

ONE-STOP-SHOP FIRE & SECURITY SOLUTIONS

Success Built On Service

QUOTATION TO: **ECO-POWER ENVIRONMENTAL**

OFFICIAL QUOTATION COURTESY OF:

KEITH PICTON

DIRECTOR

DDI: 01234 673095

Email: 22.07.2021

This quotation is valid for 30 days from the date shown above.

Fire Protection Proposal

FAO: Richard Hudson / David Barnard
Eco-Power Environmental
Gibson Ln
North Ferriby
Melton, Hull
HU14 3HH

Date: Thursday 22nd July 2021
Quote Ref: Q#11325

Dear Richard/David,

Thank you for the opportunity to quote for the fire protection of your facility.

Further to recent correspondence and your updated requirements, we are pleased to provide this updated proposal for your fire-protection requirements onsite.

Please note that as per our discussion I have made the following changes to this proposal:

- Additional Water Cannon for Feed Material Storage Shed No.3, now that this area has been constructed.
- Water Cannon for Boilerhouse 2 has been replaced with 2x Deluge Zones, to accommodate new proposed storage layout.
- Option provided for the upgrade of the water storage tank to accommodate EA requirements for fire fighting water provision onsite.

Please feel free to get in touch if you have any queries or would like to discuss this in more detail.

I am available by phone on 01234 673095 or via email at keith@blazequel.com

Yours sincerely,

Keith Picton

Director

DDI: 01234 357 357
Email: keith@blazequel.com

1.0 – ZONED DELUGE SYSTEM

As requested, we are pleased to provide our design and quotation for a Zoned Deluge & Water Cannon system, covering all your risk areas where material is stored.

This system is a custom-engineered fire solution to the client's requirements, and has been designed with consideration to the following standards:

- LPCB – Pumped Water Supply.
- NPFA 13 – Water Deluge Systems in Pre-Processing and Pelletising Areas.
- NFPA 15 – Water Spray Systems on Bunkers.
- NFPA 850 – Water Cannon System (flow rate, and use of wetting agent).

1.1. Fire Suppression System – Pumped Water Supply

The Pumped Water Supply has been designed to cater for either:

- a) The largest Deluge Zone operating (12mx12m area), or;
- b) 2x Water Cannons operating.

The pumped water supply is based on an operating duration for the largest flow scenario for 120 minutes, with no provision made for infill.

The system comprises,

- Two LPCB Approved, electric fire pumps, each rated at 3,000 l/min at 9.0 bar, and jockey set, (electrical changeover panels, by others).
- One LPS1276 Approved above ground 371 m³ effective capacity cylindrical galvanised water storage tank, 6.975 metres diameter x 10.207 metres high.
- All necessary pump suction, delivery and test pipework, complete with suction and delivery valves.
- 50mm. tank infill riser from base of tank to ball valve, complete with butterfly isolation valve.
- GRP Pumphouse Enclosure – 6.0 metres x 5.0 metres x 2.8 metres high.
- Pump house electrics and pump wiring as specified, including heating, lighting, emergency lighting and small power.
- BSEN12845, dual circuit electrical trace heating and weatherproof thermal lagging of exposed Tank Infill Riser, Pump Suction connection between tank and pump house & Pump Delivery connection between pumphouse and building.
- Pumphouse mounted Pump Remote Alarm Panel, together with interconnecting signal wiring from pump panels, pressure and flow switches.

1.2. Fire Suppression System – OPTIONAL – Increase Tank Capacity for EA Requirements

To meet the EA Requirements for firefighting water available onsite (based on your largest stockpiles) we would propose the following tank upgrade:

- One LPS1276 Approved above ground 594m³ effective capacity cylindrical galvanised water storage tank (to meet 585 m³ EA Requirement), 7.64 metres diameter x 14.042 metres high, *in lieu of the 371 m³ capacity tank included in section 1.1.*

1.3. Fire Suppression System – OPTIONAL - Foam Proportioning for Pumped Water Supply

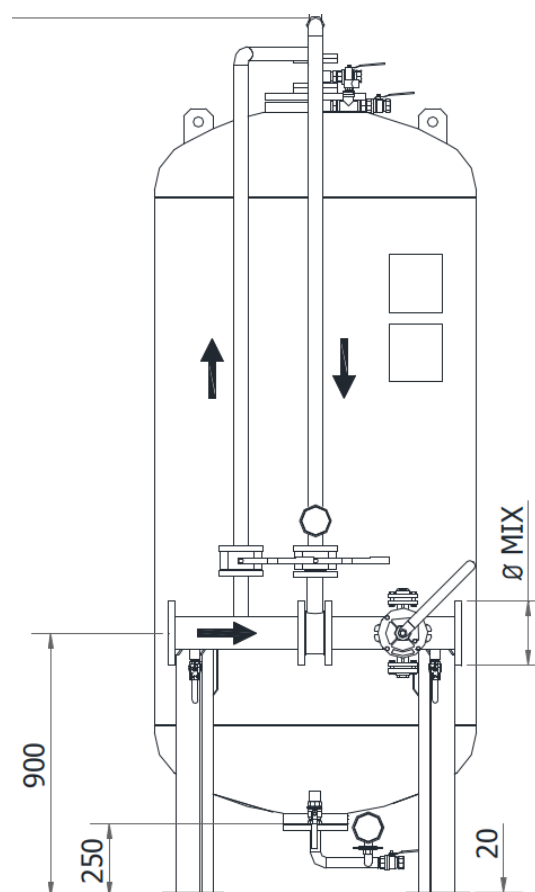
The addition of foam additive has been proven to have a very positive effect on firefighting in waste recycling applications (see WISH Burn Test document titled, 'WISH INFO 05 Waste fire burn trials summary report version 2 October 2018').

This option is for the addition of a Wetting Agent & Proportioning System, including;

- 1500lt Bladder Tank & Wide-Range Proportioning System (pre-piped assembly).
- 1500lt Toppex ia 0.5% Wetting Agent.

Note – this system will provide sufficient additive for approx. 90 minutes of firefighting duration on the largest zone (either Deluge zones 8,9,10).

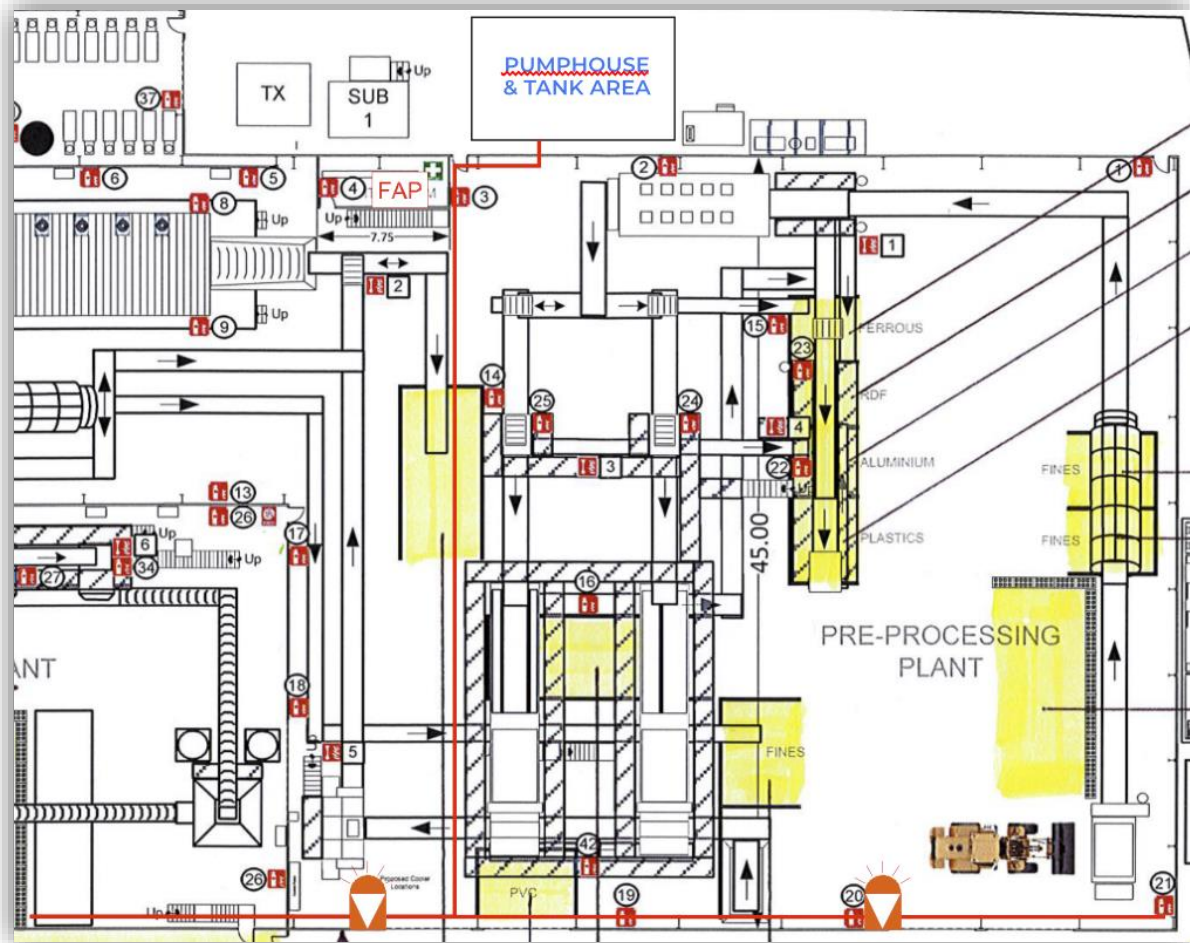
For any areas using a lesser flowrate, the duration will be proportionately longer.



1.4. Wet Mains to Zone Valve Locations

A 150mm Wet Mains in medium galvanised steel will be routed at high level through the building as shown on the Red Line marked on the drawing, to 3no. valve manifolds at low level.

We have not allowed for any trace-heating and lagging to this section of pipework (other than the section of pipe between the pumphouse and the building).



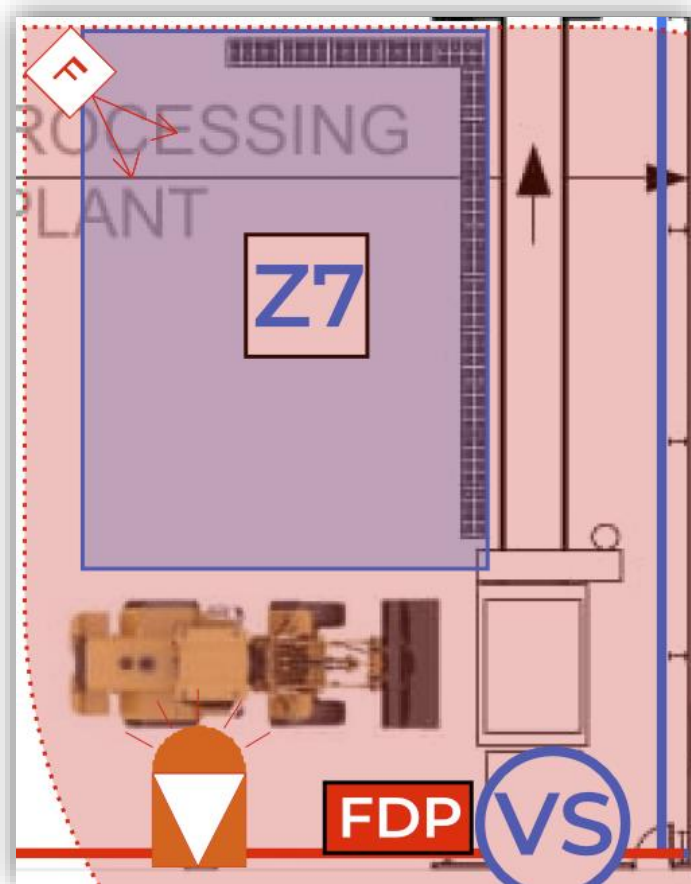
1.4. Deluge Zone over Pre-Processing Plant Material Storage Bay

Deluge Protection will be provided over this storage bay (shown as Zone 7) on our drawing) as follows:

- Provision and installation of High Hazard Deluge Sprinkler Protection to the 5 metre x 12 metre Storage Bay.
- Protection would be designed to provide a design density of 16.3mm/min over the entire storage area, to suit EH2 Classification of NFPA 13, utilising K160 'open', pendant spray sprinkler heads.
- 1x Electrically Activated Deluge Control Valve Assemblies, complete with Release Panel and Trim Piping, would be located within the adjacent area.
- Commissioning and Trip Testing of completed deluge systems upon completion.

Automatic Fire Detection & Activation of this deluge zone will be provided by a single FGD IR3 Flame Detector as shown.

The zone can also be activated manually, via a Yellow 'Manual Release' point - which will be protected within a Perspex cover, and provided with suitable clear signage.



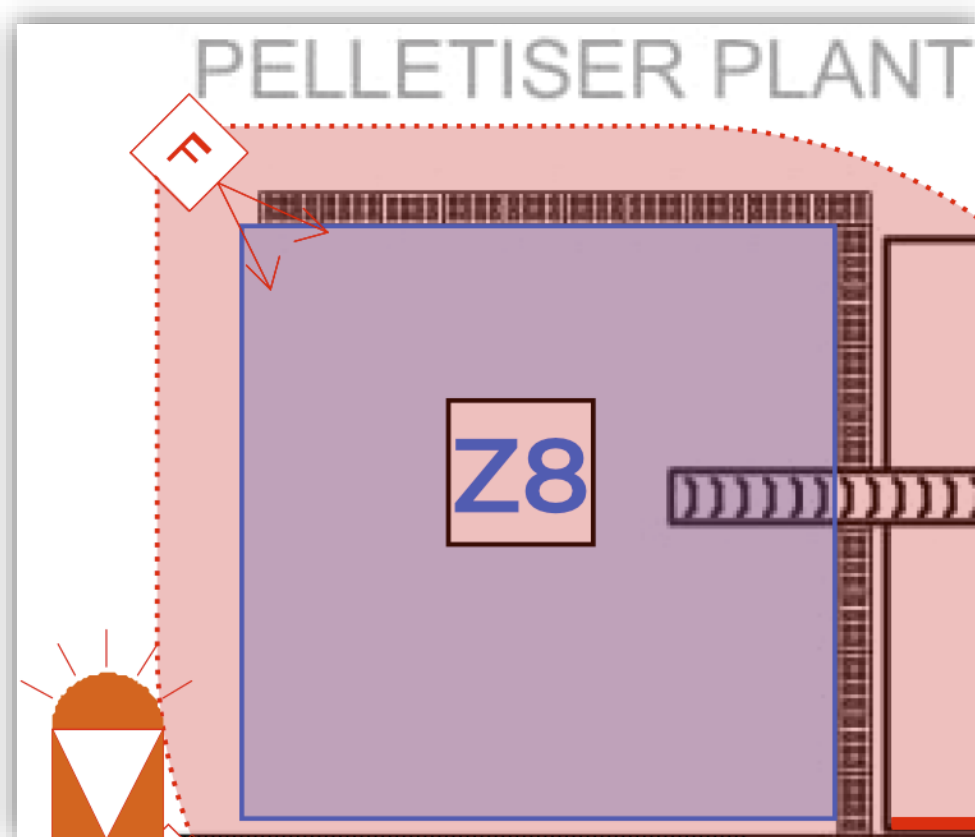
1.5. Deluge Zone over Pellet Storage Bay

Deluge Protection will be provided over this storage bay (shown as Zone 8) on our drawing) as follows:

- Provision and installation of High Hazard Deluge Sprinkler Protection to the 12 metre x 12 metre Storage Bay.
- Protection would be designed to provide a design density of 16.3mm/min over the entire storage area, to suit EH2 Classification of NFPA 13, utilising K160 'open', pendant spray sprinkler heads.
- 1x Electrically Activated Deluge Control Valve Assemblies, complete with Release Panel and Trim Piping, would be located within the adjacent area.
- Commissioning and Trip Testing of completed deluge systems upon completion.

Automatic Fire Detection & Activation of this deluge zone will be provided by a single FGD IR3 Flame Detector as shown.

The zone can also be activated manually, via a Yellow 'Manual Release' point - which will be protected within a Perspex cover, and provided with suitable clear signage.



1.6. Deluge Zones over Boilerhouse 2 Storage Bays

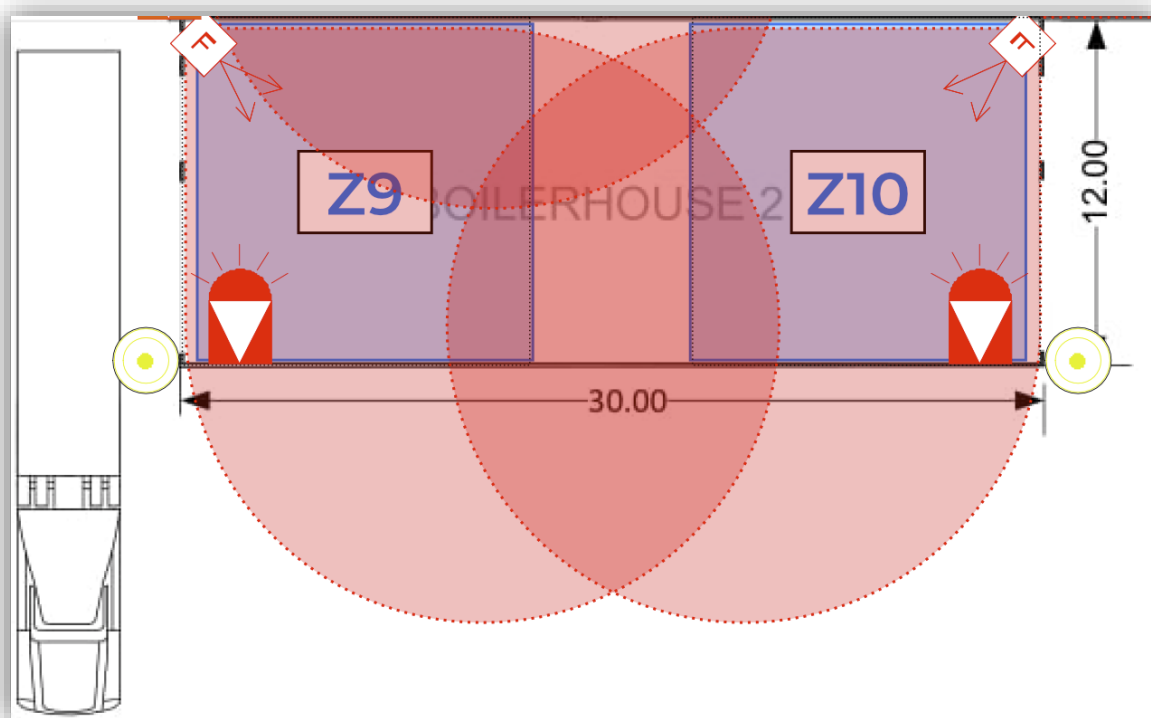
Deluge Protection will be provided over these two storage bays (shown as Zone 9 & Zone 10) on our drawing) as follows:

- Provision and installation of High Hazard Deluge Sprinkler Protection to the 2no. 12 metre x 12 metre Storage Bays.
- Protection would be designed to provide a design density of 16.3mm/min over the entire storage area, to suit EH2 Classification of NFPA 13, utilising K160 'open', pendant spray sprinkler heads.
- 1x Electrically Activated Deluge Control Valve Assemblies, complete with Release Panel and Trim Piping, would be located within the adjacent area.
- Commissioning and Trip Testing of completed deluge systems upon completion.

Automatic Fire Detection & Activation of each deluge zone will be provided by a single FGD IR3 Flame Detector as shown.

The zones can also be activated manually, via a Yellow 'Manual Release' point - which will be protected within a Perspex cover, and provided with suitable clear signage.

N.B. The system is designed to provide for just one zone in simultaneous operation. We have assumed that the wall(s) separating the bunkers will provide full height, 2hr fire resistant separation between the areas.



1.7. Automatic Water Cannon over Feed Material Storage Bays 1 ,2 & 3

A Dual Automatic Water Cannon System, rated to flow 946lt/min per cannon will be provided over the three material storage bays.

The cannon will be positioned over the concrete dividing walls which rise to 8m and separate the bays. Each 'bay' will be a separate zone. In the event of a fire being detected in either zone, the cannon will oscillate over that 'zone' only.

Due to the short distance, the cannon will be set to operate in a soft-spray pattern for optimum coverage.

The Zones are shown as 11, 12 & 13 in our drawing.

Automatic Fire Detection & Activation of each zone will be provided by a single FGD IR3 Flame Detector over each zone as shown.

The zones can also be activated manually, via a Yellow 'Manual Release' point - which will be protected within a Perspex cover, and provided with suitable clear signage.

Dry Pipe System for Frost Protection:

Each cannon will have a motorised isolation valve at accessible level, fed off the wet main feed supply within the MRF Building.

From this position, a separate dry pipe will be routed to each cannon along the front roofline of the feed material storage sheds.

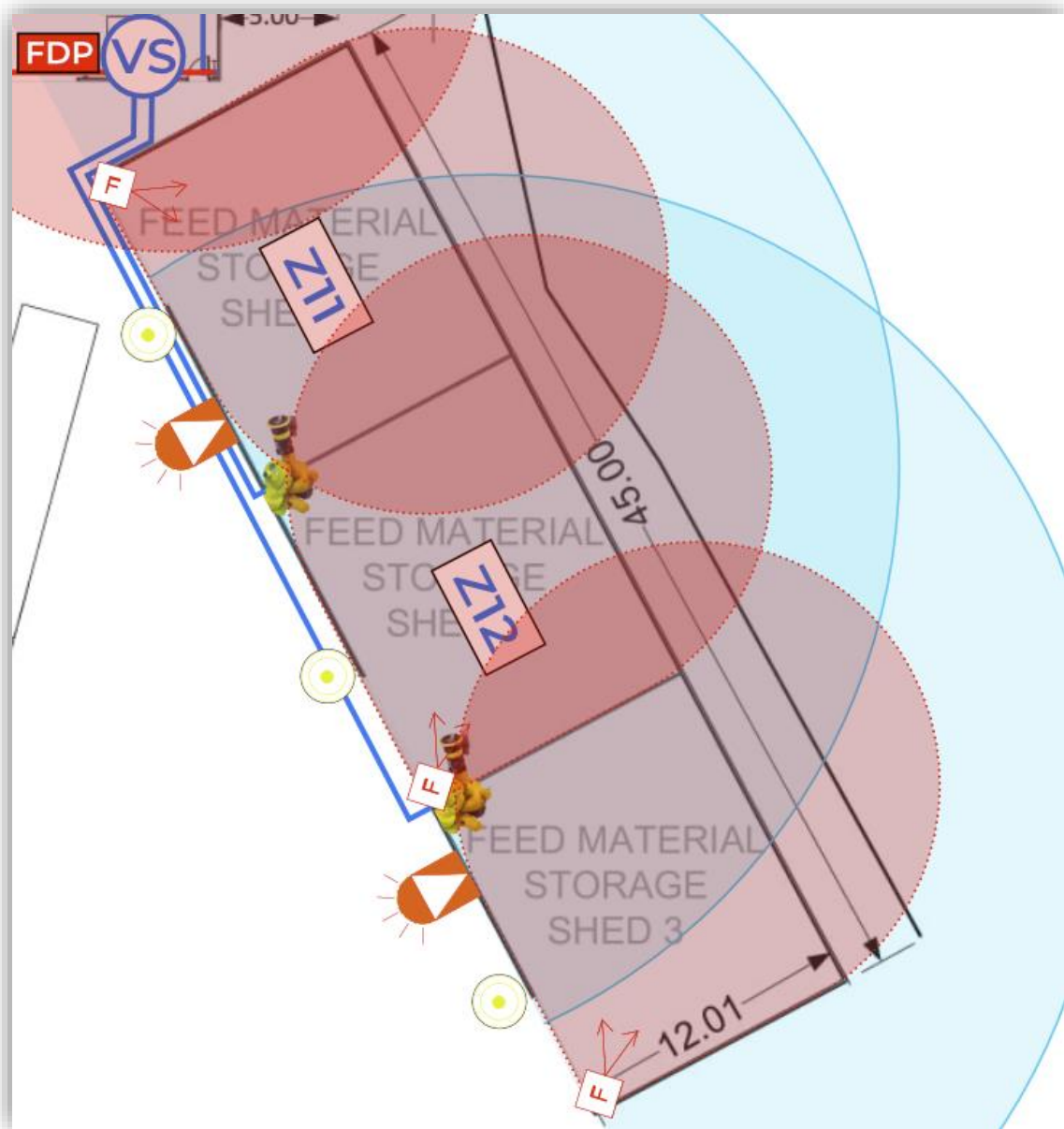
All power supplies & control panels will also be located at low level near the valve positions, for each of maintenance.

Manual Remote Control -

The cannon will be equipped with a wireless handheld controller, to allow remote manual operation of the system from safe area (line of sight operation of 100m).

Please see Appendix 1 for full details of the Water Cannon System

Cannon System Layout



1.8. Manual Deluge Zones in 'Pre-Processing' Plant

Within the pre-processing plant, there is a number of storage bunkers where separated materials from the process are deposited.

These storage bunkers require deluge systems mounted on, or under the plant to ensure effective application of extinguishing agent directly onto the risk area - whilst minimising the risk of consequential damage as a result of water discharge.

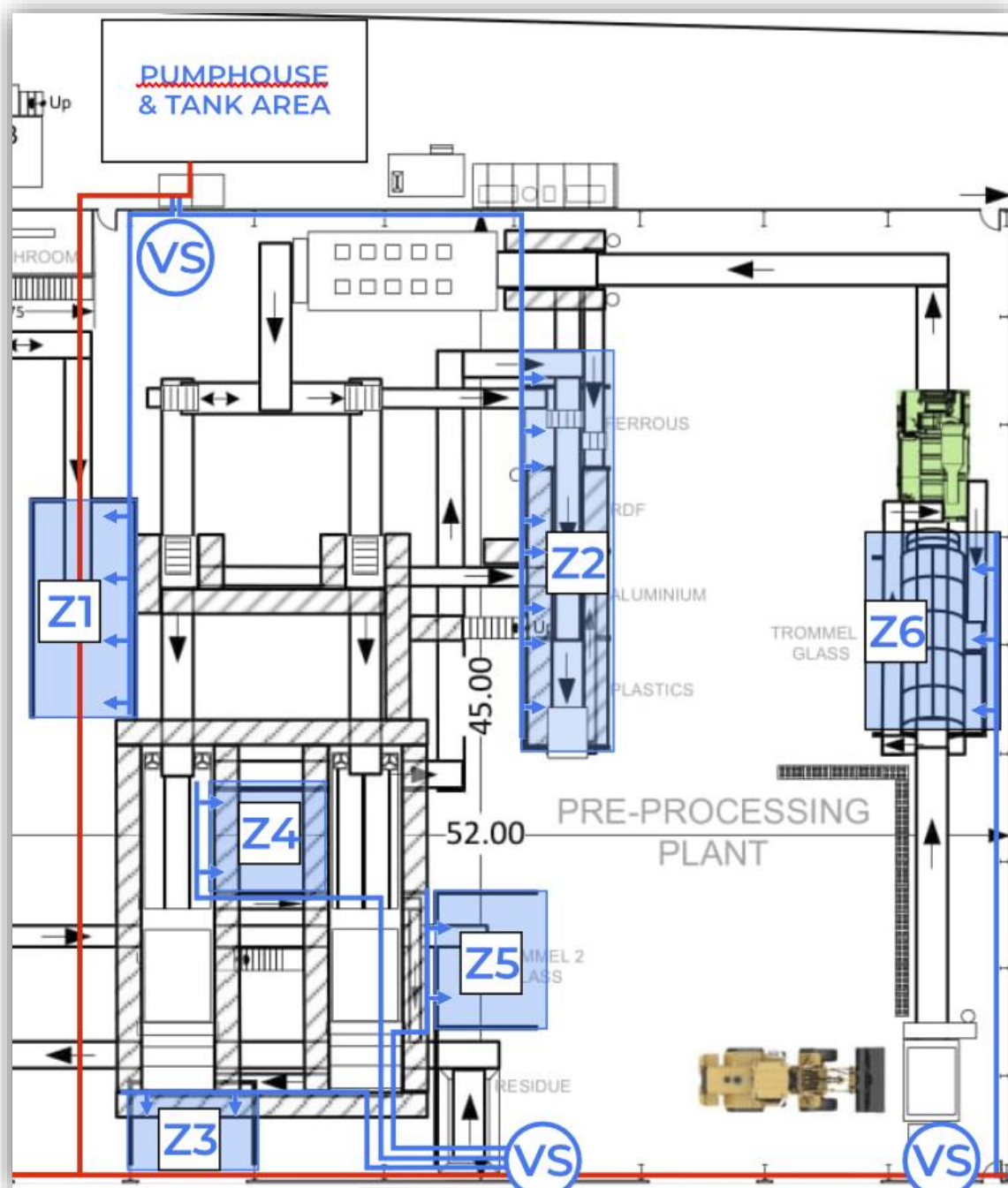
Each of these zones will have the following design characteristics:

- Protection would be designed to provide a design density of 16.3mm/min over each entire protected area, to suit EH2 Classification of NFPA 13, utilising K160 'open', extended coverage, horizontal sidewall sprinkler heads.
- The use of 'sidewall' heads allows the protection of the bunker without pipework directly over the risk area, minimising the chance of damage during operations.
- Each zone will be equipped with a manual ball valve, allowing site operators to operate the system over each zone individually.

As shown on the drawing below, the control positions for these zones will be from the Valve Stations, coming off the Wet Mains.

These positions are shown on the drawing as 'VS'.

Bunker Deluge Zones	
No.	Description
1	Storage Bunker
2	4x Bunkers in Pre-Processing Plant
3	PVC Bunker
4	Pre-Processing Output Bay
5	Fines Bay (LHS)
6	Trommel Fines Bay (RHS)



2.0. Detection & Control System:

We have specified an 'Advanced' Analogue Addressable control panel for the detection and control of your fire suppression system.

This provides significant scalability on the system, and very extensive cause-and-effect functionality to allow the system to evolve to the requirements of your facility. This includes providing shutdown outputs to your plant and provision of 'repeater' panels in other locations if required.

Fire Alarm System Specification	
1x	Advanced MxPRO5 Fire Alarm Control Panel Two-loop enclosure, with single loop card for scalability.
1x	Mains Keyswitch Isolator
1x	Battery Backup
1x	Set of associated cabling, containment
2x	'FDP' Custom Built Power/Signal Panels for all Flame Detector Interfaces and Valve outputs.
7x	Sounder/Beacon units, for a clear alarm warning of the system activation and evacuation of the areas where the system is covering, including: <ul style="list-style-type: none"> • 5x Asserta Maxi 120dB Sounder Beacons, inc PSU's & Controllers. • 2x XP95 Loop Powered Sounder Beacons
3x	FGD IR3 Flame Detectors in the Pre-Processing Facility, to provide automatic fire detection over all of the storage areas shown in Yellow.

This panel will control all of the detectors, activation point, PSU's & Interfaces on the Detection system, and the Activation Outputs to the suppression zones.

For Automatic Detection & Manual activation, each zone will include:

- FGD Flame Detectors for superior detection performance (see Appendix 1)
- A Yellow 'Manual Activation' push button inside a Perspex protective cover, for operation of the system from a safe area.

3.0. OPTIONAL - Foam Fire Fighting Trolleys

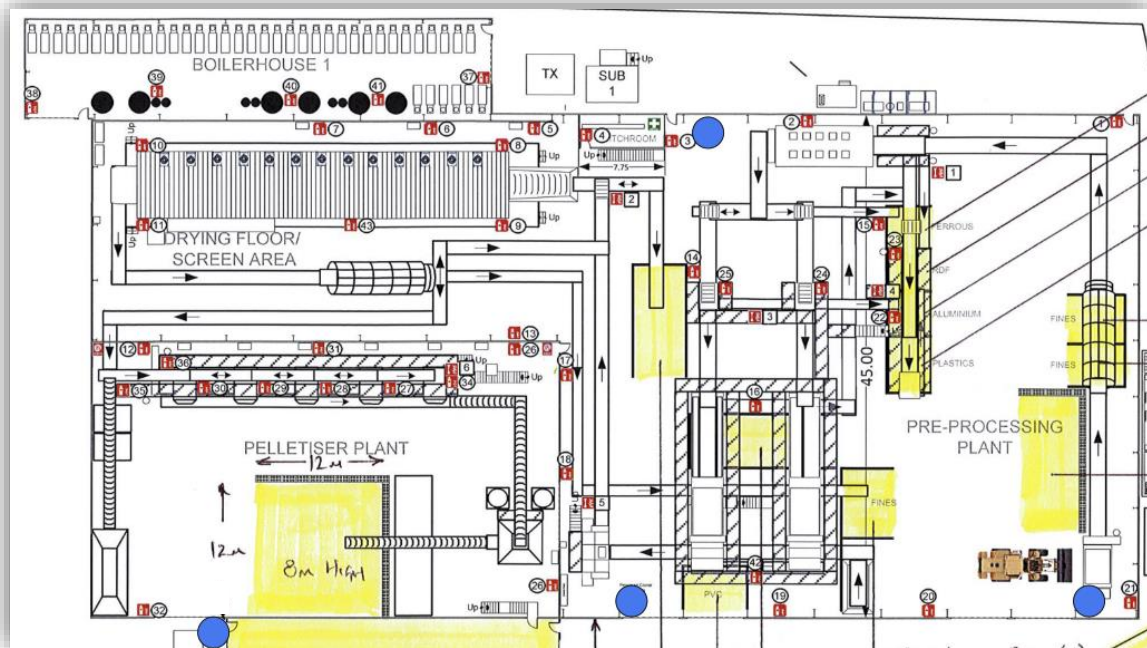
Foam fire-fighting trolleys will be positioned around the facility at key points, to provide effective manual fire fighting capacity for trained operators.

We have allowed for 3x DF130 Mobile Foam Trolleys, located at the positions shown in Blue on the drawing.

Quick-connection points will be made in these positions to the wet-mains of the fire suppression system, to allow for connection of the trolleys to the pumped water supply.



Mobile Foam Trolleys & Foam Concentrate	
3x	DF130 Mobile Foam Trolleys
15x	25Ltr DFC 503 AFFF 3% Drums



3.0. Quotation Summary

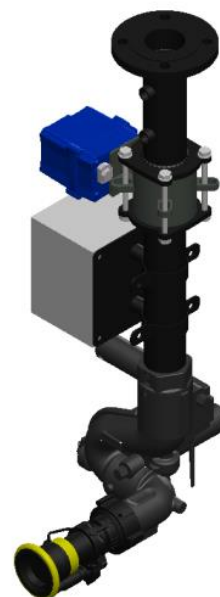
Deluge, Water Cannons & Fire Detection System			
No.	Description	Required (£)	Optional (£)
1.1	Duty/Standby, Electrically Powered Pumped Water Supply & Tank	£149,350.00	
1.2.	<i>Option on increase tank capacity for EA requirement</i>		£17,326.01
1.3	<i>Bladder Tank 0.5% Wetting Agent Proportioning & Installation</i>		£38,650.00
1.4	Wet Mains throughout Plant.	£60,032.27	
1.4	Automatic Deluge over Pre-Processing Storage Bay (inc. flame detection)	£33,250.00	
1.5	Automatic Deluge over Pellet Storage Bay (inc. flame detection)	£35,675.00	
1.6	2x New Deluge Zones in Boilerhouse 2 (Zones 9 & 10)	£74,200.00	
1.7	2x Automatic Water Cannon System Covering Infeed Storage Bays 1, 2 & 3, (inc. flame detection)	£105,850.00	
1.8	<i>Manual Deluge Zones 1-6</i>		£51,112.46
2.0	Addressable Fire Alarm Control Panel, Sounders, Interface Panels, Control Network, Fault Monitoring of all inputs.	£39,322.00	
3.0	<i>OPTIONAL – Foam Fire Fighting Trolleys & connection points from wet mains.</i>		£10,900.00
	Total	£497,679.27	£117,988.47

Appendix 1 – AUTOMATIC WATER CANNON SYSTEM SPECIFICATION

Each cannon will be specified to flow 946lt/min. At this rate we will achieve a 'soft jet' range of around 35 metres, as shown on the drawings overleaf. This soft spray setting will be set wherever possible to help minimise the chances of light material fraction from being moved around the risk area by the action of the cannon.

The cannon will be mounted in the 'pendant' position to provide the greatest field of movement.

BUNKER TURRET (A)
PENDANT: TOP INLET.



Automatic Operation - Flame Detection or Manual Push-button Activation -

- In this mode, the flame detectors will activate the water cannons, which will then oscillate over the activated 'zone' until manually stopped.
- Each zone can be set onto the cannon with its own movement pattern, 'stop' settings and nozzle jet/spray setting. This ensures precise zoning and optimal effectiveness.
- Each cannon can be programmed with multiple zones if necessary.
- Note, that each cannon will auto-oscillate over no more than one zone at once.

System Controls – Manual Modes: ***Portable Remote Controller -***

- The cannons can be controlled by a portable remote-control joystick, which has an effective range of 100 metres (line of sight). These remote controllers will be located in an enclosure (as pictured) with trickle-charger, close to the protected area for easy access.



- **Controls include;** ON/OFF function, vertical/horizontal traverse, nozzle jet/spray control, activation of pre-programmed sequences.
Each cannon has its own dedicated controller.

Control Room 'Master' HMI Panel -

- This control panel will be custom-built for your requirements, and located in a safe location within your buildings.
- This panel will give you the ability to fully operate the system using the touch-screen controls, reset the system, change operating modes if required, and view the entire system status log.

HMI Functions include:

- A '**HOME**' Screen (above) which shows the status of each system.
- An '**ALARMS**' view, where any active alarms will show.
- A '**HISTORY**' view, where any past alarms are logged.
- An '**OVERRIDE TIME**' view, allowing you to set a time period (max 600 minutes) to put the system into manual mode when required.
- A '**MANUAL**' view, where you can individually control each cannons functions. This function of the system is primarily for set up and maintenance. This view also allows you to Stop/Reset the system in the event of any automatic operation. You can view the valve % position to ensure the cannon valve is fully open/closed after use (0= closed, 100= fully opened).
- A '**SETTINGS**' view, where all commissioning settings are managed. This is password protected against unauthorised access.



Appendix 2 – FGD FLAME DETECTOR SPECIFICATION

FlameSpec IR3

Triple IR Flame Detector



The FlameSpec IR3 will detect fires and explosions extremely fast allowing preventative action to be initiated more rapidly and minimize the consequences!

Introduction

The FlameSpec-IR3 flame detector provides ultra-fast response, high performance and reliable detection of all types of hydrocarbon fires (visible and non-visible). The detector addresses slow growing fires as well as fast eruption of fire using improved triple IR (IR3) technology. It operates in all weather and light conditions with highest immunity to false alarms.

- Detection within 40 milliseconds of fireballs or explosions
- Standard fire in only 1.3 seconds from 50 ft. (15m) and 3.7 seconds from 230 ft. (70m).

Add to that, the integral event recording, on top of the proven superior capabilities of Triple IR (IR3) flame detection and you have a very powerful safety tool to protect your personnel, plant and process.

Key Benefits

- High immunity to false alarm.
- Extreme sensitivity – up to 260 ft. (80m) for a 1 ft² (0.1m²) n-heptane pan fire.
- Ultra-fast detection mode – detection within 40 milliseconds for fireballs or explosions.
- 1.3 seconds detection time – for 1 ft² (0.1m²) n-heptane pan fire at up to 50 ft. (15m) distance.
- Data/Event logger – alarms, faults and other relevant events are logged to non-volatile memory.
- Built-in-Test (BIT) – Automatic and manual self-test of window cleanliness and the overall operation of the detector.
- HART 7 models available – Easy configuration and diagnostic capability.
- Window heater to avoid condensation and icing.
- Stainless steel tilt mount with horizontal and vertical adjustment. Optional mounting adapters available for retrofit installations.
- SIL 2 compliant models available – suitable for use as part of a SIL 2 compliant safety system.

FIRE DETECTION	Detection time and distance	40ms for fast fire burst or explosion 2.6s for 1 ft ² (0.1m ²) pan fire at 0–100 ft. (0–30m) 3.7s for 1 ft ² (0.1m ²) pan fire at 100–230 ft. (30–70m)
	Field of view (IR detection)	90° Horizontal, 75° Vertical
	Time Delay	Configurable 0-30 seconds
	Built in Test	Automatic and Manual
	ELECTRICAL SPECIFICATIONS	Operating Voltage
Current Consumption		Standby: 120mA 180mA all systems in operation (including window heater)
Electrical Entries		2x cable and conduit entries 3/4" 14NPT or M25x1.5
Wiring		12-20AWG (2.5–0.35mm ²)
OUTPUTS	Relays	SPDT volt-free contacts rated 2A at 30 VDC Alarm – normally open and normally closed; Fault – normally closed
	0-20mA (stepped) current output	3 wire and 4 wire (isolated) configurations (sink and source) HART - units available upon request
	Indication	Tri-color LED (Green, Yellow, Red)
	Modbus	RTU compatible on RS-485
MECHANICAL SPECIFICATIONS	Size	5.51 x 3.54 x 3.54" (140x90x90mm)
	Weight	Detector (Stainless Steel 316): 6.6 lbs. (3.0 kg) Tilt mount (Stainless Steel 316): 3.3 lbs. (1.5 kg)
ENVIRONMENTAL SPECIFICATIONS	Temperature Range	Operating: -67°F to +185°F (-55°C to +85°C) Storage: -67°F to +185°F (-55°C to +85°C)
	Humidity	Up to 99% (RH), non-condensing
	Ingress Protection	IP66 & 68 (2m, 24hr); NEMA 4X & 6P
APPROVALS	ATEX	ATEX: II 2 G D Ex db IIC T5 Gb or Ex db eb IIC T5 Gb and Ex tb IIIC T95°C Db -55°C<Ta<75°C Ex db IIC T4 Gb or Ex db eb IIC T4 Gb and Ex tb IIIC T105°C Db -55°C<Ta<85°C
	IECEX and INMETRO	Ex db IIC T5 Gb -50°C≤Ta≤75°C Ex db IIC T4 Gb -50°C≤Ta≤85°C
	FMus & FMc	Class I, Div. 1, Groups B, C & D; T4 Class I, Zone 1, AEx/Ex db IIC T4 Gb T4 -50°C≤Ta≤85°C T5 -50°C≤Ta≤75°C
	EAC CU TR	1Ex d IIC T5 Gb or 1Ex de IIC T5 Gb and Ex tb IIIC T95°C Db -55°C≤Ta≤75°C 1Ex d IIC T4 Gb or 1Ex de IIC T4 Gb and Ex tb IIIC T105°C Db -55°C≤Ta≤85°C
	Performance	ANSI FM 3260 EN 54-10
	Functional safety	Complies to SIL2, per IEC 61508 - units available upon request
	MED	DNVGL Certificate Number MED-B-00006AM - units available upon request
	ACCESSORIES	Stainless steel weather cover
Flame simulator, model FLS-FSIM-IR3-KIT		
2" & 3" pole mount adapter		
Mounting adapters for retrofit installations		
WARRANTY	5 years	

Response Characteristics

Fuel	Size	Sensitivity	Distance ft. (m)	Avrg Resp. Time (s)
N-Heptane	1 x 1 ft.	Extreme	262 (80)	7.1
N-Heptane	1 x 1 ft.	Extreme	230 (70)	3.7
N-Heptane	1 x 1 ft.	High	197 (60)	2.7
N-Heptane	1 x 1 ft.	Medium	98 (30)	2.6
N-Heptane	1 x 1 ft.	Low	49 (15)	1.3
Gasoline	2 x 2 ft.	Extreme	328 (100)	5.3
Gasoline	1 x 1 ft.	Extreme	230 (70)	2.8
Gasoline	1 x 1 ft.	Medium	98 (30)	1.5
Methane	32-in Plume	Extreme	148 (45)	2.6
Methane	32-in Plume	Medium	82 (25)	0.6
LPG	32-in Plume	Extreme	180 (55)	3.7
LPG	32-in Plume	High	148 (45)	2.6
LPG	32-in Plume	Medium	98 (30)	1.4
LPG	32-in Plume	Low	49 (15)	1.5
Diesel	1 x 1 ft.	Extreme	164 (50)	2.6
Diesel	1 x 1 ft.	Medium	79 (24)	3.2
JP5	2 x 2 ft.	Extreme	295 (90)	9.4
JP5	1 x 1 ft.	Extreme	164 (50)	4.5
JP5	1 x 1 ft.	High	148 (45)	4.4
JP5	1 x 1 ft.	Medium	79 (24)	1.8
JP5	1 x 1 ft.	Low	39 (12)	10.1
Kerosene	1 x 1 ft.	Extreme	164 (50)	3.6
Kerosene	1 x 1 ft.	Medium	79 (24)	2.7
Methanol	1 x 1 ft.	Extreme	131 (40)	4.6
Methanol	1 x 1 ft.	High	125 (38)	4.2
Methanol	1 x 1 ft.	Medium	75 (23)	1.5
Methanol	1 x 1 ft.	Low	39 (12)	1.3
Ethanol	1 x 1 ft.	Extreme	125 (38)	4.7
Isopropanol	1 x 1 ft.	Extreme	180 (55)	3.6
Isopropanol	1 x 1 ft.	Medium	75 (23)	1.8
Polypropylene	1 x 1 ft.	Extreme	115 (35)	7.8
Polypropylene	1 x 1 ft.	Medium	66 (20)	2.1
Paper	1 x 1 ft.	Extreme	79 (24)	1.1
Paper	1 x 1 ft.	Medium	39 (12)	1.1

Immunity to False Alarm

False Alarm Source	Modulated		Unmodulated	
	Distance ft. (m)	Response	Distance ft. (m)	Response
Sunlight, Direct, Reflected		No Alarm		No Alarm
Incandescent frosted glass light, 300W	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Fluorescent, 70W (3x23.3W)	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Electric arc	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Arc welding	20.0 (6.0)	No Alarm	20.0 (6.0)	No Alarm
Radiation heater, 1850W	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Quartz lamp (1000W) shielded	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Quartz lamp (500W) non-shielded	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Mercury vapor lamp 160Wx3	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Car Exhausts	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Projector led	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Solenoid bell	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Soldering iron	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm
Electric Drill	2.0 (0.6)	No Alarm	2.0 (0.6)	No Alarm

Appendix 3 – Pumped Water Supply & Fire Suppression System Specification

A/3.1 – SYSTEM DESIGN

The system is a custom-engineered fire solution to the clients' requirements and has been designed in accordance with latest LPC Rules incorporating BSEN12845 & NFPA 13/15/850 standards.

Our Proposal is based on providing fire protection to comply with the following hazard and density requirements:

Area Protected	Hazard	Density	Area of Operation
Manual & Automatic Deluge Protection to Zones 1-10	EH2	16.3mm/min	Entire Protected Area (largest area = 12mx12m, 144m ²)
Material Storage Bays - Automatic Water Cannons		Each Flowing 946 l/min	2 cannons in simultaneous operation.

The design parameters set out above should be confirmed as being acceptable to the building insurer or any other authority having jurisdiction.

Design Notes

- As specified, the proposed deluge protection is partial, and covers only the specified plant and storage areas.
- In addition, 2 No. automatic water cannons are provided to protect Feed Material Storage Bays, all as shown on the Blazequel Fire Suppression System Design.
- We have based the pumped water supply capacity on the worst-case scenario of a single operation one of the largest Deluge Zones 8, 9 or 10, (144 m²). The specified water supply is equally capable of providing the operation of two water cannons in simultaneous operation.
- In accordance with the requirements of NFPA 13, the water storage tank has a 2 hour duration, but has subsequently been increased in capacity (as per option 1.2) in line with EA requirements.

The Electric Fire Pump electrical details are as follows :

- Electrical Supply – 415v 3ph 50hz
- Electric Motor – 90 kw
- Full Load Current – 154 amps
- Star/Delta Start Current – 364 amps
- Stall Current – 1093 amps

A/3.2 – GENERAL COMPONENT SPECIFICATIONS

The types of sprinkler heads proposed for the project are detailed below:

Area	Size	Temperature	Pattern	Response time	Finish
Deluge Zones 1 - 6	20mm K160	N/A	Open Model SW-20 ECOH Horizontal Sidewall	N/A – Open	Brass
Deluge Zones 7, 8, 9, 10	20mm K160	N/A	Open Pendant Spray	N/A - Open	Brass

Water Supply Pipework

Pipework shall be in medium grade black steel tube conforming to BS 1387 or API5L Schedule 20 as appropriate to suit the design pressure and flows of the system involved.

All above ground pipework shall have one coat of red oxide paint to be applied after fabrication but before erection. Any damage to the finish created during erection shall be touched up in situ afterwards.

Deluge & Cannon Pipework

Pipework shall be in medium grade galvanised steel tube conforming to BS 1387 or API5L Schedule 20 as appropriate to suit the design pressure and flows of the system involved.

All above ground pipework shall have a natural mill finish. Any damage to the finish created during erection shall be touched up in situ afterwards.

Drain and test line pipework shall be galvanised steel tube conforming to BS 1387.

Pipework shall be prefabricated in an off-site workshop where practical and delivered to site in phases to suit the agreed programme of works. Pipework shall be reamed after cutting and shall be free from burrs, rust, scale and other defects and shall be thoroughly cleaned before erection. Open ends left during the progress of the work shall be protected with caps or blank flanges.

Sprinkler pipework shall be installed so that the system can be drained where practicable.

The completed system will be tested in accordance with the relevant standard. A suitable water supply for testing shall be provided by others to within 10 metres of the system to be tested.

Our quotation includes for one 1st fix pressure test per installation only.

Testing other than this would be additional to our quoted sum.

Jointing

Steel pipework up to and including 50mm (2") diameter may have screwed and socket connections or mechanical grooved joints. Steel pipework over 50mm (2") diameter shall be welded in prefabricated lengths and joined by mechanical grooved joints or flanges.

Joints shall not be made in the thickness of any wall, floor or ceiling.

Screwed Fittings: Malleable iron fittings shall be of best quality malleable iron beaded or banded, screwed to BS 21 with approved jointing materials in accordance with BS 143 and BS 1256: 1968. Wrought steel fittings shall comply with BS 1740: 1961.

Welding: All welding shall be carried out in accordance with the provisions of BS 2640, BS 2971 or the Heating and Ventilating Contractors Association Manual - welding of mild steel pipework. "Set in" type branches or sockets and "cut and shut" or "segmented" bends will not be utilised. Only pipes of 50mm (2") diameter or over will be welded on site and where such welding occurs the welders' identification mark is to be provided adjacent to each weld.

Flanged joints: All flanges will be to BS 4504: Part 3.1, Table PN16 and will be made with jointing rings, bolts and nuts of bright mild steel.

Pipe Supports

Pipe supports are to conform to NFPA standards. Pipe supports shall be fixed directly to the structure of the building; the client must ensure the building is designed to support the imposed loads. No allowance has been made for secondary steelwork or underdrawing any roof structure.

Installation Control Valves

This proposal is based on the provision of the following approved control valves:

Manual Deluge Zones 1-6

- 6 No. Ball Isolation Valves

Automatic Deluge Zones 7, 8, 9, 10

- 4 No. Electrically Activated Deluge Control Valve Assemblies as below:

Deluge Installation Control Valve Set

The Deluge installation control valve would be UL/FM approved and listed and comprise the following:

- Two main stop valves with open/shut indicators
- One automatic deluge valve
- Two electric solenoid valves
- One manual release station
- One water operated alarm gong with feed and drain piping
- One alarm pressure switch
- One test and drain assembly and six metres of test and drain piping
- One alarm test valve
- Two pressure gauges
- Ancillary valves, piping and fittings
- One set straps, padlocks and keys and identification labels

Note:

- Suitable drainage facilities for water discharged during periodic testing to be provided by others.

A/3.3 – PUMPED WATER SUPPLY

The proposed sprinkler system will be served by the following form of water supply:

- Two Electric Fire Pumps each rated at 3,000 l/min. at 9.0 bar drawing water from one above ground cylindrical tank with an effective capacity of 371 M3.
- NOTE – WATER TANK DETAILS MAY CHANGE IN LINE WITH OPTION 1.2.

Cylindrical Galvanised Steel Water Storage Tank

One, 6.975 metre diameter x 10.207 metre-high, storage tank with an effective capacity of 371 m³, in accordance with BSEN12845 and LPS 1276 standards. The tank will be constructed from galvanised steel panels with a butyl liner.

The tank will be complete with the following associated equipment: -

- Tank roof
- 1 No. Ball valve housing and equilibrium ball valve
- 1 No. Immersion heater
- 1 No. Suction connection x 1m long
- 1 No. Vortex inhibitor
- 1 No. Contents gauge
- 1 No. Level Switch
- 1 No. Overflow
- 1 No. Telltale
- 1 No. Drain
- 1 No. Access ladder
- 1 No. Inspection hatch
- Pipe brackets



A suitable connection (capable of providing a minimum inflow of 172 l/min), shall be taken from the site water supply main at the base of the sprinkler tank. A 63mm MDPE connection should be provided by others and terminate at a flange at this position, minimum 300mm above ground level.

Tank Base –

We have not included for a concrete base foundation this should be constructed by you. It is your responsibility to ensure the ground should be of a suitable load bearing capability to take the imposed weight.

The minimum ground bearing capacity required, is as follows:

- 59 kn/m² for Tanks up to 6.0 m high
- 70 kn/m² for Tanks from 6.0 m to 7.2 m high
- 81 kn/m² for Tanks from 7.2 m to 9.0 m high

Details of standard foundations can be provided on request.

We do not accept responsibility for damage whatsoever resulting from the settlement of foundations.

Our proposal is based on free and unrestricted access to the tank site for our transport and machinery, with a suitable hard working area around the tank base for clear working and storage. These conditions must not deteriorate during the tank construction period.

Two Electric Powered Fire Pumps

The fire pump Installation would be designed and installed in accordance with the Loss Prevention Council's Rules for Automatic Sprinkler Installations and B.S.E.N.12845.

We have included for two electric motor driven fire pumps; either pump would be capable of providing the full system duty requirement with the other pump as stand-by.

The pump design duty is: 3,000 l/min at 9.0 bar.

The operation of each pump is governed by a set of duplicate pressure switches installed in parallel. In the event of a fire causing the operation of a sprinkler head, the water pressure in the sprinkler main falls until the first set of pressure switches operate and brings the main electric fire pump into operation.

If due to mechanical or electrical failure the main electric fire pump set fails to function, the pressure in the sprinkler main would continue to fall and the second set of pressure switches then operate to bring the stand-by electric fire pump into operation. Either pump would continue to run until switched off manually.

An emergency manual start facility is incorporated on both the electric pumps through a push-button on the individual pump control panels.

Auto Change-over Switch

In accordance with the requirements of BS EN 12845 separate automatic changeover panels are to be provided by the client, to automatically switch electrical supply in the event of mains failure.

Please advise if you require us to provide a quote to you for this equipment.

Pressure Maintenance Pump

To prevent the inadvertent operation of the main fire pumps, a small automatic pressure maintenance pump would be installed to take into account any minor pressure fluctuations in the sprinkler system. The operation is controlled by duplicate pressure switches installed in parallel, piped to the sprinkler system.

These are set to cut-in the pump at a pre-determined pressure loss and to cut-out when the loss has been made up.

The settings of the pressure switches would be higher than the cut-in points of the main fire pumps.

Remote Alarm Panel

A remote alarm panel would be provided within the pumphouse enclosure, providing the following indications:

Main Electric Pump	Standby Electric Pump
Supply failure	Supply failure
Pump on demand	Pump on demand
Pump running	Pump running
Fail to start	Fail to start

Pump Suction and Delivery Connection

The necessary piping and valves are included for isolating either pump for maintenance purposes whilst leaving the other pump in operation.

Pump Test Equipment

An approved flow measuring device and associated pipework and valves would be installed in order that periodic testing may be carried out to enable the rated capacity of the pumps to be checked.

General Notes

Pumpsets shall be housed in a compartment used for no other purpose than housing fire protection systems.

The temperature of the Pumphouse shall be maintained above 4°C.

The proposed location of the Fire Pump Installation is within the external GRP pumphouse enclosure allowed for in this proposal.

Power Supplies for Electrically Driven Sprinkler Pumps

Care should be exercised when selecting, designing and installing sprinkler pump electric power supplies, to ensure an uninterrupted supply of power to the pump controller and motor. Particular consideration should be given to ensuring continuity of power supply under fire conditions. It is normal practice for the fire brigade to isolate non-essential power supplies to a building when attending a fire.

Precautions such as segregation and labelling of power supplies for sprinkler service are therefore essential to avoid unintentional isolation.

In addition to a Mains Electrical Supply it will be necessary for a secondary supply to be provided by the client, such as a stand-by generator.

We should be pleased to provide further information on request.

Pumphouse Electrical Works by Blazequel

Our quotation includes for the following electrical works associated with the water supply:

All the necessary trunking and conduits

- 1no. 3-phase distribution board completed with breakers
- 2no. 6ft. fluorescent light fittings, including emergency provision
- 2no. 3 kw fan heaters and associated controllers
- 1no. 13 amp dual power socket
- 1no. 3 kw sprinkler tank immersion heater
- 1no. trace heating and thermal insulation to exposed pump suction and tank infill as separately specified
- 1no. Pump remote alarm panel

From the pump control panel and distribution board, we have included inter-connecting wiring to the following:

- 2no. electric motors
- 2no. changeover panels
- 1no. pressure maintenance pump
- 3no. duplicate pump start pressure switches
- 2no. 6 ft. fluorescent light fittings
- 2no. 3 kw fan heaters
- 1no. 13 amp dual power socket
- 1no. 3 kw sprinkler tank immersion heater
- 1no. trace heating to exposed pump suction, and Infill riser
- 1no. Internal pumphouse signal wiring to pumphouse mounted remote alarm panel

The pump house would be wired using 6491X cables enclosed in trunking and conduits.

Note

- Earth bonding to be carried out by the client.
- It would be necessary for you to provide two 3-phase and neutral incoming supplies to the pump house. One dedicated supply to be wired to the electric pump control panel and one general supply to be wired to the distribution board.

GRP Pumphouse Enclosure

A GRP Pumphouse Enclosure will be provided as detailed below:

Provision and installation of 1 No GRP Pump House Enclosure 6.0 metres x 5.0 metres x 2.8 metre high, internal.

The walls will be constructed from 18mm. exterior grade plywood on a 50mm perimeter frame, fully encapsulated with Class 2 Polyester Resin reinforced with 450g matting natural finish.

Roof will be constructed from 9mm. exterior grade plywood at a 5 degree pitch encapsulated as per the walls, natural finish both sides including fascia board.

The exterior walls will be semi gloss textured moulded finish RAL colour requirements as per your instruction.

The structure will provide a 60 minute Class 2 Fire Resistance (retention of stability integrity and insulation) as the requirements of BS 476 Parts 7 and 22.

The structure will afford a U value of not more than 1.5W/m²C degrees.

Pumphouse doors will be 1 No. double 2,500mm wide x 2150mm high secured by Yale type night latch, high and low level shot bolts and the doors will include hook and eye type door openers.

Ventilation will be provided by static louvres.

The pumphouse would be delivered by HIAB lorry in panel/monolithic form, bolted and sealed to a concrete base we have allowed to seal the pipe penetrations with preformed flange type fittings. We have assumed that the HIAB lorry will be able to be within 7m of the centre of the pumphouse.

A/3.4 – OTHER ITEMS

Workmanship

The installation shall comply with standards of good workmanship and practice. The whole of the section of work covering water services above and below ground shall comply in all respects with the relevant regional bylaws of the Local Water Authority.

Written approval shall be required by Blazequel on the design and principles of the system from the insurer and client prior to procurement of materials.

- The floor is to be kept clear of all loose material during the progress of our works.
- This quotation has been based on the assumption that there is no asbestos exposure hazard within the working areas. In the event that this is not the case it would be necessary for you to take whatever precautions are necessary to enable us to work safely within the working area.
- We have included for powered access towers, mobile towers and/or low height access equipment to be used in the installation of our pipework system.

Associated Builders/Civil Work

No Builders work has been included within this proposal.

Associated Electrical Works

Only the electrical works specifically detailed in this proposal have been included.

All electrical work is to comply with the relevant codes of practice and the requirement of the IEE regulations.

Electrical Trace Heating and Thermal Insulation

To:

- Exposed Tank Infill Riser
- Pump Suction between Tank & Pumphouse
- Pump Delivery Main between Pumphouse & Building.

We have included for pipework exposed to atmospheric conditions as previously specified to be trace-heated and lagged to protect the pipework from freezing.

In accordance with the requirements of BS EN 12845 Clause 11.1.2.3 the Trace Heating Circuits would be monitored for both power supply and circuit failure.

Design criteria:

- Temperature to Maintain 4°C.
- Minimum Ambient -10°C.
- Thermal Insulation 25mm. thick

Dual Circuit, Self Regulating Trace Heating Cable with a rating not in excess of 10W/m. would be applied to the pipework, cut and terminated on site to suit the actual length requirements.

The Trace Heating Circuits would be controlled and monitored via a dedicated control panel housed in a clear polycarbonate enclosure to IP65 rating and comes complete with an external temperature sensor assembly.

The temperature sensor circuit is monitored for both open and short circuit conditions with LED indications for both faults. If the temperature sensor value falls below the control panels pre-set value (Set for 5°C. With a internal adjustment of +/- 2°C.) the unit will automatically provide heating power to the primary circuit.

The unit's design automatically monitors the actual power integrity of the two heating outputs at 2 hourly intervals and switches from the primary heating output to the secondary heating output automatically should a fault occur with the primary circuit.

LED indicators provide for visual indication for "Heating On" and "Fault" for both primary and secondary circuits. A "TEST" switch is fitted to enable manual testing of both primary and secondary outputs. A manual override switch is also fitted to enable the "Heating Output" to be switched to the secondary circuit.

On any fault condition the appropriate fault LED will illuminate together with the Common System Fault LED. An internal buzzer will also sound. Two sets of Fault CHO contacts will also operate (failsafe operation) in any fault condition. The SUPPLY ON LED indicator will indicate that the Mains AC supply is connected.

Alarm and fault outputs are provided for relaying signals to external monitoring equipment.

The thermal insulation would be 25mm. thick Euroclass A1 pre-formed glass fibre sections having a bright Class “O” foil face finish. All joints would be sealed using adhesive aluminium tape.

For external pipework exposed directly to the elements, the thermal insulation would be 25mm. thick Euroclass A1 pre-formed plain fibre glass sections securely held in position with lacing wire.

The lagging to the external piping would be covered using PIB sheeting, with all joints and seams to be sealed to ensure a weatherproof finish.

COMMERCIAL NOTES

Value Added Tax

All prices quoted are exclusive of VAT. The amount of the tax properly chargeable on the project will be added to the contract sum.

Price Validity

The prices quoted in this offer are valid for a period of 30 Days from the date of this submission, after which we reserve the right to review our quotation.

Terms and Conditions

Any order placed against this quotation will be subject to Blazequel Ltd standard terms and conditions, a copy of which is available on request.

Payment Terms

A detailed payment schedule will be completed once the program for the installation is finalised and agreed. This will be required to incorporate the sub-supply contracts and credit arrangements with our supply chain.

Delivery

Standard equipment is generally supplied within 10-12 Weeks from receipt of an official order, and acceptance and sign off final design, subject to stock status. Where delivery time of products for incorporation into the works cannot be accurately forecast, it may be necessary to make early supply arrangements in order not to delay the completion programme.

Programme

Our quotation is prepared in accordance with the information made available at tender stage to ourselves, should our offers prove favourable and we would expect to agree a mutually acceptable programme for the works.

Training

After completion of the installation and commissioning of the system, we would be pleased to offer a training session for the users of the system. The presentation would include user familiarisation of the system operation and control features, together with details of user responsibilities and system maintenance requirements. This training session can be arranged by contacting the project engineer.

Handling, Storage and Protection

Off-loading of equipment will be the joint responsibility of the client, Blazequel and or authorised other. The client will be notified in advance of deliveries at site level.

Storage at the Workplace will be limited in order to ensure safe working areas for all trades and to not hinder general operations but will be sufficient to provide optimum efficiency.

Handling, storage and protection will be carried out in accordance with the requirements of our management system.

Plant and Equipment

All portable electric appliances will be tested in accordance with Electricity at Work Regulations and display a test status indicator. Hire Companies will be required to provide equipment clearly identified to its test status.

Our quotation is based upon the electrical installation for the pump unit being carried out in accordance with BS 7671 formally I.E.E. (18th Edition) Regulations.

The installation shall also be carried out in accordance with Standards of Workmanship laid down by the National Inspection Council for Electrical Installation Contracting (NICEIC).

The client will be responsible for providing a suitable electrical supply within 30 metres of all points of installation from which we may operate small power tools.

Materials

Materials installed will be as detailed on the Contract Drawings. All materials will be in accordance with the Contract Specification and the designated approval authority.

Any potentially harmful substance/material will be subject of COSHH Assessment.

General

Site working hours will be 8:30 – 17:00, no allowance has been made for out of hours working. All areas should have free and easy access at all times. All waiting time is chargeable.

Site accommodation and services should be provided by others with unrestricted use for our site operatives.

Exclusions – General:

Our price is based on the information supplied available at time of quoting and it should be noted that any significant alterations to indicated dimensions and/or layouts could result in a change to our quotation.

Also please note the following points:

- Water Authority connection and associated costs.
- Any applications for planning permissions as required.
- Site welfare facilities including lighting and first aid.
- We have assumed the tank and pumps can be offloaded adjacent to the pumphouse and tank locations.
- Secondary support steelwork for pipework, should this be required.
- Builders or civil work including pumphouse and tank bases/plinths.
- Pipe sleeves, wall plates, or making good/fire stopping penetrations.
- Sectional testing of pipework.
- Fixed scaffolding.
- Structural calculations for bases or load bearing capabilities of the structure from which the sprinkler system is to be supported.
- Water for testing.
- Power supplies (as below).

General Power Supplies:

All mains electrical works to be supplied by the client, including

- 230v 10amp Supplies at the following positions:
 - Fire Alarm Control Panel
 - Each of the 'FDS' interface cabinets.
 - Each of the Deluge Valve Control Panels
 - Trace Heating & Lagging Controllers
- A 415v 16amp supply will be required at the Water Cannon Panel position.
- A 415v 63amp supply will be required at the pumphouse position, for small-power and general services usage.
- Pumps Power Supplies & Changeover Panels,

Commissioning

We have included commissioning the works defined within this proposal. Upon completion a hand over certificate will be raised and presented.

Documentation

We shall provide one (1) set of operating manuals and one (1) set of as installed drawings.

Confidentiality and Copyright

All designs, drawings, and information provided as part of this quotation (and preceding this quotation) are confidential and remain the property of Blazequel until the quotation is formally accepted, and must only be used for the explicit purposes for which the quotation is intended.

All such information must not be shared with any third-party not directly connected with this project without the written permission of Blazequel.

Accreditations and Quality Awards



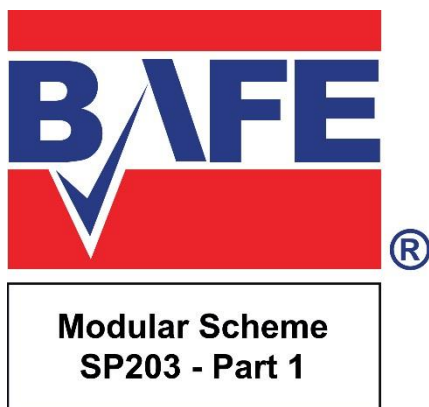
ISO 9001 Accredited Supplier

A prestigious quality assurance mark, giving you the assurance that we're focused on providing a quality, fit for purpose and traceable solution to your requirements.



CHAS Accredited Contractor

This much sought after award proves our commitment to health and safety and ensuring that our work is carried out to the highest standards with fully compliant safety measures and that all our engineers are fully trained and certified to carry out their role safely.



BAFE SP203 Accreditation

Our BAFE Accreditation is a hallmark of our professional competence in the design, installation, commissioning and maintenance of fire alarm systems.

In addition to these accreditations, our Engineers are fully trained to all the latest standards, many having completed the CSCS Safe Contractor courses and holding Enhanced DBS Disclosures and Certification for work in the vicinity of vulnerable persons.

Top 5 reasons to use Blazequel for your Fire and Security requirements:

1. Personal, friendly service from a well-established family business.
2. Reliable engineers, proactive service management and top quality equipment - saving you time and giving unrivalled peace of mind.
3. Our One-Stop-Shop Solutions means that you can have all of your fire and security requirements professionally looked after under one roof.
4. No Fixed-Term Contracts – we don't tie any of our clients into complicated service contracts – instead, we simply rely on giving an exceptional customer experience to ensure our customers want to stay with us! **Last year, 99% of our clients continued to use Blazequel for their fire protection maintenance requirements** – a powerful indicator of satisfaction!
5. You're never more than a phone call away from honest, professional and impartial advice if you have a query about your fire protection onsite!

WHAT OUR CLIENTS SAY



“We have used Blazequel to care for our fire protection requirements since 2006, and we have been delighted with the **reliable and professional service** we have received. We are now using Blazequel as our one stop shop to ensure we meet all current fire regulations. They have combined the **quality of service with capability of delivery** in a most impressive way. We would have no hesitation in recommending Blazequel to any company, large or small.”

DS Smith Sheetfeeding

“If we ever have any fire safety related queries Andrew is always on hand to offer advice and support and quite often **will go above and beyond** what I would expect from any supplier to offer assistance. I can **thoroughly recommend** the services of Blazequel to any potential customer who is considering using their services.

GoJo Industries

“When designing the MRF, due to insurance, the latest FPP requirements and high risk, fire protection was a significant element we wanted to mitigate. We discovered that although insurance companies and the Environment Agency require fire protection they do not know what they want. **Blazequel were very knowledgeable about the different fire protection and detection systems** available as well as early warning systems such as aspiration systems. After the final bespoke specification was agreed, there was a relatively short amount of time to install the system, but **Blazequel did everything they needed to in order to ensure the system was ready to work** when the plant was commissioned and the project ran smoothly. Blazequel now provide the necessary training, support and maintenance to ensure the system continues to protect our investment.”

Fortress Recycling & Resource
Management



TOTAL HONESTY
TOTAL INTEGRITY
TOTAL PROTECTION

Blazequel UK (Head Office)
Jaguar House, Shuttleworth
Road, Bedford, MK41 0EP
+ 44 (0) 1234 357 357

Registered in Northern Ireland
- NI622109 VAT No. 827 4973 88

Northern Ireland Office
1a Carrakeel Drive, Maydown
Londonderry, BT47 6UQ
+ 44 (0) 2871 377 775