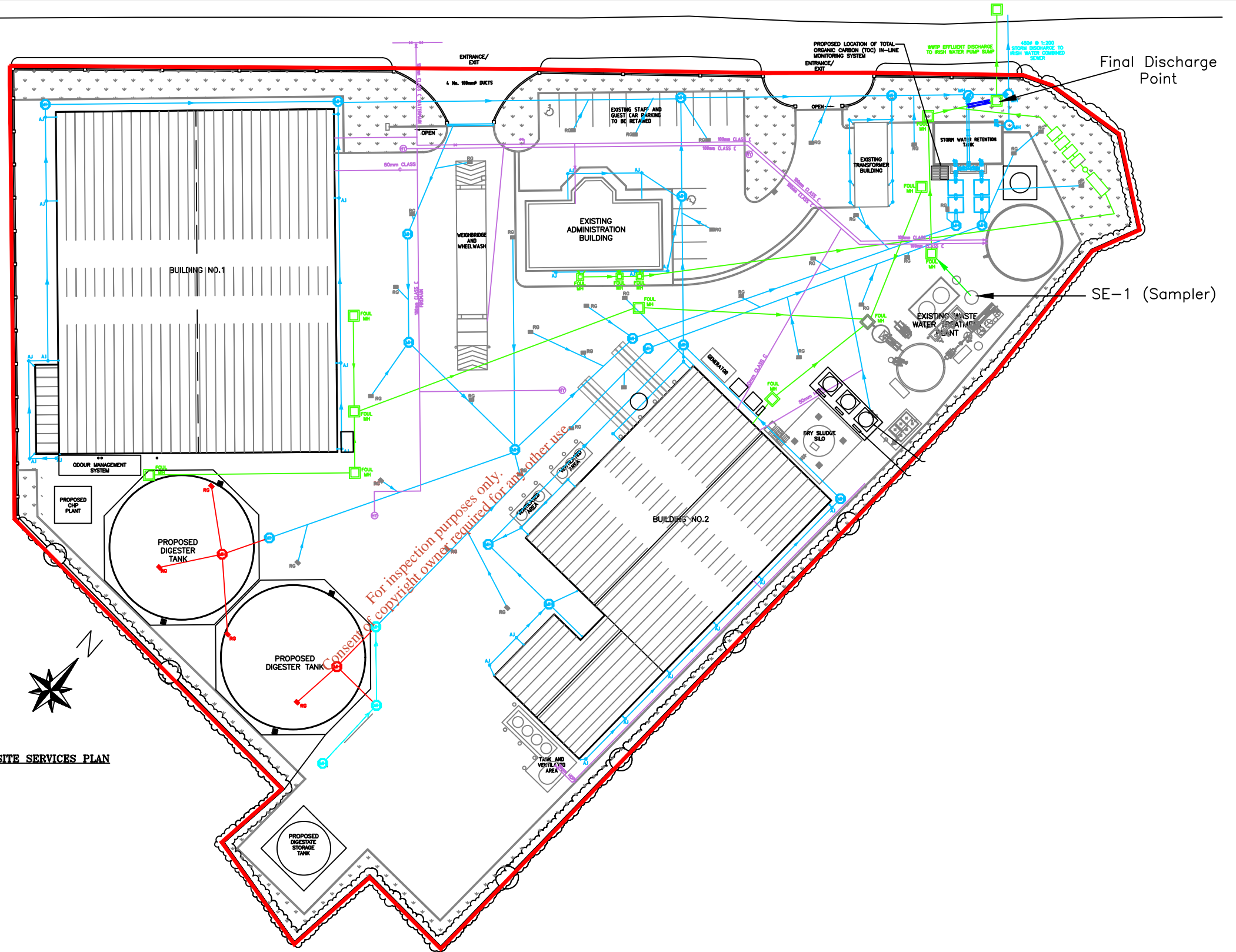
2. NEED FOR RETENTION CAPACITY

2.1 Compartmentalisation

The site layout is shown on Drawing 15-193-02. The facility encompasses approximately 1.6 hectares (ha) and the infra structure is shown on Table 2.1.

Table 2.1 – Site Infrastructure

Ref	Infrastructure	Details
1	Building 1 - Processing Building (Anaerobic Digestion Feed Area)	Area 2,140m ² . Steel portal frame with 300mm reinforced concrete floor slabs. 1.8 high mass concrete wall on top of which are wall cladding on multibeam purloins bolted to the cantilevered steel frame. The roof cladding has skylights and are bolted to seating angles. Central floor drain leading to underground feed hopper (130m ³). Below ground access chamber for hopper maintenance (180m ³). Odour abatement system comprising of an air extraction fan, wet scrubber and activated carbon filter.
2	Building 2 - Processing Building (Former Sludge Drying)	Area 1,243m ² . Steel portal frame with 300mm reinforced concrete floor slabs. External wall and roof cladding and internal floor to ceiling blockwork wall separating the dryer, the biomass boiler and the waste reception and mixing bin areas. Sludge drying has stopped and the plant and equipment are being decommissioned.
3	Site Office	Area 460m ² - No Internal drains. Used for administrative offices, canteen and changing rooms, washing machines. Two storey structure with a structural masonry (100mm) outerleaf with 100mm cavity and 215mm concrete block inner leaf and suspended ceilings. Smoke detection system with control panel in reception.
4	Transformer Building	Area. 46m ² .
5	Anaerobic Digesters 2 No.	Each has 2,500 tonnes storage capacity and both fitted with pressure monitors, pressure release valves and odour abatement systems
6	Digestate Storage Tank	1,000 tonne storage capacity
7	Combined Heat & Power Units and Transformers	2 No. Combined generating capacity 1.2MW 2 No. Transformers
8	Gas Flare	Back Up to control gas pressure in digesters when CHP units shut down for maintenance
9	Dried Sludge Silo	Not in use and being decommissioned
10	Wastewater Treatment Plant	Not in use and being decommissioned
11	Above Ground Diesel Tanks	1 No. 2,600 litre 1 No. 500 litre
12	Water Storage Tanks	Firewater Storage Tank (475m ³), Diesel Storage Tanks (2,500 L and 500 L), Storm Water Retention Tank (120m ³).
13	Electrical Substation	Controlled by utility company and not accessible by Eras Eco.
14	Open Yards	12,000m ²



PROPOSED SITE SERVICES PLAN



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 Model Farm Road, Cork, Ireland.
 Tel. (021) 4345366
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CLIENT

Eras Eco

DRAWING No.
 15-193-02

TITLE

Site Services

REV.
 B

This drawing is the property of O'Callaghan Moran & Associates and shall not be used, reproduced or disclosed to anyone without the prior written permission of O'Callaghan Moran & Associates and shall be returned upon request.

2.2 Surface Water Drainage

The open yards are paved with concrete and surrounded by a kerb. There is a concrete block wall along part of the eastern boundary. Rainwater run-off from roofs and paved areas is collected in the surface water drainage system that connects to two silt/oil interceptors (Class 1) and a storm water retention tank. The outlet valve from the tank is normally closed and only opened to release water to the estuary after an inspection confirms that water quality is satisfactory.

2.3 Wastewater

The only wastewater generated at the installation is sanitary wastewater from the offices which is treated in a proprietary treatment system (Puraflo ©) adjacent to the northern site boundary, before being discharged to the Irish Water foul sewer that outfalls to the municipal wastewater treatment plant in Youghal.

2.4 Waste Processes

The waste activities authorised by the licence are:

- Sludge Drying
- Processing of non-hazardous mixed dry recyclables (MDR).
- Anaerobic Digestion (AD)

Eras Eco has not accepted MDR since 2013 and there are no short to medium term plans to restart this activity. In July 2018 Eras Eco stopped accepting and drying sludges and does not intend to resume this activity. The operation of the AD Plant is the only waste activity that is and will continue to be ongoing.

2.4.1 Sludge Drying

Sludge drying was carried out in Building 2 using a rotary drier heated by steam produced from an on-site boiler fuelled by biomass (wood chip). Condensate from the drier was treated in the on-site wastewater treatment plant (WWTP), with the treated effluent discharged to the estuary.

The WWTP was designed to treat condensate from the sludge drier, landfill leachate and wash water from the wheel wash. It comprises a balance tank with an air diffuser, a dissolved air floatation tank, carbon and sand filters, lamella settlement unit, hypochlorite treatment and a sludge storage tank.

Sludge drying stopped in 2018 and it is not intended to restart. At the time of the OCM inspection, the sludge drying plant (reception and mixing bins and rotary drier) and associated WWTP were being decommissioned. It is understood that the sludge reception and mixing bins and the rotary drier will be removed from the site, but that the biomass fired boiler and decommissioned WWTP will be retained.

2.4.2 AD

The Anaerobic Digestion plant comprises four liquid storage tanks, a feed hopper and conveyor, two pasteuriser tanks and a quarantine tank located in Building 1, and two digester tanks and a digestate storage tank located in the south of the site. The digesters are enclosed, heated to 37°C and continuously agitated and fed with organic sludge and solid waste from the food and beverage industry.

This process produces a biogas and a digestate. The biogas contains approximately 65% methane, which is currently treated (scrubbed) and used as a fuel in two on-site combined heat and power units. It is envisaged that in the future the gas will be exported to the national grid. Where the feed stock includes animal by-products, the digestate is pasteurised to facilitate its use as a fertiliser. The temperature in the pasteurisers is raised to the required level (71C⁰) using water heated by the CHP engines. The pasteurised digestate is stored in the quarantine tank pending the results of the confirmatory testing.

2.5 Inventory of Raw Materials & Wastes

2.5.1 Raw Materials

Flammable materials handled on site include diesel oil, virgin and waste oils, lubricant and hydraulic oils. There are two above ground double skinned plastic diesel storage tanks, one 2,600 litre tank located at the eastern edge Building 1 and the second at the western side of Building 2.

Small quantities of hydraulic and engine oil were stored in spill tray inside Building 2. Waste oils generated during plant maintenance are collected in drums and stored on spill pallets. Gas cylinders used in equipment repair are stored upright and in a secured location inside Building 1.

The wet scrubber on the odour control system uses sulphuric acid, sodium hydroxide, ferric solution and hypochlorite and these are stored in Intermediate Bulk Containers (IBC) on spill pallets adjacent to the scrubber. The types and volumes of flammable and hazardous materials on site at any one time is contained in Table 2.2. The Table includes the relevant Hazard Statements for danger to aquatic life and the thresholds specified in the EPA FRA.

Table 2.2 – Hazardous Materials

Products	Quantity Stored litres	Hazard Statement	Storage Threshold Tonnes
Diesel Oil	3,500	H411	10
Engine/Hydraulic Oil	2,000	H413	1,000
Sulphuric Acid	1,000		
Sodium Hydroxide	1,000	H402	100
Hypochlorite	2,000	H400	1
Ferric Solution	4,000	H401	10

2.5.2 Wastes

The majority of the wastes accepted are either solid, semi-solid or liquid organic wastes that are not combustible. Combustible waste includes off specification palm oil and food ingredients e.g. milk powders. The palm oils are delivered in IBCs and food ingredients are typically delivered in 50kg bags on pallets.

The wastes are stored in designated areas inside Building 1, as shown on the storage plan. The bays are delineated by concrete blocks. The maximum amount of waste on-site at any one time is 6,820 tonnes, comprising approximately 6,530 tonnes of liquid and semi-solid organic wastes and 290 tonnes of other materials and waste as shown in Table 2.3.

Table 2.3 Quantity of Wastes On-Site

Waste Types-	Tonnes	Location
Organic Material (Input)	6,530	Building 1
Waste Oil	4	Building 1
Butter Oil/Palm Oil/ Sunflower Oil	20	Building 1
Packaging Waste (plastic, paper)	16	Building 1
Milk Powder	250	Building 1
Total	6,820	

The maximum storage time for any particular waste type before it is fed into the digesters is 16 weeks.

2.6 Environmental Receptors

2.6.1 Surrounding Land Use

The installation is approximately 2km from Youghal, adjacent to the former Youghal Landfill. The site and the surrounding area are situated on low lying land reclaimed from the Blackwater Estuary which is known locally as Youghal Mudlands. The northern and western boundaries of the site are defined by a public access road and an adjacent development respectively. The lands to the south and west are undeveloped.

2.6.2 Hydrology

The site is located on reclaimed land to the west of the estuary of the Blackwater River. The Tourig River enters the Blackwater to the north of the site. A drainage ditch, which runs adjacent to the access road to the north-west of the site, receives run-off from the access road and from reclaimed land to the north-west. There are a number of other drains to the east and south-east of the site, all of which enter the estuary.

2.6.3 Geology & Hydrogeology.

The soils comprise up to 3m of made ground, comprising gravelly clay soils with fragments of plastic (4-5%), wood (1%), glass (2%) and ceramics (2-3%). It is underlain by a stiff gravelly clay that is more than 14m thick. The bedrock underlying the site is Waulsortian Limestone, which consists of massive, unbedded mounds of calcareous deposits in the form of mudstones, wackestones and packstones.

The Geological Survey of Ireland (GSI) has classified the bedrock that underlies the site as a Locally Important Karstified Aquifer. A search of the GSI well database identified one well used for water supply located approximately 5km west of the site (i.e. up-gradient) and has a reported yield of 979m³/d.

The aquifer vulnerability rating shown on the GSI Vulnerability Map is "High"; however, a site investigation completed in 2007 encountered up to 14m of gravelly clays beneath the site, giving a site specific vulnerability rating of Moderate. The groundwater flow direction is to the south-east towards the estuary at low tide, but the direction could vary during high tide.

2.6.4 Designated Sites

The Blackwater River and estuary is designated a Special Protected Area (SPA), a Special Area of Conservation (SAC) and a proposed Natural Heritage Area (pNHA). The installation is located outside the designated areas; however, surface water run-off from the installation discharges to the estuary.

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3. NEED FOR RETENTION CAPACITY

3.1 Significance of Fire Event (S)

The significance of a fire event depends on the fire load and the detection and mitigation measures in place. There are three rankings, as shown on Table 2.1, which are based on the types and quantities of flammable and combustible materials in the area, as well as information regarding fire detection and protection measures in place.

Table 2.1 Evaluation of the Significance of a Fire Event

Significance (S)	Description
S1	Low Significance
S2	Medium Significance
S3	High Significance

Given the proximity to the Blackwater Estuary SAC and that surface water run-off from the site discharges to the estuary the significance of a fire event is considered to be High.

3.2 Environmental Hazard Potential (H)

The Environmental Hazard Potential (H) is influenced by the

- Properties of hazardous substances stored,
- Quantity of hazardous substances stored.

Table 2.2: Evaluation of Hazard Potential (H)

Hazard (H)	Description
H1	Low Hazard Potential
H2	Medium Hazard Potential
H3	High Hazard Potential

As the quantity of hypochlorite stored on site is > 1 tonne, the Hazard Potential is High.

3.3 Overall Firewater Run-off Risk (R)

The firewater run-off risk is R1 and therefore firewater retention capacity is required.

4. RETENTION CAPACITY CALCULATION

4.1 Firewater Retention Requirements

One discrete area for assessment was identified based on the building separation distances compartmentalisation, the type and quantities of wastes stored at any one time, the risk of ignition and drainage systems. This was Building 1. Given the separation distance between the buildings (>20m) it was considered that a fire in one building would not spread to the others.

4.2 Calculation Methods

The FRA includes three methods for the calculation of firewater retention capacity. As the design and construction of the waste processing buildings is similar to a warehouse, Method 1 is the one relevant to the site.

4.3 Other Considerations

4.3.1 Local Fire Service Resources

The Fire Service has visited the site and conducted an on-site exercise. Eras Eco has provided them with a Fire Pack that shows the locations of the fire hydrants and includes details of the hazardous substances stored on site.

4.3.2 Rainwater Contribution

The 1 in 10 year 24-hour rainfall event data has been used to determine the rainfall that could coincide with a fire event. Although it is unlikely that a 63.3mm storm event will occur at the same time as a fire and that all of the rainwater from the roofs of the buildings would enter the building, making provision for this provides a significant contingency capacity.

4.4 Volumes of Firewater

The FRA calculation sheets for Building 1 is in Appendix 1. It has been assumed that at the time of the fire there will be 6,820 tonnes of waste. Of these 24 tonnes will be flammable and 16 tonnes will be combustible, with the remainder non-combustible liquids and semi-solids. The retention requirement for Building 1 is in Table 3.1, which includes for a 1 in 10 rain event that occurred at the same time as the fire.

Assessment Area	Firewater (m ³)	Rainwater (m ³)	Total (m ³)
Building 1	468	877.34	1,345.34

4.5 Retention Capacity

4.5.1 Conclusions

The floor of the Building slopes away from the door toward the central drain that connects to the feed hopper. This will provide retention capacity, but in the absence of information of the floor levels across the building it is not possible to estimate the volume.

The feed hopper is 130m³ and will provide retention capacity; however for the purpose of this assessment it is assumed that only 50% of the capacity will be available at the time of a fire event. The access chamber to the hopper provides 180m³ retention capacity.

Firewater run-off escaping the building would enter the storm water drainage system that connects to the attenuation tank (120m³). The outlet valve is closed and only opened to release the water to the estuary after an inspection has confirmed the water quality is suitable. For the purposes of this assessment it is assumed that, at the time of a fire, only 50% of the retention capacity is available.

Once the water level in the attenuation has topped the inlet pipe that water will back up in the drains and overflow the yard gullies and flow across the yard. There is a perimeter kerb that extends around the entire site, with the exception of the two entrances. The kerbs have the potential to provide a significant retention capacity within the site.

The available confirmed retention capacity is 305m³ (50% of feed hopper; 50% of attenuation tank and the access chamber to the hopper). This is less than the estimated 1,345m³ of firewater/rainwater that could be generated in the event of a fire. There is the potential for significant additional retention capacity inside the building and in the yard, but in the absence of level information it is not possible to estimate the volumes.

4.5.2 Recommendations

It is recommended that a survey be carried out to determine the floor levels in Building 1, the levels across the site and at the site entrances and the level of the top of the perimeter kerb. The condition of the kerb should also be assessed.

The level data should be used to calculate the retention capacity inside the building and in the yard. If the existing capacity is less than the estimated firewater volumes, then additional measures may be required, for example the provision of ramps at the building doorways and at the site entrances.

APPENDIX 1

FRA Calculation Sheets

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FIRE WATER RETENTION RISK ASSESSMENT



Organisation Name		
Licence Number		
Completed By	Name	
	Position	
	Email	
	Direct Tel.	
	Date:	

This Fire Water Retention Risk Assessment Spreadsheet is to be used in conjunction with the [Guidance Document on Risk Assessment \(XXXXX\)](#). The purpose of this workbook is to determine, at a conservative level, whether firewater retention is required for the facility, and if so the required retention capacity.

SHEET DESCRIPTION	INSTRUCTIONS	COMMENT
Significance of Fire Event	Please enter the fire protection measures that are available in each area of the site and the quantity of flammable and combustible material storage within these areas.	Input Required
Hazard Potential	Please enter the quantities of hazardous substances stored within each "assessment area" of the site. If the site is a licensed waste disposal facility please select "Hazardous" or "Non-Hazardous" or "N/A" if this does not apply.	Input Required
Fire Water Run-Off Risk	This tab will outline the Overall Fire Water Run-Off Risk of each area based on the Significance of a Fire event and the Hazard Potential in each "assessment area". The conclusion as to whether or not the site requires fire water retention is stated here.	Risk Assessment Result
Method 1: Warehouse Retention Calculation	A calculation of the fire water retention required for a warehouse area storage is outlined here. The method is based on the Swiss Federation Firewater Retention Practical Guide.	Input Required
Method 2: Tank Farm / Process Plant Retention Calculation	For other areas, e.g. tank farm, process room, etc. a detailed assessment should be carried out to determine firewater retention volume required. This involves acquiring information on expected fire duration, sprinkler flow rates, etc. See Section 4.3 of the Guidance Report.	Input of Calculation and Support Data
Method 3: General Retention Calculation	A generic calculation can also be used based on first principles of fire water retention. This is a conservative approach to retention volume calculation.	Input Required

Significance of Fire Event

Sample Assessment Area

Number	Fire Protection Measures in this Area	Response		
1. Fire Prevention Measures				
1.1	Fire Detection and Alarm Systems (FDAS). IS 3218:2013	Yes		
1.2	Automatic Fire Protection	N/A		
2. Materials Stored				
		Tonnes	Substance Name(s)	
	H224 (extremely flammable)	0		Tonnes
	H225 (highly flammable)	0		Tonnes
	H226 (flammable) ¹	24	Diesel/Engine Oil and Palm/Butter Oil	Tonnes
2.1	Flammable Liquids Storage	24		Tonnes
	H220 (extremely flammable)	0		Tonnes
	H221 (flammable)	0		Tonnes
2.2	Flammable Gas Storage	0		Tonnes
	H228 (flammable)	0		Tonnes
2.3	Flammable Solids Storage	0		Tonnes
	H227 Combustible Liquids	0		Tonnes
	Waste	0		Tonnes
	Packaging (including pallets)	16		Tonnes
	Plastic (if not in packaging above)	0		Tonnes
	Oils/fuels (not classified as flammable)	0		Tonnes
	Process materials (not classified as flammable)	0		Tonnes
	Any other combustible material	250		Tonnes
2.4	Combustible Materials Storage	266		Tonnes
	Percent of S1 Storage	1367%		
	Percent of S2 Storage	181%		
	Percent of S3 Storage	181%		

S3 - High Significance

Fire Significance

Likelihood	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Scoring Details

Flammable Material Threshold (see Information Tab for Threshold details)	Fire Protection	Significance
None	N/A	S 1
Lower	FDAS	S 1
Lower	None	S 2
Middle	FDAS Sprinklers	S 1
Middle	FDAS	S 2
Middle	None	S 3
Upper	Any	S 3

Note 1 H226 Flammable Liquids have a large flash point range. Higher flash point flammables (e.g. Diesel - Flash Point 55-56°C) can be considered as combustible for the purpose of this exercise if the material under normal environmental or workplace operational conditions will always be handled at temperatures at least 15°C below their flashpoint and in consequence will not produce a flammable atmosphere. See *HSG140 - Safe Use and Handling of Flammable Liquids*, UK HSE 2015, for more information. Ambient external temperature in Ireland does not generally exceed 30°C. See Appendix A of Guidance Report for more information.

FURTHER INFORMATION

Flammable Substance Thresholds (Tonnes)				
Threshold	Flammable Liquid	Flammable Solids	Flammable Gas	Combustibles
Upper	≥50	≥10	≥5	≥200
Middle	≥5 - <50	≥0.5 - <10	≥0.1 - <5	≥30 - <200
Lower	≥0.1 - <5	≥0.05 - <0.5	≥0.01 - <0.1	≥2 - <30
None/ Negligible	<0.1	<0.05	<0.01	<2

Hazard Potential



Sample Assessment Area

Number	Material Stored in this Area	Response	Hazard Category
1. Hazardous Material Storage on Site⁴			
1.1	H400/H410 Environmentally Hazardous Material (GHS Classification) (tonnes)	2	
1.2	H401/411 Environmentally Hazardous Material (GHS Classification) (tonnes)	4	
1.3	H402/412 Environmentally Hazardous Material (GHS Classification) (tonnes)	1	
1.4	H413 Environmentally Hazardous Material (GHS Classification) (tonnes)	0	
Total H400 Equivalent Material		2.41	H2
<p>Note on WGK Classification: Use either H statement or WGK classification of a material. Start with H statement if available, if not available use WGK classification instead. DO NOT ENTER THE SAME MATERIAL UNDER BOTH CLASSIFICATIONS See Appendix A of the Guidance Document for further instruction</p>			
1.5	WGK3 Water Hazardous Material (German Classification) (tonnes)	0	
1.6	WGK2 Water Hazardous Material (German Classification) (tonnes)	0	
1.7	WGK1 Water Hazardous Material (German Classification - See information tab) (tonnes)	0	
Total WGK3 Equivalent Material		0	H1
1.8	Material not listed as hazardous but with a significant BOD (BOD loading in kg) See Appendix A of the Guidance Document for further instruction.	0	
1.9	Special Ingredients for Plant Protection - Biocides including pesticides and fertilisers (kg) See Appendix A of the Guidance Document for further instruction.	0	H1
Percent of H2 Threshold		241%	H2
Percent of H3 Threshold		24%	N/A

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1.1	Laboratories which contain Genetically Modified Micro-Organisms (GMOs) According to Directive 2009/41/EC (Groups 3 & 4) See Appendix A of the Guidance Document for further instruction.	No	H1
1.11	Licensed Waste Facility	Yes - Hazardous	H3

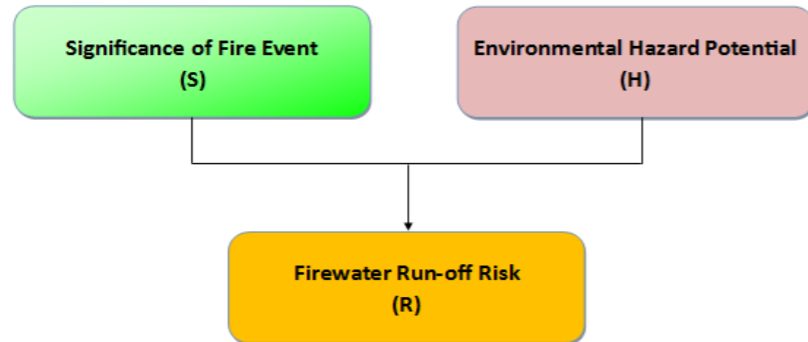
Hazard Potential **H3 - High Hazard Potential**

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Overall Fire Water Run-Off Risk



Sample Assessment Area



Sheet Reference	Score
Significance of Fire Event	S3 - High Significance
Hazard Potential	H3 - High Hazard Potential

	H1	H2	H3
S1	R0	R0	R1
S2	R0	R0	R1
S3	R0	R1	R1

Score	
Fire Water Run-Off Risk	R1 - Risk of Environmental Contamination

Risk	Minimum Firewater Retention Measures Required
R0 No Risk	No dedicated firewater retention required.
R1 Risk of Environmental Contamination	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 waste water 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.

Conclusion	
Fire Water Retention Required on Site?	Yes

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Fire Water Retention Calculation



Warehouse Area

Number	Calculation Steps	Response	Comment
1.1	Size of Storage Area (m ²)	2140	2100 Input Required
1.2	Flammable Material (tonnes)	24	From Significance tab
1.3	Combustible Material (tonnes)	266	From Significance tab
1.5	Aerosol materials, not already classified as flammable - H222, H223 (tonnes)	0	Input Required
1.6	Oxidising Material not already classified - H270, H271 (tonnes)	0	Input Required
1.7	Oxidising Material not already classified - H272 (tonnes)	0	Input Required
1.4	Non Combustible Material (tonnes) (see note 1)	6530	Input Required
1.8	Total F1/F2 Materials	24	
1.9	Total F3/F4 Materials	266	
1.1	Total Storage in this Area (tonnes)	6820	1
1.11	Fire Hazard Category	F1/F2	1
1.12	Storage Density (kg/m ³)	3186.92	
1.13	Storage Density Factor	1.2	
1.14	Type of Storage	Non-racked Storage	1 Input Required
	Preliminary Fire Water Retention Required m ³ (without storage density factor)		4 390
	Sprinklers	N/A	0 390
	Note on Preliminary Result		Fire Compartment Size too large
	Total Storage Quantity (kg)	6820	
	Fire Hazard Category	F1/F2	
	Warehouse Area (m ²)	2140	
	Sprinklers?	N/A	
	Storage Type	Non-racked Storage	
	Retention Volume Required m ³ (with density factor)	468	
1.10	Area of Site which shares common drainage with Area (m ²)	13860	Input Required
1.11	I in 10 year 24hour rainfall event for local area (m)	0.0633	Input Required
1.12	Rain Water (m ³)	877.34	
	Fire Water Retention Required (m ³)	1345.34	

Note 1
 Examples of non-combustible materials include HCl, NaOH, glass container storage etc. Any non-combustible materials stored in this "assessment area" should be reviewed against their relevant Material Safety Data Sheets and confirmed as non-combustible before being included in the calculation above.