MARSHALL FIRE

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1. Executive Summary

This report provides fire safety advice for the erection of a 2 storey (Ground+1) extension to an existing fruit processing warehouse located at West Marsh Road PE11 3UG.

This report provides guidance on how the building will comply with the functional requirements of the Building Regulations by drawing on current guidance. In order to do this, guidance from BS 9999:2017 has been used.

The fire strategy described in this report can be summarised as follows (note this is not an exhaustive list but outlines the main fire safety requirements. Please read the remainder of the report for the full requirements):

- A Category L2 link
- ion and alarm system consisting of smoke detectors, manual call points and sounders to be installed within all areas of the building, in accordance with BS 5839-1:2017.
- Sprinkler systems are not proposed since having a storey less than 30m meaning it is not required.
- It is proposed that the building will operate under a simultaneous evacuation regime.
- Elements of structure are required to achieve a 60 minutes fire resistance rating.
- Unprotected areas and boundary distances are to be reviewed once form elevations and site plans are provided.
- The fire service access is to be assessed once a formal site plan is provided.

Any departures are subject to agreement with the Approving Authority.

2. Introduction

2.1 Overview

This report provides guidance on how the erection of a 2 storey (Ground+1) extension to an existing fruit processing warehouse located at West Marsh Road PE11 3UG Spalding will comply with the functional requirements of the Building Regulations by drawing on current guidance. Guidance is taken from BS 9999:2017.

Our role is to advise on the design of the building against compliance with Part B of the Building Regulations and assist in steering the designs towards Building Regulation approval.

2.2 Purpose of this report

This RIBA Stage 3 report details how the building's fire safety measures will be enhanced and highlights the criteria to comply with the functional requirements of Part B (Fire Safety) of the Building Regulations 2010. In doing so the guidance contained in BS 9999:2017 have been used, with the main structure of the report following the format of Part B of the Building Regulations.

The status of this fire strategy should be considered at risk until such time as the appointed Building Control Body has reviewed the proposals and provided their approval.

The findings of this report are based on the information available at the time of writing this report. Marshall Fire cannot be held responsible for any subsequent changes to the design that we are not made aware of.

2.3 Scheme description

This project consists of the erection of a 2 storey (Ground+1) extension to an existing fruit processing warehouse located at West Marsh Road PE11 3UG.

The extension forms a ground floor packing and distribution area, including a racking area. The first floor is linked to the ground floor packing area through an opening in the slab, through which machinery will pass . There is also an area separated from the packing area that will form an additional expansion area for future office accommodation; this area is to be constructed to a shell stage only.

The client is constructing 2 extensions, the one described above that is within the scope of this report, and a second that is a 2 storey (Ground+1) modular extension that is being dealt with by a separate Design Team and falls outside the scope of this report. This is show in orange on the floor plans below.

The extension covered by this is to be linked by a bridge link, this linked isn’t required for means of escape and once completed the building is to be treated as a single building.

The warehouse extension is constructed of a steel portal frame type build with cladding. The site location and proposed floor plans are shown below:

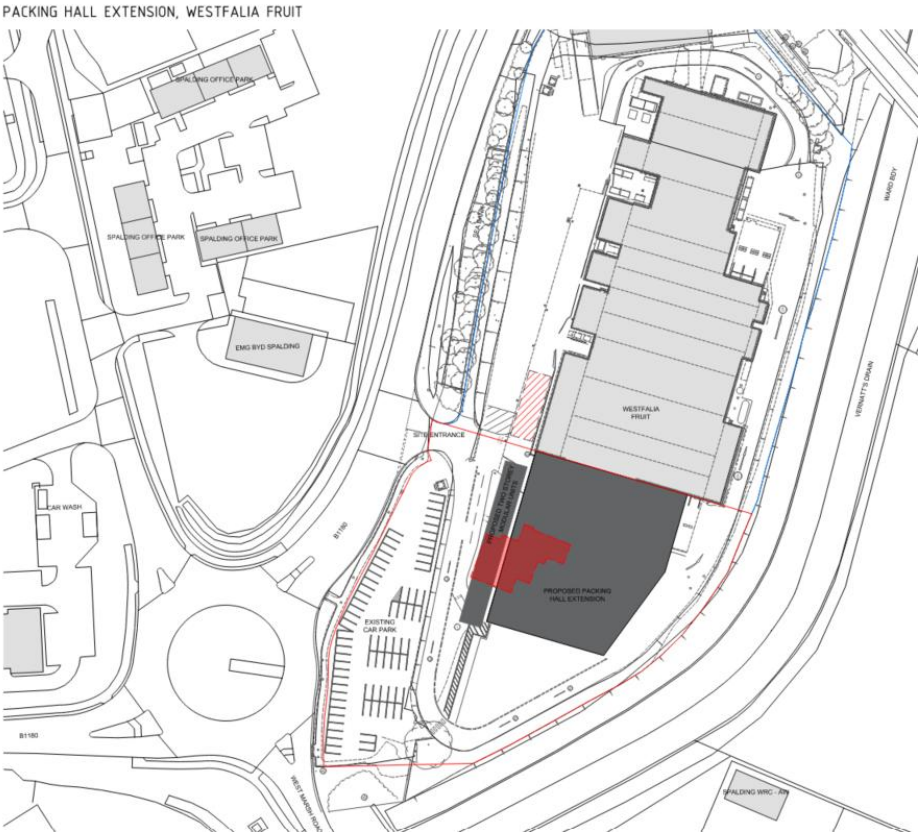


Figure 1: Site Location Plan

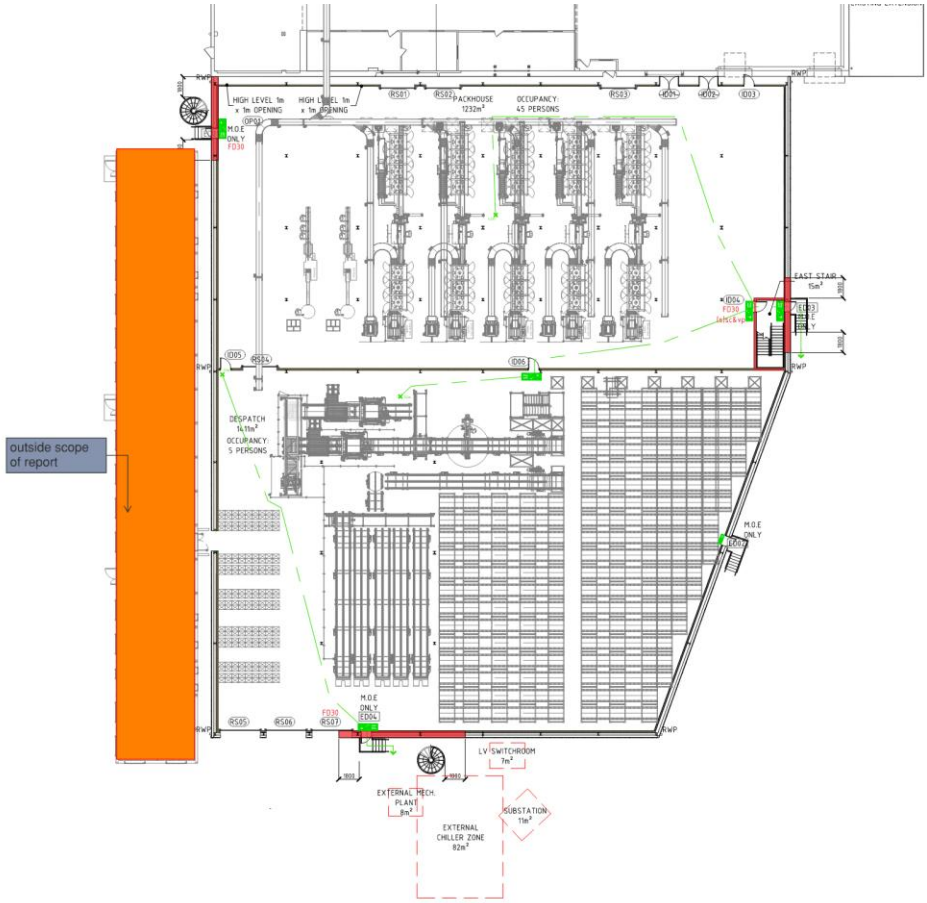


Figure 2: Ground Floor Plan

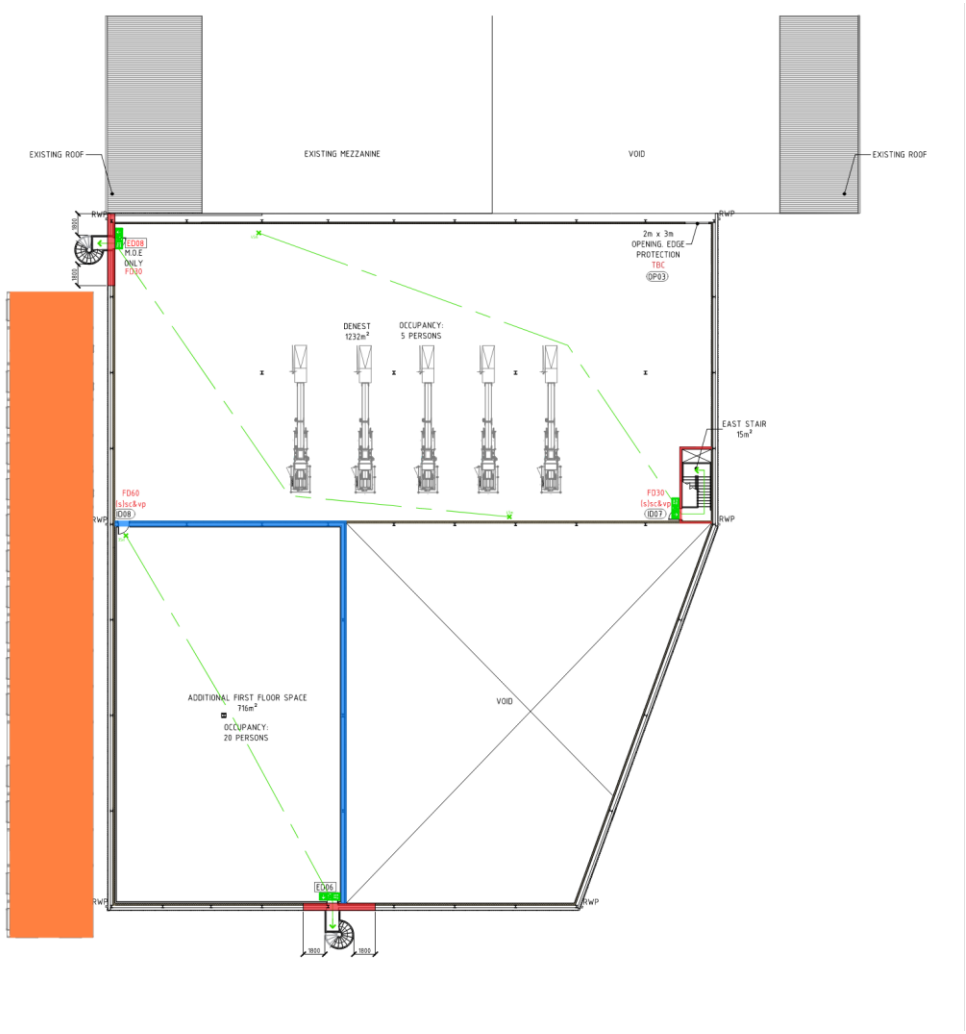


Figure 3: First Floor Plan

2.3.1 Anticipated Occupancy Figures

The maximum anticipated occupancy figures for the building have been provided by the client and confirmed by the architect.

Table 1: Anticipated Occupancy Figures

Floor	*Area m²*	*Floor space factor*	*Occupants*
Ground			
Packing Area	1232	Provided by Client	45
Dispatch	1411	Provided by Client	5
5 First			
Packing Area	1232	Provided by Client	5
Addison Office space	716	Provided by Client	129

2.1 BS 9999 Risk Profiles

Rather than banding buildings by broad occupancy type, BS 9999 uses the principle of risk profiles when prescribing an appropriate package of fire safety measures. This varies depending on the type of occupancy and inherent fire risk within the building and with the proposed buildings the following will apply:

- **Office areas** - A2 Risk profile, where occupants are awake and familiar with the building with a medium fire growth rate.
- **Packing and distribution areas** - A3 Risk profile, where occupants are awake and familiar with the building with a fast fire growth rate.

2.2 Report limitations

This report is intended for use on this project and at RIBA Stage 4 only and the contents and approaches should not be applied to any other building. This report details how the building will be constructed and does not guarantee that the building has been constructed in accordance with this document. We cannot take any responsibility for any shortfalls in the standard of construction on site as this would lie with the installer.

The proposals within this report are strategic only and any works listed herein will need to be appropriately designed and installed by others. Where it is considered that the proposals within this report may present a risk under the Construction (Design and Management) Regulations 2015 (CDM) these will be highlighted to the Principal Designer.

This report focuses on Part B of the Building Regulations. Compliance under the other Parts of the Building Regulations will also need to be achieved through works undertaken by others.

The contents and findings herein are based on the information available at the time of publication and referred to within this document. The contents should be considered an approvals risk until formally approved by the appointed Building Control Body.

By complying with the recommendations in this report it will not ensure that fires will not occur, and ongoing management of the building is essential to ensure the fire risk is controlled as much as possible. This is controlled in part by the risk assessment required under the Regulatory Reform (Fire Safety) Order 2005. This legislation applies to all non-domestic buildings and the common areas of apartment buildings, which requires that a fire risk assessment is undertaken and regularly reviewed (including whenever changes occur that might affect standards of fire safety within the building). The risk assessment will need to be made available to the Fire Service upon inspection of the building and any findings within the risk assessment are required to be addressed by the person responsible for fire safety within the building. If this is not undertaken the Fire Service have powers to serve notices on the building which could ultimately lead to it being shut down.

3. B1 - Means of Warning and Escape

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B1, Means of warning and escape:

"The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times."

3.1 Means of Warning and Evacuation Regime

It is proposed that the building will operate on a simultaneous evacuation regime where a full evacuation of the building will be undertaken upon a fire alarm being raised.

There is no current proposal for a delay or investigation period and no proposal, the existing building alarm and proposed new alarm should be linked

The minimum level of detection and fire alarm system required by BS 9999 for a A2 occupancy is a manual system and for an A3 occupancy profile is a L2 system.

To enable an efficient evacuation, the fire alarm system the building will be provided with a system that will be designed and installed in accordance with BS 5839-1 to a minimum standard of Category L2, this should be linked into the existing building system.

In areas with noisy environments and where people may be alone or who have difficulty in hearing, visual alarm devices (flashing warning beacons) should be installed.

3.2 Horizontal Means of Escape

3.2.1 Travel Distance

The maximum recommended limits on travel distances for an A2 and A3 profile where the layout is unknown are given in Table 2 below. Were the layout is known the travel distances in Table 3 can be used. An alternative means of escape is only considered if the routes are fire separated or more than 45° apart.

Table 2: Limits on Travel Distance (Direct)

Risk Profile	*Maximum permitted travel distance (m)*	
	One-way travel	*Two-way travel*
A2	15	37
A3	12	30

Table 3: Limits on Travel Distance (Actual Distance)

Risk Profile	*Maximum permitted travel distance (m)*	
	One-way travel	*Two-way travel*
A2	22	55
A3	18	45

The provision of automatic fire detection systems can be of significant benefit in terms of providing early warning. Where a clear benefit resulting from the addition of an automatic fire detection and fire alarm system is demonstrated and is appropriate to the circumstances, a 15% increase in allowable travel distance and a 15% reduction in door width, corridor width and stair width may be applied. It is not proposed to apply an enhancement to this project (A2 risk profile spaces).

It is not proposed to use the enhanced figures as part of this project as travel distance based on multiple exits being available from all areas and fully comply without the need for enhancement.

3.2.2 Width of escape routes and exits.

Door Capacity
The minimum width allowable under the recommendations of BS 9999 is 800mm clear and where a door measures less than 1,050mm clear the capacity is calculated as 500/m, where m is the width required per person in accordance with BS 9999 as follows:

- Areas with an A2 risk profile – 3.6mm/person.
- Areas with an A3 risk profile – 4.6mm/person.

Therefore, based on the above the capacity of an 800mm -1,049mm clear door is acceptable for:

- Areas with an A2 risk profile – 138 people
- Areas with an A3 risk profile – 108 people

Should there only be a single-storey exit, the occupancy is limited to 60 people.

Ground Floor
At both the ground and first floor there will be 2 exits available from all areas, at the ground floor the pack house area is provided with a final exit the leads directly to a place of safety outside the building and a second through the internal 30 minute protected stair which leads to a place to relative safety outside the building.

The displaced area is provided with a final exit that leads directly to a place of safety outside the building and a second exit through the pack house and then onward to one of the above exits

First Floor
On the first floor, the dispatch area is provided with two storey exits, one onto the internal 30-minute protected stairs and a second one onto an external escape stair. The additional office space has 2 exits one to an external escape stair and a second exit through the pack house and then onward to one of the above exits

From inspection of the floor plates, minimum the exit widths appear to be satisfactory based on the occupancies set out in Table 1 above.

General
Any gradients on escape routes should be no steeper than 1:12.

Doors should not be fitted with a lock and should be provided with fastenings that are easily negotiated in a single operation in the event of a fire. Where doors are expected to be used by more than 60 people in the event of a fire, they should open in the direction of escape and any access controls on doors should be overridden in the event of a fire being detected.

Single steps on escape routes should be prominently marked. A single step on the line of a doorway is acceptable.

3.2.3 Inner Rooms

A room whose escape route is accessed via another room (or space containing furniture and other fire loads) is called an inner room. An inner room can be at risk if a fire starts in the access room. An inner room arrangement should therefore not be provided unless all of the following conditions are met:

- The occupant capacity of the inner room does not exceed 60 people (30 people where the occupants require assistance escaping).
- The inner room is entered directly from the access room.
- The escape route from the inner room does not pass through more than one access room.
- The travel distance from any point in the inner room to the exit(s) from the access room does not exceed the allowable one-way travel distance.
- The access room is not a place of special fire hazard and is in the control of the same occupier as the inner room.

The strategy for inner rooms will adopt both of the following:

1) A suitably sited vision panel not less than 0.1m^2 is located in the door or walls of the inner room, to enable occupants of the inner room to see if a fire has started in the outer room; and

2) The access room is protected by an automatic smoke detector that either operates an alarm that is immediately audible in the inner room, to a sound pressure level in accordance with the minimum recommended in BS 5839-1 and provides an immediate visual alarm conforming to BS EN 54-23 in the inner room if the ambient noise levels are so great as to make an alarm inaudible.

Currently there are no inner rooms proposed in the project plans, however this should be taken into consideration as part of any fit out works.

3.3 Vertical Means of Escape

The first floor is served by 3 stairs, these are not lobby protected not lobby protected, serving 1 upper floor level. Discounting of 1 exit hence, as a worst case based on A3 risk profile the total vertical capacity is 370 as set out below in section 3.3.1Stair widths

Minimum stair widths have been calculated using BS 9999:2017 Table 13 for an A2 and A3 risk profile building with stairs serving 1 levels. BS 9999 specifies the minimum stair width per person is:

- Areas with an A2 risk profile – 4.5mm/person
- Areas with an A3 risk profile – 5.4mm/person

The proposed new stair are to be a minimum 1000mm, which would provide the following egress capacity:

- Areas with an A2 risk profile – 222 people
- Areas with an A3 risk profile – 185 people

Stair widths are therefore acceptable for the proposed occupancy set out in Table 1 above.

There will be two sets of steps, inside the Despatch Room, to the north and south of the racking. This will provide access onto the racking for maintenance, this access will be managed by the client through the use of dynamic risk assessment.

3.4 External escape route

Where external escape routes are proposed within 1.8m to an external wall, the wall should provide 30-minute fire resistance up to a height of 1.1m above the finished floor level and windows in walls to be 30 minutes fire rated for integrity only and non-openable.

3.5 Merging flows

Where a storey exit shares the final exit due to converging escape routes, the width of the final exit should be sufficiently sized to account for the additional congestion. From inspection of the plans, merging floors are acceptable. This can be checked using the calculation from BS 9999.

W = ((N/2.5)+(60S))/80

Where:

- W is the width of final exit in mm
- N is the number of people entering the stair at ground floor =50 people
- S is the width of the stair =1.0m

W = ((50/2.5)+(60*1.0))/80

W = 1.00 is the required width of final exit in meters

The final exit door from the protected stair in the Pach hall must provide a clear exit width of at least 1.00m.

3.6 Provision of Refuges

The first floor and ground have egress via stairs.

All stairs are to be provided with a refuge area within each stair or lobby with a notional area of 900mm x 1400mm in order to allow for manoeuvring. To facilitate the effective evacuation of people from these refuges, an emergency voice communication (EVC) system will be provided. It is essential that the occupants of each refuge are able to alert other people that they are in need of assistance and for them to be reassured that this assistance will be forthcoming.

The EVC system will conform to BS 5839-9:2021 and consist of Type B outstations and suitable signs will be provided for the disabled refuges.

The key to the evacuation of people with reduced mobility will be the management and it is not considered acceptable to rely on the Fire service to evacuate people from the building. A management plan will ensure that people of reduced mobility in the building are aware of the facilities provided (by reference to general and personal emergency evacuation plans) and that staff and facilities are available and adequately trained to evacuate occupants as required down staircases with the use of measures such as evacuation chairs or similar facilities.

A muster point is to be identified so that in the event of a fire, all building occupants can escape to a fixed location. This will need to be outside of the building and in an ultimate place of safety. It is recommended that this is positioned in a safe place in a large open area away from any danger.

3.7 Emergency Lighting and Escape Signage

Emergency lighting should be provided in accordance with BS 5266-1 and include coverage in the following areas:

- Windowless accommodation
- Internal corridors more than 30m long
- Open plan areas greater than 60m^2
- All sanitary accommodation with a floor area over 8m^2
- Windowless sanitary accommodation with a floor area less than 8m^2
- Electricity and generator rooms
- Switch room/battery rooms for emergency lighting systems
- Areas directly outside the final exits

Fire escape signs are to be provided to guide occupants from any point in a building to a place of ultimate safety. Exit and directional signage should be provided in accordance with the requirements of BS ISO 3864-1.

Signage is provided to identify the primary escape routes from each location within the building with every escape route adequately signed in accordance with BS 5499-4.

- Signage should be sited conspicuously within the normal field of vision and clearly marked, without being obscured by doors or other fixtures.
- Escape signage should be provided for all changes in direction, for corridors, stairs and open spaces forming part of the escape route. Each intermediate door or junction will be similarly signed.
- Signs above doors or open spaces should be mounted between 2m and 2.5m from floor level, measured to the base of the sign and be positioned to the centre line of the escape route.
- Signs sited on the walls should be mounted between 1.7m and 2m from the floor level to the base of the sign.
- Signs should be sited at the same height throughout the escape route, so far as it is reasonably practicable.

Any doors in the lines of fire resistance will be provided with appropriate fire signage. In general doors to staircases will be provided with ‘Fire door keep shut’ signage. Doors to cleaner’s cupboards, stores, plant rooms and service risers will be provided with signage stating, ‘Fire door keep locked’.

4. B2 - Internal Fire Spread (Linings)

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B2, Internal Fire Spread (Linings):

> *(1) To inhibit the spread of fire within the building the internal linings shall-*
>
> *(a) Adequately resist the spread of flame over their surfaces; and*
>
> *(b) Have, if ignited, a rate of heat release which is reasonable in the circumstances.*
>
> *(2) In this paragraph 'internal linings' means the materials lining any partition, wall, ceiling or other internal structure.*

Internal linings are required to be provided in accordance with Table 33 in BS 9999 as follows:

Table 4: Classification of Linings

Location	***Classification***
Small rooms of maximum internal floor area of $30m^2$	D-s3, d2
Other rooms	C-s3, d2
Other circulation spaces (including staircases, lobbies etc)	B-s3, d2(1)

NOTE:

1. *Wallcoverings which conform to BS EN 15102, achieving at least class C-s3, d2 and bonded to a class A2-s3, d2 substrate, will also be acceptable.*

The class of linings recommended in the table above can be downgraded (but not less than Class D- s3, d2) in walls of rooms providing the total area of those parts in any one room does not exceed one half of the floor area of the room and subject to a maximum of $60m^2$.

5. B3 - Internal Fire Spread (Structure)

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B3, Internal Fire Spread (Structure):

(1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.
(2) A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those two buildings.
(3) To inhibit the spread of fire within the building, it shall be sub-divided with fire resisting construction to an extent appropriate to the size and intended use of the building.
(4) The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.

5.1 Loadbearing Elements of Structure

The elements of structure are based on the risk profile and upper most occupied floor height measured from ground access level. This building will need to provide a minimum 60 minute fire protection to elements of structure due to the A3 risk profile and having a storey not more than 5m above lowest street ground level.

The A2 risk profile areas supports a 30 minutes fire resistance when having a storey below 5m. Subject to compartmentation and property protection, these different zones can be designed separately.

Any structural elements which do not perform the function of a loadbearing floor or associated supports, such as a roof do not need to be fire rated.

Any systems used to provide the required fire resistance to the elements of structure should be specified and installed in line with the manufacturers specifications and test data.

5.2 Compartmentation

5.2.1 Size of Compartments

The maximum compartment size are as follows:

- Areas with an A2 risk profile – Unlimited
- Areas with an A3 risk profile – 14,000m^2

5.2.2 Period of Fire Resistance to Key Elements

Compartment walls have been provided between the office areas and the packing and distribution areas, and the floor between the office and the distribution areas are designed as 60 minute compartment floors.

Table 5: Compartmentation (fire-resistance) requirements

Part of building	*Fire resistance rating (mins)*	*Fire doors*
Plant rooms	60 (each side separately)	FD30S
Compartment walls between office and other areas	60 (from each side separately)	FD60S
Protected stair	30 (each side separately)	FD30S

For external walls, any part 1m or more from the relevant boundary, is to be protected on the ‘inside of the building’ having RE (loadbearing and integrity) equal to the elements of structure and I (insulation) of 15 minutes.

Note: Any openings in the required construction should be protected by doors having a similar standard of fire resistance.

Any systems used to provide the required fire resistance to the compartmentation should be specified and installed in line with the manufacturers specifications and test data.

5.2.3 Compartment Walls

The party wall between the office areas and the packing and distribution areas should be constructed as a 60 minute compartment wall and be full height. Any openings within the wall should be fire stopped or fire doors equal to the wall rating.

5.3 Fire Doors

It is a requirement that the manufacturers are to have their fire doors assessed by subjecting them to a test procedure as specified in BS476 Part 22:1987 or BS EN 1634 Part 1:2014. Tests are made on complete door assemblies: i.e. the fire door and doorframe with all the requisite hardware (e.g. locks, latches, hinges, etc). The assembly, or door set, as it is also known, is fixed in a wall representing its use in practice.

It is acceptable to provide doors on electromagnetic door hold open devices which release on the operation of the fire alarm and detection system and power failure. Any fire doors provided with hold-open devices on an automatic release mechanism in accordance with BS 7273, and smoke detectors included to assist with providing early closure of these doors will be located suitably close to the doors.

Where the anticipated occupancy numbers do not exceed 60 people then there is no requirement that the storey exit doors are to swing in the direction of escape.

All doors necessary for escape which are provided with access controls will be provided with a suitable override facility that is acceptable to the approving authorities. Any electronic locks or hold open devices on escape doors will be failsafe, have break glass and manual release button and be linked to the fire alarm to BS 7273-4:2015.

Doors forming part of the means of escape from or within the building should:

a. Be fitted only with simple fastenings that can be operated from the escape side of the door without the use of a key.
b. Be hung clear of any change of floor level.
c. Be hung so that they do not reduce the effective width of any escape route across a landing.
d. If opening into a corridor, be recessed to the full width of the door.
e. Where hung to swing both ways (double swing), or subdividing corridors, be provided with a minimum of a vision panel.
f. Open to an angle not less than 90°.
g. Where 60 people or more people will escape through a door, the door should swing in the direction of escape (The door into the entrance lobby should be swung in this way)

5.4 Ancillary Areas and Places of Special Fire Risk

Ancillary areas and places of special (high) fire risk should be separated from other parts of the building and where high fire risk areas should be arranged to not affect the means of escape provisions.

The following areas are not deemed to be high fire risk and so would not generally require to be enclosed in fire resisting construction:

- Kitchens for cold food preparation and reheat (including tea points).
- Water storage tank rooms and plant rooms only containing air handling plant.

Where applicable; the following table will provide guidance on the required fire resistance provisions and fire door requirements for a given risk and floor area.

Table 6: Fire Separation for Areas of Ancillary Accommodation

Area of Ancillary Accommodation	Type of construction needs to separate ancillary accommodation from other parts of the building
• Storage areas greater than 1m^2 in area but not greater than 450m^2. • Repair and maintenance workshops where flammable or highly flammable liquids are not used or stored. • Kitchens (separate or in conjunction with an associated staff restaurant or canteen). • Transformer, switchgear and battery rooms for low-voltage or extra low voltage equipment. • Engineering services installation rooms other than refuge storage area, storage greater than 450m^2 and rooms housing internal combustion engines. • Changing rooms.	Robust construction having a minimum fire resistance of 30 minutes.
• Storage areas greater than 450m^2 (other than refuse storage) • Places classified as high fire risk areas • Repair and maintenance workshops where flammable or highly flammable liquids are used or stored • Refuse storage areas • Boiler rooms • Fuel storage spaces • Transformer and switchgear rooms for equipment above low voltage. • Rooms housing fixed internal combustion engine(s)	Robust construction having a minimum fire resistance of 60 minutes.
• Any electrical substation or enclosure containing any distribution board, generator, powered smoke control plant, pressurization plant, communication equipment, and any other equipment associated with life safety and fire protection systems	Robust construction having a minimum fire resistance of 120 minutes.

Note: Any openings in the required construction should be protected by doors having a similar standard of fire resistance.

5.5 Sprinkler Protection

Under the guidance given in BS 9999 there are no requirements to provide a sprinkler system and therefore no automatic sprinkler protection is proposed.

5.6 Protection of Openings and Firestopping

Any ductwork passing through compartment/fire resistant walls will maintain integrity of those elements by either:

- Containing within fire resisting construction.
- Containing by using fire resistant ductwork.
- Protection by installing fire dampers.

Ventilation ducts supplying or extracting air directly to or from a protected stairway should not serve any other areas.

Ductwork serving other areas and passing through a stair enclosure should be fire rated or separated by a fire-resistant enclosure.

Ductwork serving both escape routes will be provided with fire and smoke dampers (ES Rated) that are activated automatically on the activation of the building fire alarm and detection system. Dampers to in accordance with BS 9999.

Any openings for pipes with a restricted diameter breaching compartment walls are required to be fire stopped (unless protected along its entire length with fire resisting material), keeping the opening as small as possible, in accordance with BS 9999. All other pipes (of any diameter) should be provided with a proprietary seal, tested in accordance with BS EN 1366-3:2015.

Thermally actuated fire dampers and automatic actuated fire and smoke dampers triggered by smoke detection are not acceptable on kitchen extract system due to the likely build-up of grease within the duct which can adversely affect the effectiveness of any dampers.

Table 7: Maximum nominal internal diameter of pipes passing through a compartment wall/floor

Situation	***Maximum nominal internal diameter (mm)***		
	a) High melting point metal(1)	b) Lead, aluminium, aluminium alloy, uPVC(2), fibre-cement.	c) Any other material
1. Structure (but not a wall separating buildings) enclosing a protected shaft which is not a stairway or a lift shat	160	110	40
2. Any other situation	160	40	40

NOTES:

1. Any metal (such as cast iron, copper or steel) which, if exposed to a temperature of 800°C, will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.

2. uPVC pipes that comply with either BS 4514 or BS 5255.

5.7 Provisions for Cavities

The unseen spread of fire and smoke in voids will be controlled by the provision of cavity barriers. Cavity barriers will be provided to close cavities and openings in the following locations:

- At the edges of cavities, including around openings such as doors and windows.
- At the junction between an internal cavity wall and every compartment floor, compartment wall or other wall or door assembly forming a fire resisting barrier.

In addition to the above locations cavity barriers are also proposed in any newly created cavities (including ceiling voids and under floor service voids) where the cavity exceeds 20m (i.e. at 20m centres).

The cavity barriers will provide a 30 minute fire rating (i.e. 30 minutes integrity and 15 minutes insulation). Any penetrations through the cavity barriers will be either:

- Fitted with a proprietary sealing system.
- Pipes of limited diameters that are sealed with fire-stopping, or sealed with sleeving of non-combustible pipe material.
- Dampers are required to ductwork.

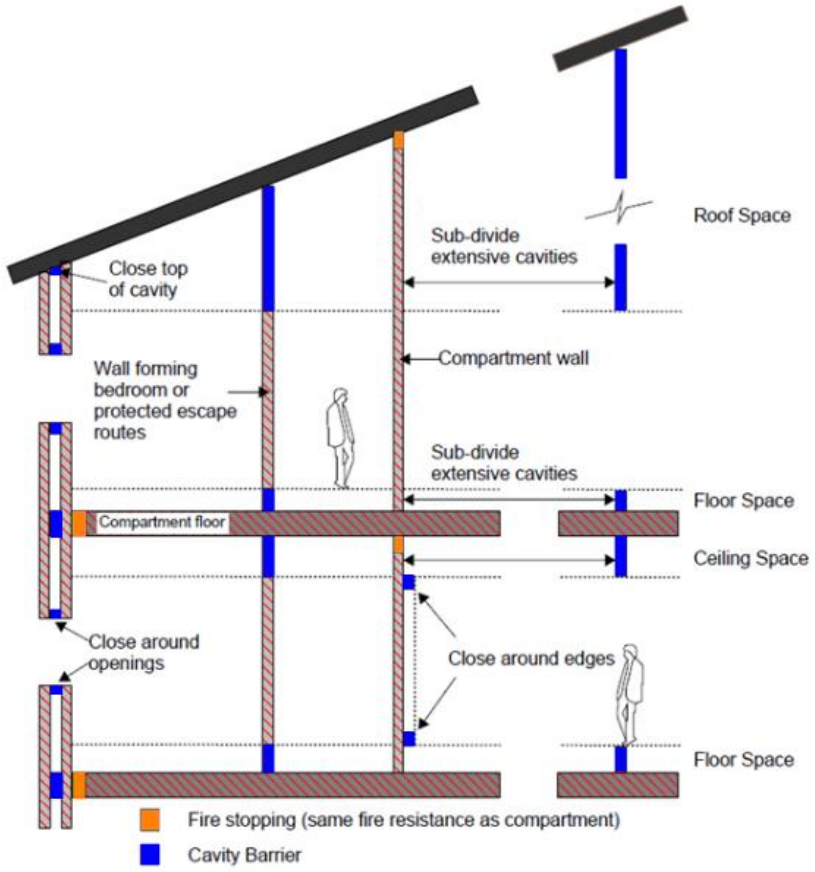


Figure 4: Provision of Cavity Barriers

6. B4 - External Fire Spread

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B4, External Fire Spread:

> *(1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of building.*
>
> *(2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.*

6.1 Overview

New buildings are required to be assessed for external fire spread. This is assessed in three ways; firstly, to ensure there is adequate separation to relevant boundaries to prevent fire spread, secondly, to also ensure that the external surfaces do not present a means for rapid fire spread and lastly, to ensure that the contents of the external walls do not provide a medium for rapid fire spread.

6.2 Space Separation

External fire spread calculations have been undertaken using the enclosing rectangle approach as detailed in BR 187 External fire spread – Building separation and boundary distances.

The relevant boundary should usually be taken as the site boundary. Where a wall faces onto a space that is unlikely to be developed, such as a road, canal or river, then the boundary may be assumed to be an imaginary line halfway across this feature.

BS 9999, Table 19 for perimeter access states ‘In the case of storage buildings, height should be measured to mean roof level’.

Where a portal framed building is near a relevant boundary, the external wall near the boundary may need fire resistance to restrict the spread of fire between buildings. It is generally accepted that a portal frame acts as a single structural element because of the moment-resisting connections used, especially at the column/rafter joints. Thus, in cases where the external wall of the building cannot be wholly unprotected, the rafter members of the frame, as well as the column members, may need to be fire protected. The design method for this is set out in SCI Publication P313.

Table 8: BRE 187 results

	Elevation size (m)	***Enclosing Rectangle (WxH) (m)***	***Boundary Distance Provided (m)***	***Distance required for 100% Unprotected Areas(m)***	***Satisfactory (Yes/No)***
A	26.1 x 13	27 x 15	42.80	20	Yes
B	33.9 x 13	40 x 15	36.10	20.1	Yes
C	39.5 x 13	40 x 15	42.40	24	Yes
*D**	58.1x 13	NA	NA	NA	N/A

* As the buildings are linked, under the same ownership and management there is no requirement to assess this elevation.

For external walls, any part 1m or more from the relevant boundary, is to be protected on the ‘inside of the building’ having RE (loadbearing and integrity) equal to the elements of structure and I (insulation) of 15 minutes.

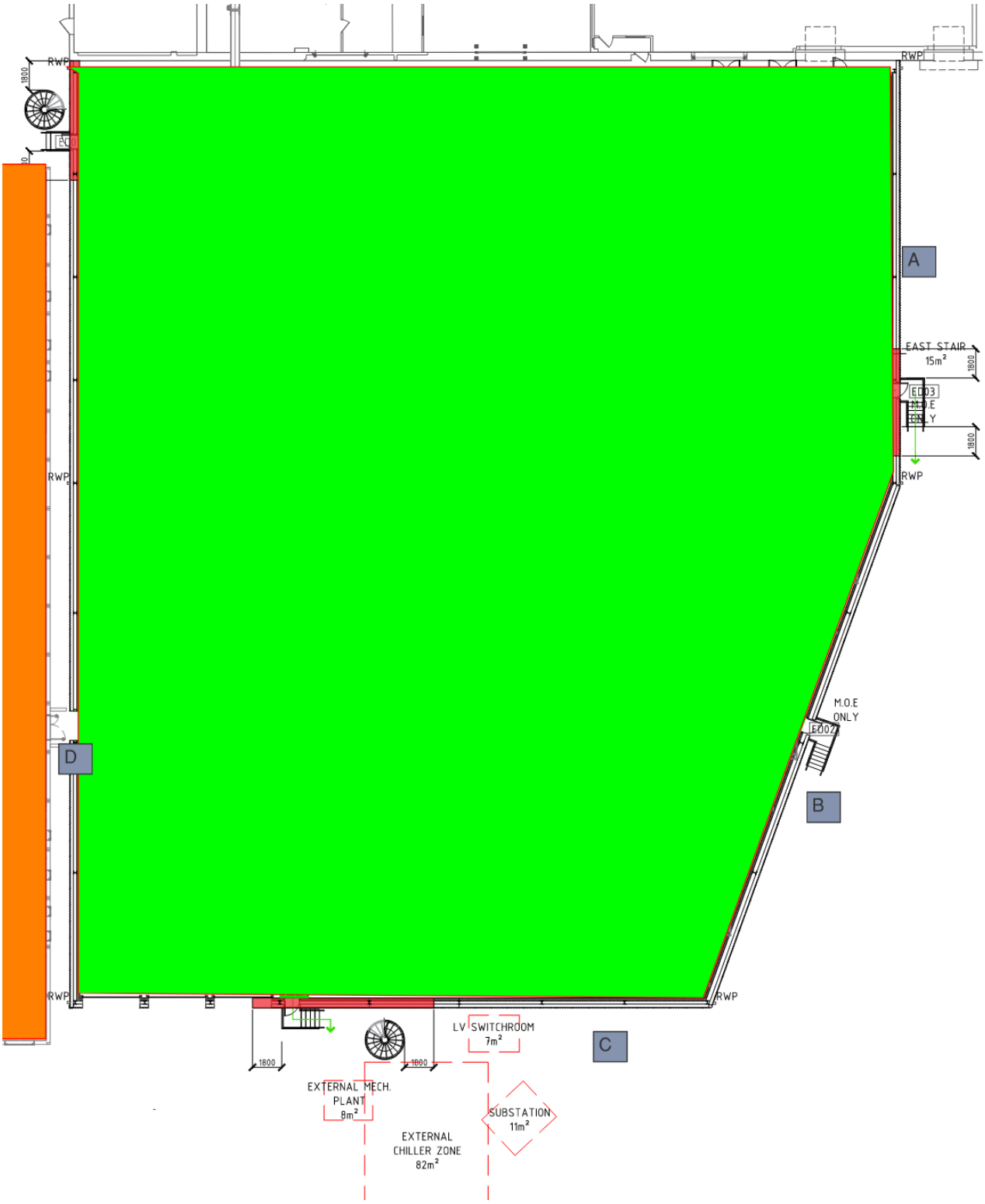


Figure 5: building elevation locations

The boundary distances and elevation hights should be verified onsite.

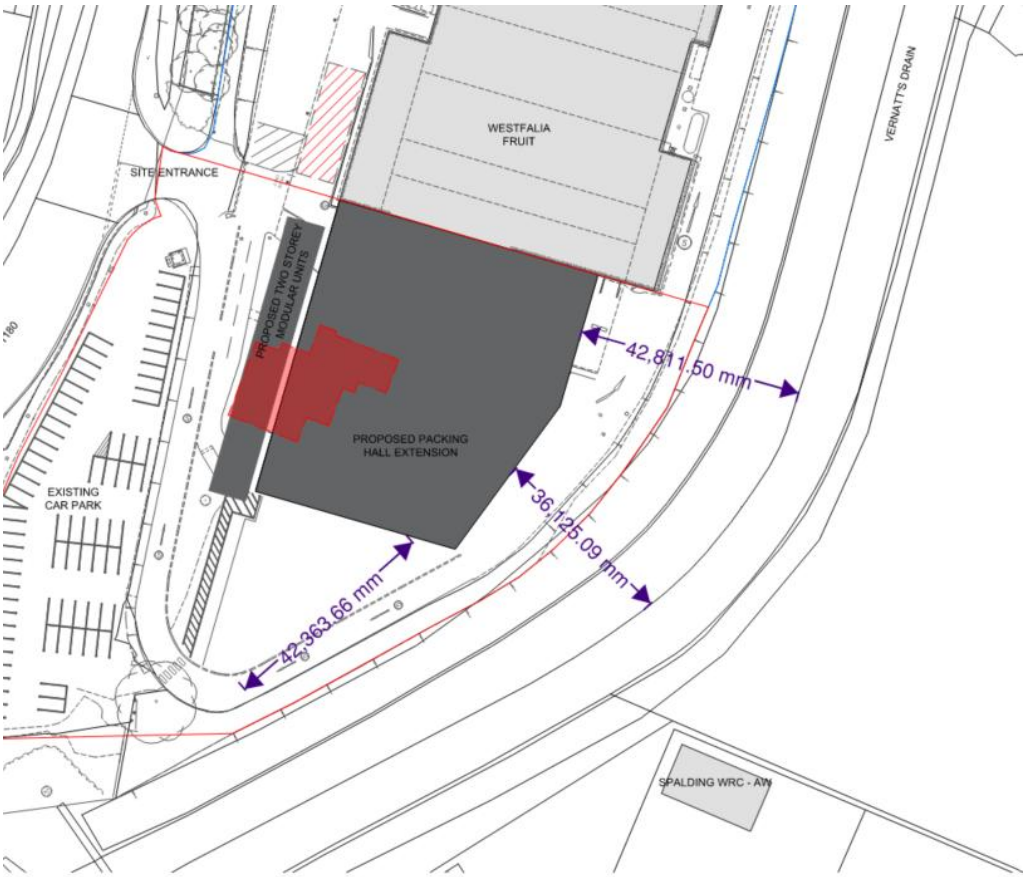


Figure 6: Boundary Locations

6.3 Surface Spread of Flame Requirements

The proposed extension will have an uppermost storey less than 18m above ground level and therefore does not have a restriction on insulation products and filler materials.

Where a building is more than 1m from a relevant boundary and has an elevation less than 18m in height, there is no specific rating given in guidance to the external surfaces.

Where the unit is 1m or less from the boundary the external walls and specified attachments are to be constructed out of materials classified as or better than Class B2-s1, d0 in accordance with BS EN 13501-1.

6.4 Roof Spread of Flame Requirements

Roof covering should be in accordance with BS 9999 Table 36 shown below in Figure 7.

Table 36 **Separation distances for roof coverings**

Designation of covering of roof or part of roof [A]		Distance of roof from any point on relevant boundary			
National class	European class	Less than 6 m	At least 6 m	At least 12 m	At least 20 m
AA, AB or AC	$B_{ROOF}(t4)$	Acceptable	Acceptable	Acceptable	Acceptable
BA, BB or BC	$C_{ROOF}(t4)$	Not acceptable	Acceptable	Acceptable	Acceptable
CA, CB or CC	$D_{ROOF}(t4)$	Not acceptable	Acceptable [B], [C]	Acceptable [B]	Acceptable
AD, BD (or CD [B])	$E_{ROOF}(t4)$	Not acceptable	Acceptable [C]	Acceptable	Acceptable
DA, DB, DC (or DD [B])	$F_{ROOF}(t4)$	Not acceptable	Not acceptable	Not acceptable	Acceptable [C]

Figure 7: BS 9999 Table 36

7. B5 - Access and Facilities for the Fire Service

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B5, Access and Facilities for the Fire Service:

> *(1) The building shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life.*
>
> *(2) Reasonable provisions shall be made within the site of the building to enable fire appliances to gain access to the building.*

7.1 Access to the Building for Firefighting

The total floor area of the building is between 8,000m^2 and 16,000m^2. Building with a floor area between 8,000m^2 and 16,000m^2 should be provided with access to 50% of the perimeter.

BS 9999, Table 19 for perimeter access states 'In the case of storage buildings, height should be measured to mean roof level'.

The building will be accessed via public and onsite roadways which need to be suitable to withstand a fire tender in the event of a fire. The following parameters will be achieved.

Table 9 Pump appliance access route requirements.

Appliance Type	Min. width of road between kerbs	Min. width of gateways	Min. turning circle between kerbs	Min. turning circle between walls	Min. clearance height	Min. carrying capacity
Pump	3.7m	3.1m	16.8m	19.2m	3.7m	12.5t*
High Reach	3.7m	3.1m	26.0m	29.0m	4.0m	17.0t*

Note: * The minimum carrying capacity should be checked with the local fire brigade

Turning facilities should be provided in any vehicular dead-end access route that is more than 20m long. This can be by a hammer-head or turning circle.

A full assessment of the fire service assessment will be provided once a formal site plan is provided.



Figure 8: Current Site Plan

Fire Action Plan from Design Team required showing Hydrant points, building entry points, available access for fire tender). This will be used as part of the firefighting support, Regulation 38 folder and a copy kept in the reception for ease.

7.2 Provision of Fire Hydrants

There is no hydrant within 90m of the proposed extension. Therefore it has been agreed via an email dated 28 April 2025 by Matthew Hall Fire Safety Inspector, Lincolnshire Fire & Rescue. That they would utilise Vernatt's Drain watercourse.

7.3 Emergency Power Supplies

In the event of a failure of the mains power supply a secondary backup power supply will be provided to feed all life safety systems that require electricity to function as intended. The secondary supply will be appropriate for the life safety system concerned. The following life safety systems will include a backup power supply:

- Emergency lighting.
- Automatic fire alarm and detection systems.
- All fire alarm interlinked fire/smoke dampers

It should be ensured that all power and control cabling required for life safety equipment within the building is specified and installed in accordance with BS 8519.

8. Fire Safety Management

The primary focus of this strategy is on two groups, the persons present in the building (and the provisions associated with ensuring safe egress), and on fire-fighter protection.

Regulation 38 of the Building Regulations requires that the Fire Strategy be brought to the attention of building management and incorporated into the risk assessment that will have to be carried out post occupation under the Regulatory Reform (Fire Safety) Order together with staff training, systems maintenance etc. and documented.

The Regulatory Reform (Fire Safety) Order 2005 requires that systems provided for fire safety are maintained in good working order at all times. This includes firefighting equipment together with other facilities to be provided for the safety of people in the building and to help firefighters.

Due the managed provision of disabled evacuation, we would highlight the need to adopt a Level 1 enhanced management system as detailed in the table below, to ensure high level conformity with a management system such as BS 9997. This should be conveyed to the end user to ensure agreement.

Table 10: BS 9999 Table 7 extract

Management system level	Management system type	Robustness	Minimum assurance	Conformity
1	Enhanced	Best practice	High level of assurance	Conformity with a management system standard such as PAS 7
2	Adequate	Good practice	Adequate level of assurance	Conformity with requirements of legislation

Key factors listed below should be considered when defining the fire risk management strategy once the building is occupied, these include:

- Fire Risk Assessment.
- Resources and authority.
- Fire safety training.
- Control of work onsite.
- Maintenance and testing.
- Communications.
- Emergency planning.
- Disabled person evacuation.
- Allocate assembly points.

At completion of the project the following information is recommended to be passed onto the responsible person where applicable:

- This Fire Strategy
- All design assumptions relating to the management of the building (where not included in the Fire Strategy)
- Escape routes, escape strategy and muster points
- Details of all passive fire safety measures including compartmentation, cavity barriers, fire doors, self-closing fire doors and other doors equipped with relevant hardware (e.g. access controls), duct dampers and fire shutters.
- Fire detector heads, smoke detector heads, alarm call-points, detection/alarm control panels, alarm sounders, emergency communication systems, CCTV, fire safety signage, emergency lighting, fire extinguishers, wet risers and other firefighting equipment, other interior facilities for the fire service,

emergency control rooms, location of hydrants outside the building, other exterior facilities for the fire service.

- Details of all active fire safety measures including:
    - Smoke control system(s) (or HVAC system with a smoke control function) design, including mode of operation and control systems.
    - Any high-risk areas (e.g. heating machinery) and particular hazards
    - As built plans of the building showing the locations of the above items.
    - Specifications of any fire safety equipment provided, including operational details, operator's manuals, software, system zoning and routine inspection, testing and maintenance schedules. Records of any acceptance or commissioning test.
    - Any provision incorporated into the building to facilitate the evacuation of disabled people.
- Any other details appropriate for the specific building.

This information is mainly provided in the form of as built plans, but supplemented in this case by the Fire Strategy, i.e., this document. Using this information, the "responsible person" should ensure a fire risk assessment is carried out for the building. It is recommended that this is recorded, kept with the other information indicated in this document and updated on a regular basis or when any significant change is made to the fire risk or facilities in these areas.

9. References

i. BS 9999 – 2017, Fire safety in the design, management and use of non-residential buildings – Code of practice

ii. The Building Regulations 2010: Approved Document B. Volume 2. 2019 edition, incorporating 2020 and 2022 amendments. London: HMSO.

iii. BS 5839 Part 1, Fire detection and fire alarm systems for buildings. Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises, 2025

iv. BS 5266-1:2016, *Emergency lighting. Code of practice for the emergency lighting of premises*. BSI

v. BS EN 1838:2013, *Lighting applications. Emergency lighting*. BSI

vi. BS 5499-4:2013, *Code of practice for escape route signing*. BSI

vii. BS ISO 3864-1:2011, *Graphical symbols. Safety colours and safety signs. Design principles for safety signs and safety markings*. BSI

viii. BS 8519:2020, *Selection and installation of fire-resistance power and control cable systems for life safety and fire-fighting applications*. Code of practice. BSI

ix. BR 187: 2014 *External Fire Spread Building Separation and Boundary Distances*