



## FIRE PREVENTION PLAN

### Biomass UK No.4 Ltd Plymouth EfW Facility

**Prepared By:**  
Sol Environment Ltd

**Date:**  
September 2023

**Project Ref:**  
SOL\_21\_P024\_COG

VERSION CONTROL RECORD			
Contract/Proposal Number:		SOL_21_P024_COG	
Authors Name:		Adam Stone	
Issue	Description of Status	Date	Reviewer Initials
1	First Submission to the Environment Agency	18 <sup>th</sup> September 2023	SB

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# 1 INTRODUCTION

## 1.1 Introduction

This document has been prepared by Sol Environment Ltd on the behalf of Biomass UK No.4 Ltd (the 'Operator') for the proposed operation of an energy from waste facility at their site at Units 21-29, Belliver Way, Roborough, Plymouth, Devon, PL6 7BW.

The document provides a structured framework and approach in effectively preventing potential fires associated with the operation of the facility.

This Fire Prevention Plan document (referred hereafter as the 'FPP') has been produced in accordance with the updated Environment Agency's Fire Prevention Plan Guidance (published 29<sup>th</sup> July 2016, updated 4<sup>th</sup> May 2018, and 11<sup>th</sup> January 2021).

This Fire Prevention Plan meets the fundamental objective of the FPP Guidance as it demonstrates that the site can:

- Minimise the likelihood of a fire happening;
- Aim for fire to be extinguished within 4 hours; and
- Minimise the spread of fire within the site and to neighbouring sites.

## 1.2 Structure of the Fire Prevention Plan

This FPP has been structured in accordance with the EA Fire Prevention Plan Guidance and considers the following relevant aspects of the facility:

- Managing Common Causes of Fire;
- Preventing Self Combustion;
- Managing RDF Piles;
- Preventing Fire Spreading;
- Quarantine Area;
- Detecting Fires;
- Suppressing Fires;
- Firefighting Techniques;
- Water Supplies;
- Managing Fire Water; and
- During and after an Incident.

## 1.3 Status of the Fire Prevention Plan

The FPP is a "live" document and will form part of the key environmental management documentation for the facility. All monitoring procedures, responsibilities and compliance actions will be updated as and when required.

## 1.4 Testing and Staff Training

The operator will carry out regular exercises, at least quarterly, to test how well the fire prevention plan works. During plant commissioning, the operator will define how often it will carry out these exercises and what the training will consist of.

The exercises will include but not be limited to:

- What staff need to do to prevent a fire occurring;
- What to do during a fire if one breaks out; and
- Anything site specific considered to be required.

Plan testing procedures and staff training details will be provided when the site upgrade works have been finalised and completed.

## 2 SITE BACKGROUND

### 2.1 Site Background

Biomass UK No.4 Ltd (the 'Operator') intend to operate an energy from waste facility at their site at Units 21-29, Belliver Way, Roborough, Plymouth, Devon, PL6 7BW. The facility will be regulated in accordance with the requirements of the Environmental Permitting Regulations, under the conditions of an Environmental Permit.

The 2.13 acre (0.86 hectare) site is in Belliver Way, Roborough, around five miles north of Plymouth. It comprises a 3,700 m<sup>2</sup> industrial/warehouse unit, completed in 2011 and extended in 2017, which houses the facility and office accommodation.

The location of the subject Site is shown on Annex A1, centred at approximate National Grid Reference: SX 49890 62378. The site layout is shown in Annex A2.

The site has been both previously operated and permitted by the previous plant owners and operators under environmental permit number EPR/XP3134AW, using waste wood as a feedstock for gasification. The site was closed in 2018 and permit duly surrendered by the Environment Agency (EA).

Biomass No.4 intends to upgrade the existing facility and make changes to the combustion technology and boiler to enable the plant to operate reliably on a wider range of fuels to include refuse derived fuels (RDF), Solid Recovered Fuels (SRF) as well as mixed (PAS111:2012 Grade A – C) non-hazardous waste wood feedstocks.

The Facility comprises a single-line incineration process, including a single thermal oil boiler serving an ORC turbine. The turbine is designed to generate a gross electrical output of 4.64 MWe of electricity. The plant has a corresponding parasitic load of approximately 0.75 MWe resulting in a net electrical export of approximately 3.9 MWe.

The Facility will have the capacity to export up to approximately 10 MWth of heat, subject to configuration and available offtake partners.

The Installation has been designed to process an approximate annual throughput of 50,000 tonnes of waste feedstock per annum, with a maximum potential of 60,000 tonnes per annum assuming the lowest acceptable NCV.

### 2.2 Site Setting

The surrounding area is a mix of residential to the south and east (Roborough) and woodland to the north and west with farmland beyond. The Business Park houses a number of industrial neighbours including Toshiba Carrier (UK), Burts Potato Chips, Devon and Cornwall Food Action, and BD Vacutainer Systems.

The site is immediately bound to the south by Belliver Way, to the east and west by industrial units and to the north by Haxter Close with steeply sloping topography down into the wooded valley of Tamerton Foliot Stream which is located approximately 110 m distant.

The nearest residential areas to the site are on Lady Fern Road in Roborough which lies approximately 100 m southeast of the site.

Table 2.1 below provides further information in relation to the site setting.

Table 2.1: Site Setting	
Direction	Observations
North	Immediate Vicinity: Haxter Close, Pipex Yard Within 500m: Woodland, Tamerton Foliot Stream, Agricultural Fields Beyond 500m: Roborough Farm, Commercial Units, Agricultural Land, Woodland
North East	Immediate Vicinity: Industrial Unit. Within 500m: Haxter Close, Pipex, Agricultural Fields Beyond 500m: Devonport Leat, Nursing Home (Roborough House), Woodland, Sewage Treatment Works
East	Immediate Vicinity: Industrial Unit. Within 500m: Belliver Way, Residential Housing, A386. Beyond 500m: Agricultural Fields
South East	Immediate Vicinity: Belliver Way Within 500m: Industrial Unit, Residential Area, A386. Beyond 500m: Residential Areas of Roborough and Woolwell,
South	Immediate Vicinity: Belliver Way Within 500m: Industrial Unit, Wooded Valley, Stream Beyond 500m: Residential Areas of Belliver and Southway
South West	Immediate Vicinity: Belliver Way. Within 500m: Industrial Unit, Wooded Valley, Stream Beyond 500m: Residential Area of Southway, Oakwood Primary School, Widewell Primary Academy
West	Immediate Vicinity: Industrial Unit Within 500m: Industrial Units of Belliver Business Park, Steeply Wooded Valley, Stream Beyond 500m: Agricultural Fields and Farmland
North West	Immediate Vicinity: Haxter Close. Within 500m: Steeply Wooded Valley, Stream, Industrial Units Beyond 500m: Agricultural Fields and Farmland

The facility has been designed to prevent and mitigate the offsite impacts associated with fire as far as practically possible.

The wind direction is pre-dominantly from the south west.

A sensitive receptor plan is included in the Annex A1, showing sensitive receptors within a 1km radius of the site that could be affected by a fire.

### 3 FIRE PREVENTION PLAN

This Fire Prevention Plan has been developed to include an assessment of fire risk on site and the measures in place to prevent, detect, suppress, mitigate, and contain fires.

This plan forms part of Biomass No.4’s management system and sets out the fire prevention measures and procedures that will be put in place and used on site.

All staff and contractors working on site will understand the contents of the Fire Prevention Plan and the Incident and Emergency Management Plan and what they must do during a fire.

The Fire Prevention Plan will be kept in the Site Office and all staff will be aware of where it is kept.

#### 3.1 Control of Potential Causes of Fire

The following table identifies common causes of fire and the measures that Biomass No.4 take to reduce the risk of a fire taking place:

Table 3.1 Control of Potential Causes of Fire		
Source of Fire	Applicability to Site and Proposed Management Controls	Residual Risk
Arson	<p>Security measures will limit access to site, reducing the risk of arson. The site is staffed 24 hours a day, seven days a week due to the nature of the operation. The site has CCTV system, which will be monitored in the control room.</p> <p>The site is surrounded by palisade fencing. The main pedestrian and vehicle gate will be kept closed and locked, with access given only to authorised vehicles / pedestrians.</p>	<b>VERY LOW</b>
Plant and Equipment	<p>The site will have a regular inspection and maintenance programme which identifies any electrical or mechanical machinery faults which could result in a machinery fire.</p> <p>Mobile plant when not in use will always be parked in dedicated mobile plant storage areas. These will be located in segregated areas away from RDF storage which limits the potential for fire spread from machinery to material.</p> <p>All mobile plant is visually inspected daily as per daily check sheets.</p> <p>Machinery and mobile plant will be regularly cleaned to remove any dust, waste, etc to ensure that this does not accumulate.</p> <p>All relevant machinery and mobile plant for use in the Fuel Reception Hall has the necessary fire suppression systems fitted.</p> <p>All mobile plant is equipped with manual fire extinguishers.</p> <p>All conveyors mobile and plant machinery will be maintained to manufacturers/suppliers’ recommendations.</p>	<b>VERY LOW</b>



	<p>All the existing equipment within the plant has been assessed and certified under the appropriate DSEAR Regulations including undertaking HAZID HAZOP HAC to ensure that it is suitable and safe with regard to operations.</p> <p>HAZOP will be revisited &amp; reviewed when detail of upgraded plant plan is finalised.</p> <p>There is fire detection and suppression fitted throughout the building. This is under review for upgrade to meet current standards and regulations.</p> <p>There is dust suppression fitted within the reception hall. This is under review for upgrade to meet current standards and regulations.</p>	
<p>Electrical Faults Including Damaged or Exposed Electrical Cables</p>	<p>The risk of damaged or exposed electrical cables is controlled via the regular inspection and maintenance programme.</p> <p>The electrical installation is by competent electricians and appropriate certificated personnel will be the only ones allowed to undertake electrical work on the plant. Work will be undertaken in accordance with the site electrical works procedures.</p> <p>There is a specialist DSEAR/ATEX zone around the combustion plant and associated auxiliary burner trains meaning only appropriate certified personnel are allowed to undertake electrical work in these areas.</p> <p><i>Electrics certification</i> Prior to the facility becoming operational, the electricians will be fully certified by a suitably qualified person.</p> <p><i>Electrical equipment maintenance arrangements</i> All electrical equipment will be checked annually and certified by suitably qualified electrical personnel.</p>	<p><b>VERY LOW</b></p>
<p>Discarded Smoking Materials</p>	<p>Staff and visitors are only permitted to smoke within the designated external area away from operational areas.</p> <p>There is no smoking permitted within the operational area where RDF is stored or handled.</p>	<p><b>VERY LOW</b></p>
<p>Hot Works</p>	<p>No hot works will be carried out on site without the work being managed via the Hot Work Procedure. Hot works will be undertaken under a permit to work system. Hot work will only be undertaken by staff who are trained and have the relevant permit to work.</p> <p>The hot works will be located at a safe distance from combustible materials. The activity will be very closely managed and with the presence of a fire guards.</p>	<p><b>VERY LOW</b></p>

	<p>If hot works is carried out on site, a fire watch will be carried out for at least 30 minutes after the hot works finishes which is in line with HSE Guidance, and at the end of the working day.</p>	
Industrial Heaters	<p>There are two temporary 415v 15kw portable electric heaters used for frost protection if required during plant shutdown in the winter months.</p> <p>The use of industrial heaters on site will be managed by site operational procedures and be maintained according to the maintenance programme.</p>	<b>VERY LOW</b>
Hot Exhausts	<p>The site has a regular inspection and maintenance programme which identifies any signs of a fire caused by dust settling on any hot exhausts and engine parts. This is carried via visual checks throughout the day as well as at the end of the working day.</p> <p>All inspections are carried out as per the sites mobile plant Check Sheets.</p> <p>Machinery is regularly cleaned to remove any dust, waste, etc to ensure that this does not accumulate on moving parts.</p> <p>The equipment used on site has been reviewed through the DSEAR/HAZID HAZOP and the HAC process and the necessary remedial procedures and actions documented.</p> <p>Fuel preparation will occur offsite to help reduce risk. The residual heat and spark prevention main risk is through maintenance, and this is controlled through the use of a hot work permit system and good housekeeping.</p> <p>Vehicles and mobile plant will be turned off when not in use.</p> <p><i>Fire watch procedures</i></p> <p>A fire watch (visual checks) will be carried out at regular intervals (hourly, unless more frequently checks are required by the maintenance works being undertaken that day) during the operating hours to detect signs of a fire caused by dust settling on hot exhausts and engine parts. A further fire watch will be undertaken at the end of the working day.</p> <p>In addition, the site is staffed 24/7. The site is monitored by CCTV and there is automatic fire detection and fire suppression throughout the building.</p>	<b>VERY LOW</b>
Ignition Sources	<p>There is no smoking allowed on site except in designated areas.</p> <p>Other activities such as welding and grinding are undertaken to the requirements of a risk assessment and a hot work permit.</p> <p>There are 2 portable 415v 15kw electric heaters that may be used for frost protection during the winter when the plant is offline.</p>	<b>N/A</b>

	<p>There is an introductory safety briefing for staff for visitors and contractors to remind them of fire safety and evacuation procedures when they come on site.</p> <p>All naked flames, space heaters, furnaces, incinerators, and other sources of ignition will be kept 6m away from combustible and flammable waste.</p> <p>Any ignition sources on site will be kept at least 6 metres away from the stored RDF on site.</p>	
Batteries	<p>The facility will store and use the following types of batteries:</p> <ul style="list-style-type: none"> <li>• 30 x 110V 15A VRLA (Sealed Lead Batteries) – Turbine emergency lube oil pump</li> <li>• 2 x Batteries – Diesel fire pump starter batteries</li> <li>• 2 x Batteries – Back-up standby generator</li> </ul> <p>New batteries will be stored in the Turbine MCB room. Old batteries will be stored in the Turbine MCB room until disposal by current guidelines.</p>	<b>VERY LOW</b>
Leaks and Spillages of Oil and Fuels	<p>The prevention of fuels and oil leaking out from vehicles will be achieved by a regular inspection and maintenance programme. If there are any leaks, the regular inspections allow this to be dealt with straight away. Delivery vehicles are required to be in a safe and good state of repair. Any vehicles suspected of being in a poor state will be rejected from site.</p> <p>Minor spillages will be cleaned up immediately, using sand or proprietary absorbents. The spill clean-up materials will be placed into containers for disposal at a suitably permitted facility.</p> <p>Spill kits will be provided throughout the site. All staff will be trained on how to use the spill kit as well as the procedures to carry out in the event of a spillage.</p> <p>In the event of a major spillage, immediate action will be taken to contain the spillage and prevent liquid from entering surface water or drains. Contaminated water and any materials used for clean-up will be cleared immediately and placed in containers for offsite disposal. Ignition sources such as vehicles will be turned off wherever possible.</p>	<b>VERY LOW</b>
Build-up of Loose Combustible Waste and Dust	<p>The site has a regular inspection and maintenance programme which will identify any build-up of wastes and dust.</p> <p>Machinery is regularly cleaned to remove any dust, waste, etc to ensure that it does not accumulate. The site is inspected at least twice a day in accordance with the site's inspection procedure. Any build up of waste and dust would be identified during the inspection.</p> <p>If any dust, waste, etc was identified then the area would be immediately cleaned (swept, dampened down, etc).</p>	<b>VERY LOW</b>

	All mobile plant Check Sheets and site walkovers will be logged and retained.	
Reactions Between Wastes	<p>All waste will be accepted on site in accordance with the sites Waste Acceptance Procedures and Waste Specification. This ensures that no incompatible or unstable waste will be accepted on site.</p> <p>In the unlikely event of incompatible or unacceptable waste being accepted on site, it will be transferred to the quarantine area before removed off site.</p>	<b>VERY LOW</b>
Hot Loads	<p>All waste received on site will be subject to the waste acceptance protocol. This will ensure that only the correct, permitted types of wastes are accepted. Thus, acceptance of incompatible wastes that may cause reactions will be eliminated as far as possible.</p> <p>Any hot wastes that are identified following the waste being deposited in the reception hall will be quarantined until it can be removed from site. Reception hall staff will be trained to look out for potential causes of ignition including:</p> <ul style="list-style-type: none"> <li>• signs of heating, for example, steam or smoke</li> <li>• batteries, in particular lithium-ion batteries</li> <li>• oils or other contaminants</li> <li>• rags soaked in oils or chemicals.</li> </ul>	<b>N/A</b>
Hot and Dry Weather	<p>All waste received on site will be stored in the enclosed reception hall, and thus will be shaded from direct sunlight.</p> <p>Frequent temperature monitoring will identify any potential hot spots. Piles will be turned to make sure the waste remains cold, and any localised warming is dissipated quickly. Water can be added to piles if necessary to cool piles and reduce the risk of self-combustion.</p>	<b>VERY LOW</b>

Table 3.2 below provides details of other materials that are stored on site that are not covered by the Fire Prevention Plan Guidance.

Table 3.2: Material Summary		
Hazardous Substance / Material	Size	Location
Maintenance oil	100 litre tank	Main Building
Maintenance grease	25 litre tank	Main Building
Propane	2 gas cylinders	External to Main building
Oxygen	2 gas cylinders	External to Main building
Turbine lube oil	3,200 litre tank (operation) 200 litre tank (store)	Main building
Hydraulic oil	150 litre tank	Main building

Air Pollution Control Residue	2 x sealed RoRo skips	External to Main Building
CEMS Calibration Gases	Various Gas Bottles	Main Building
Diesel	5,000 litre tank	External to Main Building

### 3.2 Prevent Self-Combustion

#### 3.2.1 *Managing Storage Time*

Under typical periods the maximum amount of storage of fuel on site is 4 days. Limited weekend deliveries mean the reception area will be effectively emptied every weekend; thus, it is very unlikely fuel would be onsite longer than 7 days.

Fire prevention and insurance rules prevent fuel from being stored on site for more than one month. Even under normal shut down periods any stored material will be run down to minimise storage volumes as a part of standard operating procedure and will be removed from site if the shutdown is greater than one month.

RDF will be delivered to the Fuel Reception Hall and unloaded internally in the vehicle offloading area where it will be visually inspected upon delivery to a fuel acceptance protocol, and out of specification loads rejected.

Fuel will be continually mixed within the reception hall to ensure the feedstock into the plant is homogeneous as possible. This will ensure a continual turn-over of material. The plant will run constantly 24/7 using waste that is produced year-round thus there will be no seasonal variations to fuel storage.

Fuel from the piles transferred to one of the four bunkers for storage prior to loading into the gasification system. Waste will be extracted by means of the front loader and always in a clockwise direction around the fuel hall.

Newly delivered fuel will be deposited to the left of the extraction site thereby ensuring that the 'oldest' fuel is always being removed from the fuel hall.

The bunker loading system operates using a first in, first out priority system (FIFO).

This rapid turnover of stock significantly reduces the risk of 'older' material from self-heating and practically eliminates the potential for thermal runaway and self-combustion. This is significantly lower than the stipulated Fire Prevention Plan Guidance maximum storage time of 6 months. The risk of self heating and fires is therefore considered to be very low.

The storage capacities are continuously monitored by operational staff and the automatic storage control system.

RDF will be received, inspected, and accepted in accordance with the established site waste acceptance procedures. The procedure will dictate that all RDF is required to be compliant with the RDF supply agreement and Fuel Specification.

#### 3.2.2 *Monitor and Control Temperature*

The bunkers will be continuously monitored for temperature via the sites detection system.

The control room is staffed 24/7 ensuring that there is always a trained operative available to act in the event of an alarm.

A trained site operative will carry out a visual inspection each 12-hour shift to ensure that the RDF storage areas are being managed correctly and that all detection and suppression equipment is working.

RDF is stored internally in a dedicated system and is not subject to fluctuations in temperature caused by external weather conditions.

In the event the detection system identifies a fire within the bunker, an automated suppression system will be used to extinguish the fire.

The RDF offloading area will also be equipped with automatic fire detection and sprinkler systems.

All of the above measures meet the minimum expectations defined with the EA Fire Prevention Plan Guidance.

### *3.2.3 Waste Bale Storage*

Waste bales are not scheduled to be delivered and processed on site.

However, in an abnormal circumstance it is possible that a small quantity of bales may be received on site where they will be stored in the fuel hall in the designated fuel pile areas.

## **3.3 Manage Pile Sizes**

### *3.3.1 Storage in Largest Form*

There will be no long-term storage of RDF onsite. Storage will occur in the reception hall and fuel bunkers, in accordance with the stock rotation policy, RDF is expected to be stored for no longer than 4 days.

Thus, the RDF will only be stored in its largest form prior to loading into the combustion plant.

### *3.3.2 Maximum Pile Sizes*

Waste will initially be stored in the reception hall prior to transfer to the fuel bunkers. The reception hall has a storage capacity of 1,000t (enough for 4 days of operations).

Each of the four fuel bunkers will store 180m<sup>3</sup> (4m W x 15m L x 3m H).

Although the fuel reception hall exceeds the pile size requirements in the guidance, fuel being stored for a maximum of 4 days ensures that self-combustion is extremely unlikely. Additionally, the presence of dedicated automatic detection and suppression equipment covering the fuel storage areas ensures that in the event of a fire, the fire would be put out immediately. Any incident would be dealt with within the bunker. The resultant fire risk is low and is considered BAT for this Installation.

Please refer to the Site Layout Plan layout provided within Annex A.

### *3.3.3 Waste Stored in Containers*

Combustible waste is not stored in containers. Only non-combustible waste (bottom ash and air pollution control residues) are stored in containers. Therefore, this section does not apply.

## 3.4 Prevent Fire Spreading

### 3.4.1 Separation Distances

The four bunkers are purpose-built storage bunkers, therefore the separation distances stipulated within the FPP Guidance are not considered appropriate.

However as previously stated, the rapid 4-day turnaround of the RDF stored on site means that the risks of self-combustion and thermal runaway conditions are negligible. In the event that a fire did occur, it would be detected via the detection systems (detailed within Section 3.6 and Section 3.7 of this FPP). This would in turn trigger the suppression system resulting in any fire being extinguished.

The fuel reception contains a maximum of 4 days storage of prepared fuel, and this is the minimum quantity needed on site for operational reasons to cover planning conditions on the permitted deliveries of fuel at weekends and bank holidays.

All Mobile Plant will be parked within dedicated areas away from any combustible waste.

### 3.4.2 Fire Walls and Bays

The fuel storage bunkers are purpose-built fuel storage bunkers. The RDF will not be separated by fire walls or stored in bays.

All waste will be processed ensuring first in, first out (FIFO).

#### *Office Block*

- External partition walls
  - 1. Gyproc Shaftwall  
92mm Stud framework, core board & 2 layers of 15mm Fireline board  
Performance: 2 hours fire resistance, 6.7m max height and  $R_w = 46$  dB
  - 2. 2 layers of 12.5mm Fireline board either side of boxed 146mm metal studs with 50mm mineral wool insulation to cavity  
Performance: 2 hours fire resistance, 8m max height and  $R_w = 52$  dB
- Internal partition walls
  - 2 layers of 15mm plasterboard either side of 70mm metal studs with 50mm mineral wool insulation to cavity.  
Performance: 1.5 hours fire resistance, 4.9m max height and  $R_w = 50$  dB

#### *Fuel Hall*

- External walls
  - 300mm thick cavity wall construction comprising 100mm dense blockwork.
  - Inner leaf is BS 6073 kitemark certified. 100mm nominal cavity with integral non-ferrous wall ties and clips @ 450mm c/c vertically and 750mm c/c horizontally.
  - Outer leaf is 103mm facing brickwork matching existing.  
DPCs installed at all reveals and openings vertically and horizontally.

### 3.5 Quarantine Area

Due to the design of the bunker and the detection and suppression equipment provided throughout the bunker, a quarantine area sized in accordance with the FPP Guidance requirements (namely 50% of the largest single pile) is not considered appropriate.

All bunker incidents will be dealt with within the bunkers, resulting in there being no need for an external quarantine area on site.

Any fire would be immediately detected which in turn would trigger the suppression system resulting in the fire being extinguished. Burning RDF would never need to be removed from the bunkers and extinguished in a quarantine area.

The whole of the fuel reception hall is a bunded area fitted with automatic fire detection and suppression. In the event of a small fire and where it is safe to do so the mechanical front loader will be used to remove smouldering waste from the fuel hall to the designated external quarantine area where it will be isolated from the main fuel pile and extinguished.

The quarantine area is on concrete hard standing in the external yard area away from where the waste is stored. The size of the quarantine area is 15m x 5m and its location is shown on the site plan in Annex A1.

In the event of a fire, dependent on severity, the plant would be shut down and the fire suppression system operated. During such an emergency, no further deliveries will be accepted on site until the incident was fully under control, extinguished and all affected fuel material removed.

In the unlikely event that a hot spot is identified within the temporary storage bay and waste needs to be spread out and cooled, this will be transferred to the quarantine area located in the yard.

### 3.6 Detecting Fires

The existing detection system will be upgraded to meet current standards and regulations. Below are details of the existing system and upgrade proposal. Plans and details of the upgraded system will be provided when works completed.

#### 3.6.1 Existing System

The building will be provided with a fire alarm system consisting of:

- Site wide fire detection and alarm system;
- Actuation system linked to High pressure Watermist Fire Suppression System; and
- Gas detection and alarm system in specific areas of site.

The installed Fire Alarm and Detection system includes the following components:

- Control and Indicating Equipment;
- Fire detection devices;
- Audible and visual alarm devices;
- Manual call point devices; and



- Interface Units.

These components work together to automatically detect fire, alert any individuals in the surrounding area of the presence of fire in order to evacuate the building in a controlled manner and send interface signals to auxiliary building control systems to control plant shutdowns as per the system design cause and effect matrix.

The system has been designed according to the requirements of BS5839-1:2002 to L1 and M design category (L1 in the office areas and M in the open plant areas).

Automatic detection will vary according to risk i.e.:

- Reception Hall – flame detection
- Treatment Hall – flame detection together with Carbon Monoxide detection.
- Turbine/Boiler – flame detection
- Accommodation – smoke/heat detection
- Ancillary Rooms – smoke/heat
- External HV and Gas cubicles – smoke/heat detection

Note:- there may be some variation to this generalisation as deemed necessary.

There shall be appropriate interfaces with the fire alarm system including the fire suppression system.

Manual operated call points will be provided at each final exit and on routes of exit especially from rooms of high risk. Audio visual alarms to be provided throughout the Process Areas and Plant Rooms.

Monitored CCTV will be provided in high-risk areas to ensure immediate plant shut down if there is a delay in actuation of flame detection. It should be noted that plant will also automatically shut down in the event of fire.

The design, installation, and maintenance of all fire detection systems on site will be covered by an appropriate UKAS accredited third party certification scheme.

The automatic fire detection systems will provide 24/7 detection of all waste storage areas. This allows a fire to be detected and suppressed immediately.

### *3.6.2 Upgrade Proposal*

The existing fire detection system will be upgraded to a BS 5839 Part 1:2017 Category P1 fire alarm detection system to cover the site and give actuation signals to the new sprinkler systems proposed. The proposed upgrades are as follows:

- Reception hall
  - 1 x Triple IR Flame Detector (for feed hopper)
- Top of Combustion Plant / Boiler area
  - 4 x Base mounted Triple IR Flame Detectors c/w brackets (area detection)
  - 2 x Triple IR Flame Detectors c/w brackets (boiler front detection)

- 2 x Break glass units c/w hinge covers
- 2 x Weatherproof wall mounted open area sounder/beacons
- Interface units for new gas suppression areas
  - 6 x Gas suppression system interface units (3 per system)
- Enclosed walking floor bunker area
  - 4 x Triple IR Flame Detectors (for within the enclosed walking floor)
- General additional area protection to increase the existing detection coverage to a P1 Standard
  - 10 x Base mounted Triple IR Flame Detectors c/w brackets
  - 3 x Break glass units c/w hinge covers
  - 5 x Weatherproof wall mounted open area sounder/beacons
  - 4 x Smoke detectors
  - 1 x Heat detector
  - 3 Sounder/beacon bases
  - 2 x Standard bases
- Sprinkler interface and activation units
  - 3 x Metal enclosures c/w power supply units and batteries
  - 10 x Sprinkler valve solenoid actuation interface units
  - 10 x Flow switch monitoring interface units
  - 3 x General fault indication interface units
- Site-wide re-commissioning and testing

### 3.7 Suppressing Fires

If a fire is identified by the detection system, the suppression system will be activated and the fire extinguished.

The bunkers will be fitted with a fire suppression and detection system based around water suppression and will be developed during detailed design.

Please note that the design, installation, and maintenance of all automated suppression system equipment will be covered by an appropriate UKAS-accredited third-party certification scheme.

The existing suppression system will be upgraded to meet current standards and regulations. Below are details of the existing system and upgrade proposal. Plans and details of the upgraded system will be provided when complete.

### 3.7.1 Existing System

The facility has an automated Watermist Suppression (Deluge) System supplied by Ultramist. The solution is a pumped based system comprising of duty electric motor driven fire pump with diesel engine driven back up fire pump, water storage tank, control system, monitoring system and open head discharge nozzles. The system is designed to provide a 15-minute discharge period.

The system consists of open nozzle Deluge nozzles, supplied by fully charged trunk mains from the fire pumps. The trunk mains are pre-charged with water at 10.5 bar. The system is supplied by dedicated pumped water supplies that has been tested to ensure adequate flows and pressures are available.

The areas protected are set out below:

Table 3.3: Suppression system location and design				
Location	Type	Operation	Nozzle	Flow rate
Area 1 – Reception Hall	Total Deluge System	Flame Detection	N pipe nozzles (V type)	3278 l/min
Area 2 – Conveyor Belts to Walking Floor	Local Deluge System	Flame Detection	N pipe nozzles (I type)	571 l/min
Area 3 – Walking Floor	Total Deluge System	Heat Detection	N pipe nozzles (I type)	276 l/min
Area 4 – Gasification	Total Deluge System above conveyor / in Unit	Flame Detection / Heat Detection / Heat Probe	N pipe nozzles (I type)	903 l/min
Area 5 – Charcoal Room	Total Deluge System	Flame Detection	N pipe nozzles (V type)	468 l/min
Area 6 – Turbine	Local Deluge System	Flame Detection	N pipe nozzles (K6 type)	243 l/min

In addition, further upgrades are being made to the fire protection system as follows:

Table 3.4: Fire protection system upgrades	
Location	Upgrade Work
Area 2 – Conveyor Belts to Walking Floor	Extension of the existing Deluge suppression system to cover motor areas below conveyor belts, including extending the Detection system. Survey highlighted 6 areas that need additional coverage.
Area 3 – Walking Floor	Extension of Suppression system from high level to protect area with Deluge suppression
Area 4 – Gasification	Extension of Suppression and Detection to low level area of Conveyor and Link conveyor from Area 3
Area 7 – Switch Room	Installation of gas system
Area 8 – HV Switch Room	Installation of gas system
MCC Room	Installation of gas system
Turbine Room	Full Deluge coverage to area at high-level and low-level platform area, including low level suppression to pipework/oil lines

In the event of a fire the detection system will raise the alarm(double knock-dual signal required) and send a signal to operate the actuated valve controlling the zone where the fire is located. The actuated valve will

then open. The water will then flow through to the discharge nozzles and will result in the pressure falling within the trunk mains. The pressure switch on the above Test assembly manifold will then signal for the fire electric motor driven fire pump to start.

Should the electric driven fire pump not operate then the trunk mains pressure will continue to fall and at the diesel engine fire pump will operate.

### *3.7.2 Upgrade Proposal*

Similar to the detection systems, there are proposals to upgrade the site suppression systems as outlined below. Full plans and details of the upgraded system will be provided when works completed.

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**8. Proposed Mechanical Water Based Fire Fighting Systems**

The proposed fixed firefighting systems have been based on the aforementioned enquiry information received, in line with the following standards and documentation:

- Chubb Guidance Document - Energy from Waste (EfW) - Fire Systems
- Chubb Guidance Document - Waste Processing Plants - Fire Systems
- NFPA 850:2015 - Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
- NFPA 11:2016 - Standard for Low-, Medium-, and High-Expansion Foam
- NFPA 15:2017 - Standard for Water Spray Fixed Systems for Fire Protection
- NFPA 13:2016 - Standard for the Installation of Sprinkler Systems
- FM Guidelines (if applicable)

We make note of the following clauses with relation to some of the specific protection proposed:

- Area of operation not required to be increased by 30% as single interlock pre-action systems are being offered in line with NFPA 13 clause 7.3.2.1(1) & 11.2.3.2.5.
- NFPA 13 Clause 7.2.5.2.3. & 7.3.1.8.2.3. – Heat tape shall not be used in lieu of heated valve enclosures to protect the control valve and supply pipe against freezing. (we have assumed valve manifolds will be located within areas that are not subject to freezing conditions)

**Fixed Fire Fighting Systems – Waste Reception Hall**

Roof Level Pre-Action Type Sprinkler System:

Design Basis	NFPA / Chubb
Application	Roof Structure
System Type	Pre-Action Alarm Sprinkler System
Hazard Classification	Special Hazard
Actuation	Automatic
Application Rate	14.3 mm/min/m <sup>2</sup> over 279m <sup>2</sup>
Maximum Sprinkler Spacing	12m <sup>2</sup>
Control Valve(s)	1 No. 200mm Pre-Action Type Sprinkler Alarm Valve

Firefighting Hose reels:

Design Basis	NFPA / Chubb
Application	Ground Floor Only
System Type	Dry Type
Hazard Classification	Special Hazard
Application Rate	189 l/min
Hose reel Quantity	2 No.
Control Valves(s)	1 No. - 50mm Isolation Valve c/w flow switch on manifold.

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**Fixed Fire Fighting Systems – Process Hall**

Gasifier Burner Fronts Pre-Action Sprinkler System:

Design Basis	NFPA / Chubb
Application	Burner Fronts
System Type	Pre-Action Sprinkler System
Hazard Classification	Special Hazard
Actuation	Manual / Automatic
Application Rate	10.2 mm/min/m <sup>2</sup> over protected area
Control Valve(s)	1 No. 80mm Electrically Actuated Deluge Valve

5 x Conveyor Electrically Actuated Deluge System:

Design Basis	NFPA / Chubb
Application	5 No. Conveyors – Protection Above & Below
System Type	Deluge Water Spray System
Hazard Classification	Special Hazard
Actuation	Automatic – Triple IR Detection
Application Rate	10.2 mm/min density over 186 m <sup>2</sup> of enclosed area or the most remote 30 m of conveyor structure up to 86 m <sup>2</sup>
Maximum Sprinkler Spacing	3.7m
Control Valve(s)	5 No. 100mm Electrically Actuated Deluge Valve

1 x Walking Floor Enclosure Electrically Actuated Deluge System:

Design Basis	NFPA / Chubb
Application	1 No. Walking Floor Enclosure
System Type	Deluge Water Spray System
Hazard Classification	Special Hazard
Actuation	Automatic – Triple IR Detection
Application Rate	10.2 mm/min density over 186 m <sup>2</sup> of enclosed area or the most remote 30 m of conveyor structure up to 86 m <sup>2</sup>
Maximum Sprinkler Spacing	3.7m
Control Valve(s)	1 No. 100mm Electrically Actuated Deluge Valve

Firefighting Hose reels:

Design Basis	NFPA / Chubb
Application	Process Hall – Ground floor only
System Type	Wet Type – Firefighting hose reels
Hazard Classification	Special Hazard
Application Rate	189 l/min
Hose reel Quantity	7 No.
Control Valves(s)	1 No. - 50mm Isolation Valve c/w flow switch on manifold

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**Fixed Fire Fighting Systems – Turbine Hall**

Turbine Equipment Pre-Action Sprinkler System:

Design Basis	NFPA / Chubb
Application	Turbine generator gearbox bearings, inboard bearings and turbine steam valve
	Turbine generator non-drive end bearings
System Type	Pre-Action Sprinkler System
Hazard Classification	Special Hazard
Actuation	Automatic
Application Rate	10.2 l/min/m <sup>2</sup> over protected area
Maximum Sprinkler Spacing	12m <sup>2</sup>
Control Valve(s)	1 No. - 150 mm Single Interlock Pre-Action Sprinkler Alarm Valve

Lube Oil Skid Local Application Deluge System:

Design Basis	NFPA / Chubb
Application	Lube Oil Skid & Associated Pipelines
System Type	Deluge Water Spray System
Hazard Classification	Special Hazard
Actuation	Manual / Automatic
Application Rate	12.2 mm/min/m <sup>2</sup> over protected area
Control Valve(s)	1 No. - 80mm Electrically Actuated Deluge Valve

Firefighting Hose reels:

Design Basis	NFPA / Chubb
Application	Turbine Hall – Ground floor only
System Type	Wet Type - hose reels
Hazard Classification	Special Hazard
Application Rate	189 l/min
Hose reel Quantity	1 No.
Control Valves(s)	1 No. - 50mm Isolation Valve c/w flow switch on manifold

The above systems will be fed directly from the pumped water supplies to a general control valve manifold location. Each system will have its own control valve relevant to the type of system and application.

Where possible, valve manifolds will be situated in a strategically and mutually agreed location. This will in turn minimize the quantity of normally wet pipework and assist with coordination with other services. All valve manifold locations are assumed to be in normally heated areas and therefore, no heating or THL has been included.

*Certification for the systems*

Evidence will be included in the Annexes of this FPP once the system has been upgraded from a watermist system to a sprinkler system in accordance with current standards and regulations, plant commissioned, and the system is certified.

### 3.8 Firefighting Techniques

The site has been designed in order to allow active firefighting.

The person discovering the fire will raise the alarm as per the site induction and inform the control room. The control room operator shall implement the Incident and Emergency Plan and inform the Shift Team Leader. The Shift Team Leader shall assess the situation and contact the emergency services as appropriate.

The site has the following resources required for active firefighting:

- Material Loaders which can be used to move waste from the offloading area if considered necessary. This would allow unburnt material to be separated from the pile;
- 24/7 staff availability; and
- A sufficient water supply on site, both stored on site and via the nearby public fire hydrant; and
- Finance.

Active firefighting by site operatives will only take place if it is safe to do so and the operative is suitably trained and competent.

The firefighting techniques that the operator expects to use on site include:

- applying water to cool unburned material and other hazards, via the automated deluge system;
- separating unburned material from the fire using heavy plant; and
- separating burning material from the fire to quench it with hoses.

All site operatives will be trained in all aspects of the Fire Prevention Plan, incident and emergency management plan and active firefighting measures.

The site will be evacuated in accordance with the site evacuation plan with exception of those staff involved in active firefighting and operating the plant.

All staff, contractors and visitors would follow the Fire Evacuation procedure as included in Section 3.9 below.

Personnel safety is the primary concern, and the building will be evacuated. All personnel contractors and visitors are given a fire safety and evacuation induction.

There are hand held fire-fighting equipment available at locations within the facility, but these are most appropriate to the office areas and personnel evacuation and safety is the main concern.

The automatic fire detection and suppression system covers the whole of the building and will therefore protect the personnel and plant.

In the unlikely event of a fire which has unsuccessfully been extinguished by the sites extensive suppression system, staff are to await the Fire and Rescue Service (FRS), who would then take the appropriate actions.

All personnel working on site will be provided training in the Fire Prevention Plan and Incident and Emergency Management plan.

The FPP training will be provided to all new starters and temporary employees working at the site.

FPP refresher training will be carried out to all personnel at least annually.



### 3.9 Evacuation and Fire Muster point

The Fire Muster point will be located in the external yard near the weighbridge and is clearly signposted.

Sites rules are reinforced via use of fire drills and planned response scenarios.

All personnel to follow the instructions of the Fire Wardens and the Site Manager.

A list of trained Fire Wardens is maintained and displayed on the site, together with a list of on call staff to attend the site in the event of a fire outside of normal operation hours.

The Fire Evacuation Procedure is provided to staff, contractors and visitors which states:

- On discovery of a fire, immediately operate the fire alarm by pressing the nearest break glass call point and / or contact the Site Manager via a radio to ensure the alarm is raised.
- Fire Wardens and staff must only tackle to fire if they are trained to do so, the equipment is appropriate and if their safety or that of others is not compromised.
- Leave the building / work area by the nearest available exit / safe route and report directly to the assembly point located at the main office.
- Leave quickly but in a calm, controlled and orderly manner. Do not detour to collect personal items.
- Do not re-enter the building / work area for any reason until authorisation has been given by the Site Manager / Fire Brigade.
- The Site Manager will assess the situation and call the Fire and rescue Service if required.

### 3.10 Water Supplies

The table below provides a summary of the on-site firefighting water supplies:

Table 3.5: Fire Water Supplies		
Description	Volume	Location
Mains supply	Mains fed – N/A	On site
2 x Public hydrants	Mains fed – N/A	1 on Belliver Way at the junction with Haxter Close adjacent to the back of the plant (SE corner)
		1 on Haxter Close 80m from the site entrance
Rainwater harvesting tank	Dependent on rainfall	On site - external yard

The mains water will feed the suppression systems as described in section 3.7.

Using the EA Guidance, water supply requirements are based on the worst-case scenario of the largest waste pile catching fire. For a 300 cubic metre pile of combustible material there must be a water supply of at least 2,000 litres a minute for a minimum of 3 hours.

In this case, the largest pile is potentially up to 1,000 m<sup>3</sup> in the reception hall, meaning the site is required to have 1,200,000 l of available water supply. This is adequately covered by the mains water supply either via on site connection or hydrant.

On-site firefighting water supplies in accordance with the Guidance are not appropriate for the bunkers. In the unlikely event of a fire within the bunkers, all incidents will be dealt with within the bunkers by proposed water suppression systems.

The provision of the above water supplies as well as the automatic detection and suppression systems is considered BAT for site.

### 3.11 Managing Fire Water

A site drainage plan is provided within Annex A3.

In the event of a fire within the bunkers, any water from the suppression system will be retained within the bunkers.

In the event of a fire within the reception hall, the area has been designed such that all firewater will be contained within the building. The entire area will have a bunding system to stop any potentially contaminated firewater escaping the area which will be finalised during detailed design.

In the highly unlikely event of a fire in the yard area, fire water will be contained on the yard and the interceptor shut off to restrict fire water from leaving the site.

The firewater collected will be tankered off site for disposal by a licenced contractor.

### 3.12 During and After an Incident

#### *During*

During any fire fighting or subsequent clear up operations, any incoming waste deliveries will be halted or if enroute, either returned to the waste supplier or diverted to an alternative waste processing site.

All nearby residents, businesses and the Environment Agency will be notified according to the Incident and Emergency Management Plan. A register of contact details will be kept in the control room.

#### *After*

Should there ever be a fire event on site, Biomass No.4 will liaise and agree with the Environment Agency the steps to be taken to bring the site back into operational use.

The steps would include:

- Once the fire is extinguished all burnt items will be sorted and removed from site to an appropriately licensed waste disposal facility;
- All potentially contaminated firewater contained on site will be tankered off site for disposal;
- All firefighting equipment inspected, serviced, and replaced as necessary;
- All infrastructure to be inspected by appropriately qualified persons with repairs to buildings and equipment to be organised to enable the site to re-open as quickly as possible;
- Uncontaminated waste will be taken to an alternative disposal facility if the plant is unable to resume operations within a month.

- Determine how and why the fire started and revise Fire Prevention Procedures as necessary to reduce risk of a reoccurrence;
- Carry out a full review of the Fire Risk Assessment; and
- Divert all deliveries of waste and materials to alternative sites or cease deliveries if required.

## ANNEX A1: SITE PLANS

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## ANNEX A2: GENERAL SITE LAYOUT

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## ANNEX A3: DRAINAGE PLAN