

APPENDIX 1



FRANKHAM

REPORT

Feasibility Summary for the Installation of Retrofit Sprinkler Systems to Southwark Housing Blocks



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Document Control

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CONTENTS

Document Control	i
Copyright, Design and Patent Act 1988	i
Third Party Assignment	ii
CONTENTS	iii
1.0 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Instructions	1
1.3 Client Brief.....	3
1.4 Properties & Accommodation.....	3
2.0 INSPECTION METHODOLOGY	5
2.1 Programme.....	5
2.2 Data Collection	5
2.3 Access.....	5
2.4 Key Inspection Areas.....	7
3.0 RECOMMENDATION RATIONALE	9
3.1 Background.....	9
3.2 General Government Guidance	9
3.3 London Fire & Emergency Planning Authority Guidance.....	9
3.4 Assumption Criteria.....	10
3.5 Occupancy Profiles.....	12
4.0 INSTALLATION REQUIREMENTS	14
4.1 General Sprinkler Installations.....	14
4.1.1 Introduction.....	14
4.1.2 Water Supply	14
4.1.3 Flow Rates	21
4.1.4 Controls	21
4.1.5 Pipe Network.....	21
4.1.6 Sprinkler Heads.....	21
4.1.7 Sprinkler Alarm	22
4.2 Personal Protection Sprinkler Installation	22
4.2.1 Introduction	22
4.2.2 System Requirements	23
4.2.4 Installation and Monitoring.....	24

4.3	Building Works	25
4.4	Mechanical & Electrical Services.....	26
4.5	Protection of Installation.....	27
4.6	Duration of Works.....	28
4.6	Health & Safety Issues	28
4.6.1	CDM Regulations 2007	28
4.6.2	Asbestos.....	28
4.6.3	Segregation of Works.....	30
4.6.4	Building Control.....	30
4.7	Annual Maintenance & Servicing Requirements.....	31
4.7.1	Sprinkler Heads.....	32
4.7.2	Sprinkler Head Restriction.....	32
4.7.3	Pipe work	32
4.7.4	Water Supply	32
4.8	Landlord & Tenant Issues	32
4.8.1	Leaseholders.....	32
4.8.2	Landlord Obligations	33
5.0	COMMERCIAL ANALYSIS OF INSTALLATIONS	34
5.1.	Budget Costs.....	34
5.2	Approximate Annual Repair Cost and Maintenance Budget	35
5.3	System Failure Costs.....	36
5.4	Life Cycle Costs	36
	CONCLUSION.....	37
	APPENDICES.....	40

1.0 INTRODUCTION

1.1 Background

On 3rd July 2009, Lakanal House a 14 storey tower block on the Sceaux Garden Estate in Camberwell suffered a substantial fire that led to the death of 6 residents. On 28th March 2013 the inquest concluded and Her Honour Francis Kirkham issued a letter to the council, pursuant to rule 43 of the Coroners Rules (as amended) requesting consideration of retrofit sprinkler systems in Southwark Council's high rise residential buildings.

On 23 May 2013 Southwark Council provided a response to the Rule 43 letter. The response confirmed that Southwark Council had undertaken a survey of 3 typical high rise blocks which identified a number of issues that would need to be considered with regard to installing a retrofit sprinkler system. The issues are summarised below.

- No right of access to leasehold properties
- Full internal stock condition survey of leasehold and tenanted dwellings necessary
- Effect on the amenity of the dwellings of pipe work
- Disruptive associated builder's works
- Likelihood of disturbance to Asbestos
- No current government guidance for the retrofitting of sprinklers

The Council concluded by confirming their intention to undertake a full feasibility study which looks at the requirements for 145 blocks taking into account the complexities of the blocks, design intent and existing fire safety features as well as best practice and current guidance from the government and fire authorities.

1.2 Instructions

On 30th August 2013 Frankham Consultancy Group Limited were instructed by Southwark Council to undertake a feasibility study for installing retrofit sprinkler systems in 145 housing blocks.

A letter of appointment was received on the 30th August 2013 followed by a formal order which was received on 20th October 2013.

An initial start up meeting took place on 28th August 2013 which was attended by Peter Myall and Lara Dennison of Frankham Consultancy Group. Tony Hunter and Steve Kallagher attended on behalf of Southwark Council.

Survey works of the properties commenced on Wednesday 4th September 2013.

1.3 Client Brief

The Client brief is as per the Councils invitation to quote document of July 2013. This document sets out the background to the commission, the feasibility requirements and the key deliverables. A copy of this document is provided at Appendix A to this report.

1.4 Properties & Accommodation

Southwark Councils brief identified that 145 existing housing blocks would need to form part of the study. The 145 properties are a mixture of General Needs, Sheltered Housing and Hostel accommodation types.

During the course of the survey programme the following 4 blocks have been omitted by Southwark Council for the following reasons.

1. Bradenham House – It is understood that this block is set for demolition
2. 6 Willow Walk – It is understood that this block is set for demolition
3. King Charles Court – It is understood a retrofit fire sprinkler system is already being installed
4. 244 Old Kent Road – Understood not under Southwark ownership

Lakanal House was added to the programme to give a revised total of 142 blocks to be assessed.

A property list was provided by the Council with address information for each property and the accommodation type. This list also indicated the blocks that are identical in the construction and layout so that cloned data could be utilised as highlighted in the Councils brief.

During the course of the surveys our site team identified further similarities in regard to construction and layout of other properties not previously identified. These properties have also been utilised as cloned data.

63 of the 142 blocks were identified as being suitable for assessment using cloned data. The property list which identifies properties assessed using cloned data is included within Appendix C.

2.0 INSPECTION METHODOLOGY

2.1 Programme

Using the Councils property list as a basis, a survey programme was prepared.

Where the Housing blocks are of identical construction (cloned data) we have only inspected one block of that type. A sample inspection of the blocks used as cloned data has been undertaken to ensure that the block have no fundamental differences.

2.2 Data Collection

A bespoke template has been used to ensure a consistent approach to data collection and that sufficient information is gathered on site.

Site inspections of the properties have been undertaken by the Frankham Building Surveying team. The individual Building Surveyors were accompanied by a Specialist in the design and installation of Residential fire sprinkler systems for high rise buildings and Residential Care homes. The specialist sprinkler installer is an approved Contractor of The British Fire Sprinkler Association (BAFSA), The Residential Sprinkler Association (RSA) and who has relevant experience in this specialist area of work.

2.3 Access

Access into plant areas has been achieved via plant room suited keys supplied by the Council. We have not been able to access some areas as other keys are required or the plant room location could not be identified. These access issues are generally limited to the General Needs properties.

On site, access to General Needs properties main common areas was achieved to some properties using Fire Brigade drop keys. Access to inspect a sample of all different types of accommodation and configurations within these blocks was by cold call procedure via door entry systems. Southwark Council provided an introductory letter to be shown to the residents that set out detail of the purpose of our visit. This method of access into the individual dwellings was slow and it has been difficult to achieve a full sample of the different types of accommodation types. However we have carried on with the cold call process which has continued to be slow.

Access to the Sheltered Housing and Hostel accommodation has been much more successful. A contact list of Sheltered Housing and Hostel Officers was provided and specific arrangements for visits were made. During these visits Surveyors have been accompanied by a Housing Officer to provide access into the required sample flats and bedroom units.

2.4 Key Inspection Areas

2.4.1 Existing Construction and Layout

An overall assessment of the suitability of the existing building construction and services has been undertaken to ascertain whether it is possible to install a retrofit sprinkler system within the property.

All accessible communal areas entrances, corridors, plant rooms and restricted communal areas where sprinkler installations could be routed have been inspected.

Assessment of the following has been undertaken:

- Location of existing risers and suitability for use as sprinkler risers or drops
- Location of proposed new risers if the existing riser unsuitable
- Routes of horizontal and vertical pipe work and the necessity for core holes to be formed
- Ceiling heights to check suitability for lowering ceilings
- Existing electrical and mechanical services that may be affected

An inspection of a sample of the individual dwelling layout types has been undertaken where possible at each property.

Assessment of the following has been undertaken:

- Routes of horizontal pipe work and the necessity for core holes to be formed
- Ceiling heights to check suitability for lowering ceilings
- Existing Electrical and Mechanical services that will be affected if lowered ceilings are required
- Window detailing to check if bulkhead details will need to be formed to allow lowered ceilings
- Door detailing at ceiling level to check if they will need to be replaced to allow lowered ceilings.

2.4.2 Water Supply

An inspection of the existing domestic cold water supply arrangement has been undertaken at each property. The details of the existing water pumps performance have been identified via the pump casings or from the manufacture.

Where the domestic supply is not deemed adequate alternative options have been considered either via provision of a water storage tank or new dedicated water supply.

The water service provider's minimum pressure guarantee is 1 bar within the property. A sprinkler specialist has taken pressure readings of similar properties within the local area and consulted the local water service provider and it is clear that 3 bar and above pressure is available within the local area.

2.4.3 Existing Fire Safety Arrangements

In order to make a specific assessment of whether a retrofit fire sprinkler system should be considered at each block it has been necessary to review the existing fire safety features and arrangements.

An inspection of the existing active and passive measures that affect fire safety at each property has been undertaken. During our inspection any recently undertaken fire safety upgrade works have been noted.

3.0 RECOMMENDATION RATIONALE

3.1 Background

The social housing sector has looked to the government for guidance on retrofitting of sprinklers, but the response from the Department of Communities and Local Government (DCLG) to the Southampton Rule 43 letter suggests that, instead of taking a view on behalf of all social housing landlords, DCLG considers that decisions regarding the retrofitting or not of sprinkler systems to high rise buildings is for landlords to consider themselves.

There are differing opinions within the housing sector and the fire industry as to whether compartmentation and other appropriate fire stopping and early warning systems such as heat and smoke detection are in themselves sufficient risk mitigation for high rise dwellings.

3.2 General Government Guidance

The local government group publication "Fire Safety in Purpose Built Blocks of Flats" states

"It is unlikely that retrofitting sprinklers or water mist systems would be reasonably practicable for existing blocks. Nevertheless, this does not preclude their use where there is clear justification and appropriate consideration of the practicalities of their installation and subsequent maintenance."

It also states that the provision of a sprinkler system could be considered as a compensatory fire protection measure where periods of fire resistance are not met or cannot be readily achieved by upgrading or where there are insufficient means of escape from flats.

3.3 London Fire & Emergency Planning Authority Guidance

The London Fire & Emergency Planning Authority (LFEPA) has however produced a statement regarding the retrofitting of sprinklers and advocates the provision of sprinklers in domestic dwellings where the most vulnerable residents live. (See Think Sprinkler Leaflet published by LFEPA, freely available for download on www.london-fire.gov.uk). The term vulnerable residents, however, is not that clear. The sprinkler leaflet produced by the LFEPA states that "We advocate the fitting of sprinklers in the homes of people most at risk from fire – younger people, older people, people with mental health problems and those who have mobility problems."

Vulnerable residents are also identified by the LFEPA as those falling into the following categories

- Residents with a disability, especially impaired mobility
- Residents with visual and / or hearing impairments
- Residents with mental health problems
- Intoxication by drugs and / or alcohol
- Smoking

- Old age
- Living alone

This is not considered to provide clear guidance on exactly which residents the LFEPA is advocating the provision of sprinklers for.

For the purposes of retrofitting sprinklers we determine that those persons that are unable to self evacuate are the most vulnerable and we have used this criterion for the basis of our recommendations.

As part of this study we have also looked at the fire safety strategy for the building types, including compartmentation and early warning systems and identified the provision we consider to be appropriate.

3.4 Assumption Criteria

It is assumed that a stay put policy is adopted for the sheltered schemes and general needs blocks as recommended in the local government group publication "Fire Safety in Purpose Built Blocks of Flats".

A 'stay put' policy involves the following approach.

- When a fire occurs within a flat, the occupants alert others in the flat, make their way out of the building and summon the fire and rescue service.
- If a fire starts in the common parts, anyone in these areas makes their way out of the building and summons the fire and rescue service.
- All other residents not directly affected by the fire would be expected to 'stay put' and remain in their flat unless directed to leave by the fire and rescue service.

For this strategy to be effective it will be necessary for there to be adequate (normally 60 minutes) compartmentation between the flats preventing spread of fire from one flat to another or to the communal areas or any ancillary parts. Current benchmark design guidance for new purpose-built blocks of flats recommends that the following should be constructed as compartment walls and floors:

- every floor (unless it is within a multi-level flat)
- every wall separating a flat from any other part of the building
- every wall and floor enclosing a refuse storage room.

It also needs to be ensured that the fire-resisting enclosure of flats is maintained at all openings, including:

- flat entrance and other doors
- any internal windows into the access corridor, or any glazing above or around the flat entrance door
- openings in walls and floors for services, such as water, gas and electricity

- vents into shared air supply ducts, but, more commonly, shared extract ducts from bathrooms and sometimes kitchens

Individual dwellings are not covered by the requirements of the Regulatory Reform (Fire Safety) Order 2005, however it is understood that some compartmentation between flats has been checked as part of the fire risk assessment process. This should be completed to ensure that the stay put policy is appropriate for each individual building and that compartmentation meets the current standards. Where this is not the case improvements will be required, it is assumed that any areas that do not meet the current compartmentation requirements will be upgraded.

The stay put policy also requires individual residents to be made aware of a fire within their dwelling in order to alert others in the flat and make their way to a place of safety and alert the fire service.

The local government group publication "Fire Safety in Purpose Built Blocks of Flats" states that

*"In **all** flats, early warning of fire should be provided by means of smoke alarms installed in accordance with BS 5839-6. A category LD3 system should be considered the minimum in all circumstances. This is a system where there is one or more smoke alarms solely in the circulation spaces of a flat. Flats with more than one level and those with more than one hallway or circulation space will always require more than one smoke alarm. "*

We would therefore recommended that provision of a minimum of an LD3 system within all flats be considered.

3.5 Occupancy Profiles

The key to an effective fire safety strategy is that should a fire start, it is prevented from spreading and anyone affected by it is made aware and can begin to evacuate.

The provision of appropriate fire compartmentation within a dwelling will prevent it from spreading and a category LD3 alarm system will provide early warning to anyone within the vicinity enabling them to evacuate the area.

It is therefore considered appropriate to provide 60 minutes fire compartmentation and a minimum of a category LD3 alarm system where occupants are able to self evacuate.

It may however be appropriate for a higher level of protection to be provided for those occupants that are unable to self evacuate and it is considered that a suppression system would provide additional benefit to these occupants. Suppression systems can be provided to the whole block or to individual dwellings and it is considered that some blocks would benefit from sprinkler systems and in other cases individual dwellings only. (Personal Protection Sprinklers).

It is recommended that a sprinkler system be fitted to the whole block where there are a significant number of residents who may be unable to self evacuate. This would include sheltered schemes and hostels. However in general needs blocks where it is considered that the majority of occupants would be able to self evacuate it is recommended that personal protection sprinklers be provided for the individual dwellings of those occupants identified as being unable to self evacuate.

The recommendations for providing sprinkler/suppression systems for those residents unable to self evacuate is in accordance with the guidance provided by the LFEPA and the fire safety strategy adopted by Southwark Council for their blocks.

There is an assumption that the remedial works identified within the fire risk assessment will be completed, that checks will be made to ensure that appropriate fire compartmentation is in place throughout the building, including between dwellings and further that automatic detection is provided within the flats in accordance with the recommendations in the local government group publication "Fire Safety in Purpose Built Blocks of Flats".

4.0 INSTALLATION REQUIREMENTS

4.1 General Sprinkler Installations

4.1.1 Introduction

BS9251:2005 sprinkler systems are a wet pipe system, in that, the sprinkler pipes are charged with water at all times. When a fire occurs and the nearest sprinkler head is subjected to the heat from the fire, a fusible link breaks thus releasing a plug within the sprinkler which in return allows the release of water.

BS9251:2005 is the UK standard for Domestic and Residential Sprinkler systems which are primarily used for life protection, in that, they are designed to ensure, as far as practically possible, to maintain the dwelling's escape routes from the building when a fire occurs.

Historically BS9251 sprinkler systems have more than out performed there basic requirement as in nearly all cases the sprinkler system extinguishes the fire, thus ensuring that not only can the occupants escape easily but also provides a great deal of building protection.

BS9251 is currently under review and a revised version is due to be released next year, therefore, there are certain requirements and facts within BS9251:2005 that are out of date and thus trade associations such as BAFSA, (British Automatic Fire Sprinkler Association), has released Technical Guidance Notes 1, (TG1), which provides additional information and corrects some parts of BS9251:2005.

Sprinkler systems design to BS9251:2005 should also therefore take into account BAFSA TG1, which is a document that has also been approved by FIRAS who is the third party accreditation company that most residential sprinkler designers and installers are approved by.

This report takes into account BS9251:2005 and BAFSA TG1.

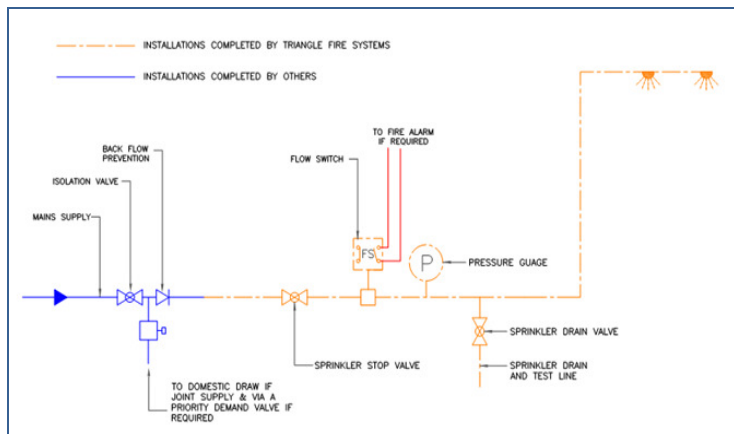
4.1.2 Water Supply

The water supply or water source can be direct from the rising main, town main¹ via a break tank and pump, town main via a booster pump, or interfacing with the current water supply to the building.

Within the individual property reports different types of sprinkler water supplies have been referenced and are identified below.

¹ The Town Main is a terminology use in the sprinkler industry to describe the water supply when derived from the local water undertakers' mains supply.

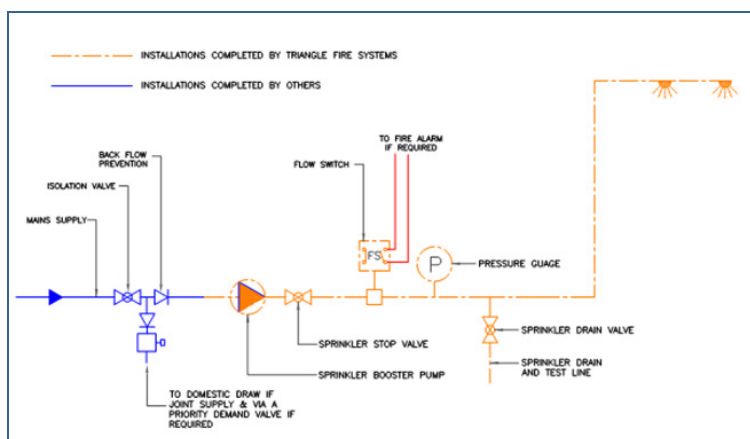
Type 1 -Direct Mains Supply



A water supply is brought into the building which may be dedicated to the sprinkler system or serve both the sprinkler system and the domestic draw. This type of supply is extremely reliable and normally cost effective.

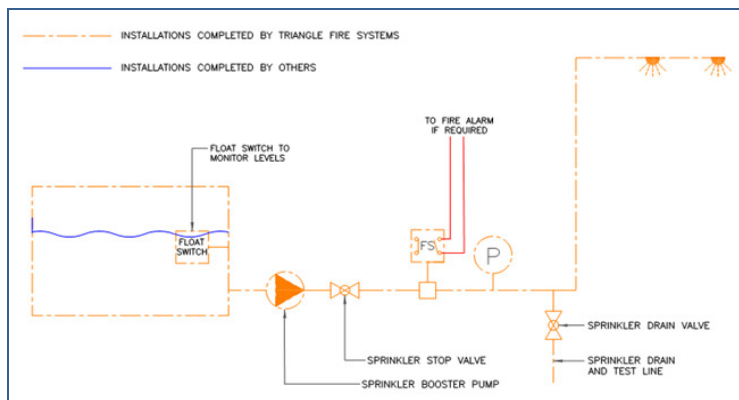
When used as a joint supply then it may be required to have the domestic draw via a demand valve. This depends on the flow rate provided by the main supply and the likely flow rate used by the domestic draw. If required the sprinkler flow switch will close the demand valve on activation of the sprinkler system thus leaving all the available water and pressure to the sprinkler system only.

Type 2 - Direct mains supply with booster pump or cold water tank on roof or within the roof void



This sprinkler supply system is as per Type 1 but with the addition of a booster pump. Booster pumps can only be used when there is sufficient flow but not sufficient pressure. Additionally, permission must be gained by the water supplier. However, where the water tank is on the roof then this system can also be used and permission from the water supplier.

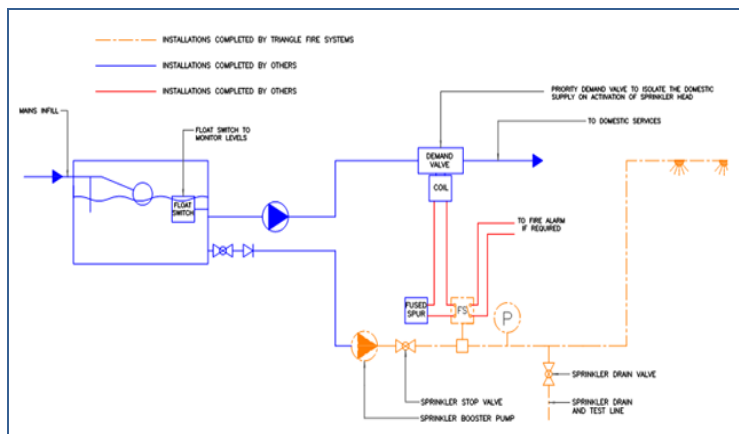
Type 3 – Dedicated Sprinkler Tank



When the current water supply is insufficient and the addition of a separate water supply from the main does not have sufficient pressure/flow, then a dedicated sprinkler tank should be installed. This tank can have the addition of an infill of simply filled up with a hose and monitored via the float switch.

Tanks can be one large tank or multiple tanks linked together and they can be placed underground if required.

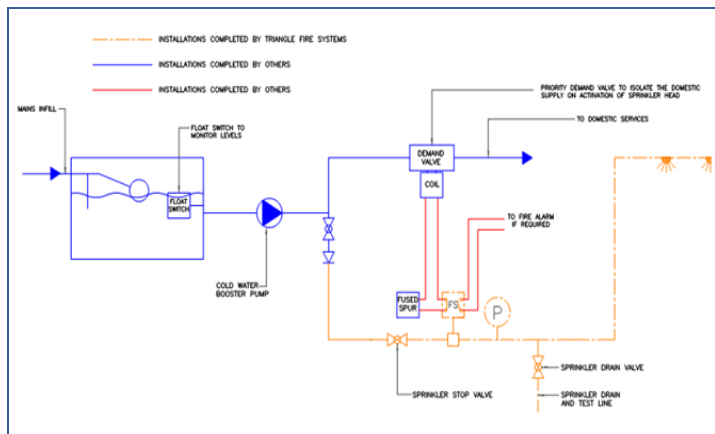
Type 4 – Combined tank and separate sprinkler pump



Often the water tank is satisfactory but the pump may not be good enough to handle the flow rate of the building, the sprinkler flow rate and the pressure. Whilst it will be investigated to see if an upgrade to the existing pumps is practical, a dedicated sprinkler pump is often the way forward.

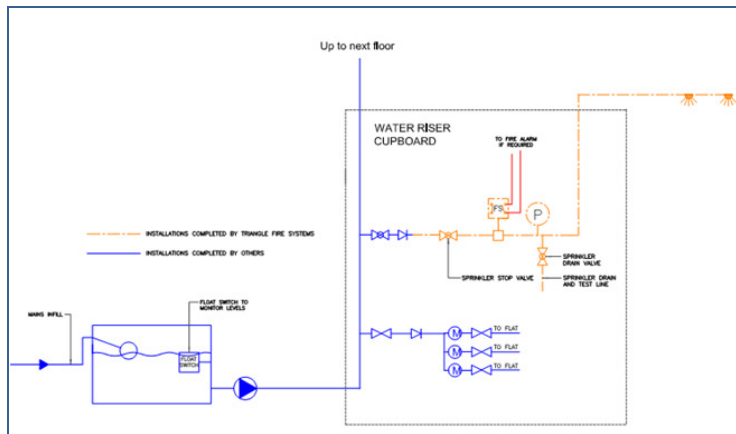
In this situation on operation of the sprinkler system the sprinkler flow switch will close the demand valve ensuring that all of the tanks water will be available for the sprinkler system.

Type 5 – Combined tank and pump



With this system the cold water tank and pump is found to be more than adequate to handle the flow and pressure required by the sprinkler system but not simultaneously with the domestic draw. Therefore, a branch is fitted on the output from the cold water booster pump set followed by an isolation valve and a check valve. The sprinkler system is then taken from this point and again the sprinkler flow switch closes the demand valve to ensure all of the water, pressure and flow is solely available for the sprinkler system.

Type 6 – Sprinkler system connected to cold water riser on each floor



With this system the cold water tank and pump is found to be more than adequate to handle the flow and pressure required by the sprinkler system and the domestic demand. In each riser cupboard a branch is fitted followed by a full bore isolation valve and a check valve. The sprinkler system is then connected to this point. Effectively this means that we have a separate sprinkler system to each floor.

4.1.3 Flow Rates

Within BS9251:2005, there are two specifications, Domestic and Residential. All of the properties within this feasibility study will be under the residential specification. Therefore the duration of the supply must be 30 minutes or greater.

The flow rate however will change but would normally be greater than 260 litres per minute, (4.3 litres per second). BS9251 states that in a residential sprinkler system four sprinkler heads must be capable of operating simultaneously if there are four sprinkler heads in any one room. Therefore, in most cases, if the communal corridor is sprinkler protected then at least 200 litres per minute will be required. In other situations, there may not be more than two sprinkler heads in any one room and therefore the flow rate maybe as low as 100 litres per minute.

The actual flow rate will only be known after a full design has been completed which is outside of the scope of this feasibility study. However, the flow rate where detailed in the feasibility studies will be very close to the final figures.

4.1.4 Controls

The sprinkler controls will include such items as a drain and test valve, stop valve, pressure gauge and flow switch. If the sprinkler system is using a dedicated sprinkler pump then these components would often be part of the sprinkler pump.

4.1.5 Pipe Network

The sprinkler pipe network extends from the sprinkler controls to the sprinklers located around the building. The majority of the pipe would be CPVC Blazemaster but can also be copper or steel. However, CVPC is most often used for the following reasons:

- has the longest life span of over 50 years
- does not support bacterial growth
- extremely quick to install with the very little mess
- cost effective
- flexible

4.1.6 Sprinkler Heads

Sprinkler heads will be of the Residential type and can be concealed, semi concealed or pendant type. The cost of each type is very similar and where possible the concealed type should be used as they are less obvious and unlikely to be damaged.

4.1.7 Sprinkler Alarm

While BS9251 states that a sprinkler alarm should be fitted that can be heard in all parts of the dwelling, this could conflict with the existing fire strategy within the Sheltered Housing and Hostel accommodation. Therefore, for each building the feasibility report will give options for the sprinkler alarm with consideration to the existing fire strategy with the particular building. The most common practice will be to link to the installed fire systems where they exist.

4.2 Personal Protection Sprinkler Installation

4.2.1 Introduction

Since the introduction of Domestic sprinkler system to BS9251 in 2005, there have been many requests to provide a Personal Protection Sprinkler Systems (PPS) for at risk people. Many systems have been promoted but they are not backed by a British Standard and therefore, they cannot be totally relied upon.

A system has been recently developed that can be installed within a day and later removed, stored and subsequently re-installed within another dwelling. This system is in full compliance with BS9251:2005.

BS9251:2005 has two specifications, that of Domestic and Residential. PPS systems use the Domestic specification only. Therefore, to comply with BS9251:2005, the system must be capable of running for ten minutes and if there are two heads in any one room then the system must be capable of running two heads for 10 minutes.

Whilst it is possible that two heads may be required in one room where they are greater than 4.9m by 4.9m, it is very seldom that 2 heads are required particularly in flat accommodation. Should a situation occur where BS9251 dictates that more than one head is required in any one room, there will be additional costs due to pipe work, pump and tank size increases.

The PPS system that has been considered is in full compliance with BS9251 and also takes into account the upcoming changes to the British Standard.

In most cases the systems are used to protect an at risk person who can no longer move from one room to another to self evacuate, therefore, the complete sprinkler system is usually setup in one room and it is not necessary to link to a water supply. The PPS system can also be extended into multiple rooms within each dwelling.

4.2.2 System Requirements

For a PPS system to be installed there are minimum requirements that need to be met:

- A space needs to be made available for the tank and the control systems. The floor area required will depend on the tank used. There are many tanks available but the following are common sizes:
 - Length 1000mm, Width 630mm, Height 930mm
 - Length 1250mm, Width 460mm, Height 1010mm
 - Diameter 700mm, Height 1435mm
- An electrical supply must be provided. Whilst the electrical supply should be a dedicated supply, as long as the optional extra of 'Off Site Monitoring' is included (refer to section 4.2.4) it is possible to use an existing supply via an un-switched fused spur. The sprinkler supply should not be connected to an RCD device unless the RCD is dedicated to the sprinkler system.

4.2.3 PPS System Components

The PPS system includes a tank, a float switch and submersible pump, a control panel, valve group, pipe work and sprinkler heads. A basic system includes pipe work sufficient to install the sprinkler head up to 10 meters from the control equipment but this can be added to.

The pipe work is charged with water and on activation of the sprinkler the pressure switch detects the fall in pressure and thus starts the pump.



The photograph above shows the controller, (measuring 300mm by 220mm) alongside the sprinkler controls, (measuring 300mm by 525mm). These items are typically mounted above the water tank but this is not a requirement.

4.2.4 Installation and Monitoring

The tanks are positioned in a suitable location filled via hose. The water level is monitored at all times and therefore, the tank does not need a dedicated water supply.

The pump controller is wall mounted along with the sprinkler controls. The sprinkler controls are then linked to the submersible pump. Following this, the sprinkler pipe is extended from the top of the sprinkler controls to the sprinkler head or heads.

Connection to the electrical supply is made and the system is then fully tested.

The tank and controllers can be located in a cupboard with door or hatch access or left fully exposed. The pipe work can either be left exposed, painted with water based paint or concealed using pipe casings.

Although BS9251 does not require fault monitoring at this time, the PPS system monitors and sounds an alarm on the following fault conditions:

- Loss of 240V power
- Loss of 12V DC power
- Loss of system pressure
- Low level water
- Weekly test failure

The fault signals can be monitored off site although this function will require a BT socket. A simple Texacom auto-dialler module can be connected to the pump controller and therefore, should a fault occur a text message is sent to a nominated person, or persons, (up to eight numbers can be entered). The dialler can also send a set message weekly to inform that the weekly test has passed successfully.

Should the sprinkler system activate, a message will be sent to the registered numbers stating that the sprinkler system has activated and will give the location of the property.

The sprinkler is capable of being linked to the smoke detection system although the pump set does have its own fire alarm included as part of the system.

In accordance with the recommendations of BS9251:2005 the PPS system will need to be serviced annually.

4.3 Building Works

Associated builder's works that are required to facilitate the retrofit sprinkler system will add significant costs to the works. The builders works will be disruptive to Tenants of the General Needs blocks and the Residents within Hostels and Sheltered Housing Units.

During inspections individual assessments have been made of each block and the sample dwellings accessed. The works identified are included within each block report.

In general the following works have been highlighted and considered:

- Core drilling of holes through ceilings and walls
- If existing ceiling heights are suitable, install new ceilings at a lower level to conceal pipe work
- Construction of new pipe casings to conceal pipe work if lowering the ceilings is not possible.
- If existing risers/drops are not suitable to be utilized, construction of new risers/drops will need to be formed in pipe casings.
- Construction of new secure cupboards or hatches to conceal isolation valves
- Provision of weatherproof enclosures at roof level to house pump sets where no roof void exists.
- Excavate for above or below ground external tanks and provide weatherproof enclosures
- Asbestos management (see 4.6.2)

4.4 Mechanical & Electrical Services

Associated Mechanical and Electrical works that are required to facilitate a retrofit sprinkler system will be required. It is clear that there are general works that will be required as part of each sprinkler installation. There will also be works that will be specific to each property type.

During inspections individual assessments have been made of each block and the sample dwellings accessed. The works identified are included within each block report.

In general the following works have been highlighted:

- Specialist fire alarm works may be required to link the sprinkler flow switches to the existing fire alarm within Sheltered Housing and Hostel accommodation
- Provision of dedicated electrical supplies to the sprinkler pumps and fault alarms
- Provision of dedicated electrical supplies to new sprinkler alarms where necessary
- Alterations to existing lighting, smoke detection and in some cases emergency warden call alarms to accommodate lowered ceiling options, if suitable
- Reconfiguration of existing water supplies to facilitate the different type water supply arrangements (refer to section 4.1.2 Water Supply)
- Provision of new dedicated 63mm water supplies with approval of Thames Water

4.5 Protection of Installation

Due to the location of some of the properties there is a risk of vandalism to the system. If an individual wishes to maliciously operate a sprinkler head there is very little that can be done to prevent this. It should be noted that since the release of the residential sprinkler standard in 2005. It is understood that there has been no deliberate acts of sabotage to sprinkler heads recorded. This is in part because the sprinkler heads are now more commonly situated above the ceilings within many new build high rise properties and the common corridors are not protected with sprinklers. The common areas are considered more susceptible to vandalism as Tenants do not want to release water onto their own property.

Statistics show that malicious damage is not a major issue however the following will reduce the risk as far as possible:

- Use concealed heads and conceal pipe work wherever possible
- Give careful consideration to the routing of pipe work within communal areas
- Do not install sprinkler heads into common corridors where the fire risk is very low
- Keep sprinkler controls out of public areas and restrict access

As part of the feasibility study we have been specifically instructed by Southwark Council to assess the suitability of the blocks and dwellings for installation of lowered ceilings so that pipe work can be hidden and concealed sprinkler heads installed. It is understood that this is so the risk of malicious damage can be reduced and improve the visual appearance of the systems within people's homes.

Budget options have been included within Appendix B to highlight the associated costs of lowered ceilings if the existing building constraints allow. Budget information has also been provided in regard to the alternative cost of surface mounted pipe casings. This will enable the Council to make comparisons between the two options.

4.6 Duration of Works

The duration of the sprinkler installations have been identified within the report for each building. The working week timescales have been calculated based upon the works being undertaken by teams of 2 engineers. We understand it is possible to reduce these timescales by increasing the size of the teams however this will be dependent on the capabilities of the sprinkler installer that is undertaking the works.

Installation timescales within each dwelling will be specific to each block. The duration of works is largely dependent on the layout of the unit and the associated works that may be required. For example replacement of doors, forming bulkheads, lowered ceilings, lifting floor boards and replacing flooring will add to the timescales

4.6 Health & Safety Issues

4.6.1 CDM Regulations 2007

The contract period for the retrofit sprinkler systems is likely to be more than 30 days the project will be notifiable under the CDM Regulations. Southwark Council will need to appoint a CDM Co-ordinator.

4.6.2 Asbestos

Asbestos survey data has been provided by Southwark Council. It is understood that the information is derived from a combination of management and refurbishment/demolition surveys. The surveys give information on asbestos identified within the dwellings and communal areas. The survey data shows a variety of different asbestos types and products present.

The asbestos surveys indicate that asbestos containing materials (ACM's) have been identified in a percentage of dwellings within the properties. Surveys are likely to have been carried out on a representative basis only and therefore further asbestos should be presumed to be present throughout the remaining dwellings.

As only a limited and representative asbestos survey has been carried out, the exact locations or quantity of asbestos that may be present within the building as a whole, is not clear. It is likely that any retrofit sprinkler works will disturb asbestos within the building and asbestos removal works will be required. A further more comprehensive asbestos R&D survey in advance of any major works would provide a more accurate budget for asbestos removal works.

In accordance with the Control of Asbestos Regulations 2012 a refurbishment and demolition asbestos survey will need to be undertaken prior to any works commencing at each block.

4.6.3 Segregation of Works

There will be associated risks to the Resident's/Tenants whilst works are being undertaken within the common areas. Slips, trips, and tools falling from height are an example of the potential hazards. These hazards will be particularly prevalent when working in corridors and on pedestrian routes.

In order to mitigate the risks the working areas will need to be separated by closing off corridor areas with agreement of the Councils H&S team and preparation of specific risk assessments. Where this is impractical the Contractor will need to agree an alternative safe working method before commencement of works.

There will be similar associated risks to the Resident's/tenants whilst works are being undertaken within the General Needs and Sheltered dwellings. If possible the dwellings should be vacated on a rolling decant. Where this is impractical Sprinkler Contractors that can demonstrate a good depth of experience in working in occupied dwelling should be commissioned and safe working methods agreed before commencement of works.

4.6.4 Building Control

As part of the feasibility study we have been requested by Southwark Council to consider future development of Lakanal House and Maydew House.

It is understood that it is proposed to undertake major works at Maydew House which will involve a full decant the building, strip back to the core construction and full refurbishment throughout. It is further understood that additional floors may be added to the top of the building if possible.

The works proposed at Lakanal House are a complete strip back and refurbishment this time with the specific addition of two further floors on the top of the building.

Following consultation with Building Control representatives it has been confirmed that if both buildings are refurbished to this level current Building Regulations will apply. The buildings are over 30m in height so any new storeys that are added will require sprinklers under current building regulations. It was confirmed that there is no legal obligation to install a sprinkler system to the remainder of the building.

Southwark Council may wish to give consideration of the opportunity for a full sprinkler retrofit as part of the major works when the property is fully decanted and building stripped back to core construction.

4.7 Annual Maintenance & Servicing Requirements

BS9251:2005 states that the sprinkler system should be serviced annually by a competent person. Whilst the word 'competent' could be defined in many ways, it is generally agreed that any maintenance operative or similar given suitable training could undertake the scheduled maintenance of the sprinkler system.

However, maintenance should only be carried by a Contractor approved under the relevant trade association.

Sprinkler servicing has four main areas that require attention:

4.7.1 Sprinkler Heads

Sprinkler heads have cover plates which hide the sprinkler head. The cover plates need to be visually checked to ensure that are intact and have not been glued in position or painted over.

4.7.2 Sprinkler Head Restriction

Sprinkler heads also need to be checked to ensure that the sprinkler spray pattern has not been impeded or restricted by objects or such as layout alterations undertaken within the dwellings.

4.7.3 Pipe work

The complete building should be check for signs of water damage, although historically it is extremely rare that Blazemaster CVPC suffers from leaks.

4.7.4 Water Supply

The sprinkler water source should be inspected and a full flow test run and compared to the design figures. This is the most complex item. With the appropriate equipment this can be completed by trained Council staff, but often the above servicing items are carried out by trained Council staff while the flow test is left to a sprinkler contractor. Unlike commercial sprinkler systems to BS EN 12845, the flow testing for BS9251 systems is very cost effective when the other areas are completed by Council staff.

4.8 Landlord & Tenant Issues

4.8.1 Leaseholders

In Southwark's General Needs blocks there are a significant percentage of leasehold dwellings. In a number of blocks a large proportion of the total units are leasehold dwellings. These Residents own their own homes and pay a service charge to the Landlord (Southwark Council) for servicing and cleaning of common areas and maintenance and repair.

Although we have not reviewed any lease agreements it is understood as the Landlord the Council does not have a legal right to access the leasehold dwellings to install a retrofit sprinkler system. It is likely that these works will fall outside of the current lease terms and associated maintenance agreements. In light of this the works would require the full consent of the Leaseholders.

If a sprinkler system is recommended in a significant number of leasehold dwellings it is assumed that the Council will seek to recover the individual leaseholder's share of the installation cost. If a leaseholder is not willing to consent to access for the works or contribute to their share of the works cost, the council should seek legal advice on how this can be achieved although at present this situation is without precedent. If a fire broke out in a leasehold dwelling and no sprinkler protection was installed. The leasehold dwelling and others adjacent would be less well protected from the spread of the fire so a greater reliance would be required on the existing compartmentation between the dwellings.

It is understood that the high rise Sheltered Housing Unit in Sheffield, Callow Mount did contain a Leaseholder and in this case the installation cost was gifted by the Council. This project is the only current example of a retrofit sprinkler installation in a high rise blocks.

4.8.2 Landlord Obligations

It should be noted that if a sprinkler system is installed, under the Fire Safety Order, in particular Article 17, annual maintenance must be provided to ensure the sprinkler system can perform as per its design parameters (refer to section 4.7).

5.0 COMMERCIAL ANALYSIS OF INSTALLATIONS

5.1. Budget Costs

We have prepared cost estimates for all blocks, where access has been made available for surveys to be carried out. The sprinkler system installation costs are based on budget quotations provided by Triangle Fire Systems Limited.

We have then included costs for the scope of the builders work in connection with the installation, and associated fire alarm and electrical services costs, based on recent tenders received, and our cost database.

The cost estimates are generally based on 3 options:

1. The sprinkler pipework would be boxed on to the soffit of the units.
2. The sprinkler pipework would be concealed within a lowered ceiling within each unit (where practicable), which would also require light fittings, and smoke detectors to be lowered, and in some cases new doors installed.
3. Combined solution (where practicable), which would involve accessing the units from the floors above, and removing and replacing the floor finishes, and boxing in pipework, where this is not practical.

A cost estimate per unit for installation of individual Personal Protection Systems (PPS) has also been calculated, these estimates also include associated builders and electrical works:

One Bedroom Flat	£15,800
Two Bedroom Flat	£16,400
Three Bedroom Flat	£16,900

The above PPS costs have been calculated using suitable average unit quantities that has been derived from data gathered during site inspections. The cost per unit is not included in the within Appendix B Budget Cost Summary. This information can be used as an indication of the cost of installation where a standalone system is required with a particular property, although these costs will be dependent on the quantity of installations commissioned.

For the retrofit cost options we have also included allowances for Main Contractor Preliminaries (15%), Overheads and Profit (5%), and Contingencies (15%). For the PPS installations we have increased these allowances as they dependent on the number of installations commissioned for Preliminaries to 20%, Overheads to 7.5%, and Contingencies to 20%.

We have excluded the following from our estimates:

- VAT (currently 20%).
- Professional fees.

- Inflation/Deflation (depending on when the works are instructed).
- Relocation/decanting costs for residents.

We have also provided a separate allowance for alternative accommodation based on £30 per night per room. Allowances for decanting are based on a phased installation and is an approximation should the residents need to be relocated during the works. The requirement to decant the residents would need to be established by Southwark depending on the option selected, and whether asbestos material needs to be removed, or not.

We would recommend that, if the decision of the council is to proceed with any of the installations, then a full set of tender information for the proposed scope and programme is developed, before competitively tendering the works. We would also recommend that the estimates are reviewed as this information is made available.

Works costs for each block are included within Appendix B Budget Cost Summary.

It should be noted that pro rata cost data has been used to calculate the budget costs on the blocks where partial access has only been available. These blocks are highlighted in yellow on the Budget Cost Summary. Where pro rata costs are not suitable average unit costs have been utilized and these are indicated in amber.

5.2 Approximate Annual Repair Cost and Maintenance Budget

As advised by Triangle, the central sprinkler plant will require an annual inspection, which equates to £150.00 plus VAT per block, which would include for the necessary flow tests, but would exclude any necessary repairs, or replacement parts. We have then made an allowance for a visual inspection of all units, based on 15 minutes per unit per year at a rate of £34.50 plus VAT per hour. We have also made a provision for replacement pumps, at 1 per year at £150 per block, and a 10% replacement of damaged sprinkler heads at the rate of £3 plus VAT each.

The PPS system should be serviced annually and the more systems there are to service the cheaper the cost. A single system will cost £80 + VAT per annum at the present schedule of rates.

5.3 System Failure Costs

As advised by Triangle, sprinkler systems are extremely reliable, and are installed with fail safes to avoid the need for decanting, remedial works, and rental loss. If we are required to provide approximate costing for this eventuality, we will need further information to be able to provide costings, such as, rental charges, contents insurance details, etc.

5.4 Life Cycle Costs

The design life of the installation is in the region of 40 years. As an allowance we have also included within the repairs and maintenance allowance £150.00 plus VAT per block per year,

which would allow for pumps to be replaced once every 10 years, although their life span should be in the region of 10-15 years. We also included for replacing 10% of the sprinkler head caps per annum within the maintenance costs.

CONCLUSION

This feasibility study has identified that in terms of building works associated with the installation requirements it is feasible to install fire sprinkler systems to all of the Southwark Council housing blocks. It is evident from inspections of the properties that the way in which the retrofit sprinklers are installed and the associated works will vary across the property types. This is due to complexities and constraints in the existing construction and layout. These issues will have a direct effect on both the timescales and costs for the works.

It is likely that any retrofit sprinkler works will disturb asbestos within the blocks or dwellings and removal works will be required. Asbestos survey data that has been provided shows a variety of different asbestos types and products present within the buildings. Unfortunately this data is limited in that information for some blocks was not available and where available it only gives representation of asbestos identified within dwellings and common areas. The exact locations or quantity of asbestos that may be present within the buildings as a whole is not clear. It has not been possible to price asbestos removals within the Budget Cost Summary. A further more comprehensive survey would provide a more accurate budget for asbestos removal works.

It is clear from the inspections undertaken and from current Fire Risk Assessment information provided by Southwark Council that significant active and passive fire safety measures have already been undertaken at a number of properties. Further improvements have also been identified to the existing fire safety features within the properties.

The building works requirements and specific complexities of the individual blocks have been considered in conjunction with the existing Fire Risk Assessments and current guidance to make a balanced recommendation on whether a retrofit sprinkler can reasonably be installed by Southwark Council at each property.

It is clear that the construction constraints identified at the properties are not sufficient to make retrofit sprinkler installation not feasible from a physical installation aspect. For example where is not possible to lower a ceiling it is possible to surface mount the pipe work. Where this might not be desirable to the tenants aesthetically this should not prevent the retrofit for life safety reasons, as a result our recommendations are primarily based upon the current government and fire authority guidance.

The recommendations for the retrofitting of sprinkler systems have been based on guidelines and recommendations made by the London Fire and Emergency Planning Authority (LFEPA) to provide sprinkler systems in domestic dwellings where the most vulnerable residents live. Further consideration has been made to the provision of compartmentation and early warning systems and evacuation strategies adopted within the blocks.

Assumptions have been made that the compartmentation within the blocks will be brought up to current standards and automatic fire detection will be provided in all individual dwellings.

It is therefore considered that this will provide appropriate protection to those residents that would be able to evacuate in the event of a fire in their dwelling.

It is acknowledged that that the Councils sheltered housing accommodation house large numbers of or are entirely made up of the most vulnerable persons.

The Councils temporary hostel accommodation often house vulnerable residents and due to the transient nature of these resident types it is difficult to operate an evacuation policy.

The numbers of the most vulnerable people accommodated within the general needs accommodation are variable and there is no consistency in regard to the locations of their properties.

The retrofitting of sprinkler systems is therefore recommended in the following situations where there are occupants unable to self evacuate:

- Sheltered Housing Units – General Sprinkler Installation (to block)
- Hostels – General Sprinkler Installation (to block)
- General Needs – Personal Protection Sprinklers for those individual occupants identified as unable to self evacuate

The recommendation for each property is set out within Appendix E Recommendation Summary.

Cost estimates for 3 installation options have been prepared using site gathered data where possible. The cost for associated builder's works has been assessed using recent tenders and our cost database. The sprinkler installation has been priced using information from a specialist sprinkler installer. The cost of a retrofit sprinkler installation has been calculated for each complete property and is included within Appendix B Budget Cost Summary. The cost of individual dwelling installations for use where a resident is unable to self evacuate has also been calculated. The cost of these installations is included in section 5.1 Budget Costs.

APPENDICES

Appendix A - Southwark Councils Invitation to Quote document dated July 2013

Appendix B – Budget Cost Summary

Appendix C – List of Properties

Appendix D – Block Feasibility Studies

Appendix E – Recommendation Summary