FRANKHAM

Frankham Consultancy Group
Building Services Engineering
Martlett Court
Water Services Condition Survey Report

City of Westminster

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1.0 Executive Summary

The survey and inspection of the water services within the blocks forming Martlett Court, not only involved the services installation, but also included inspections within individual flats, and interviews with a number of occupants.

The general installation in all blocks comprises a rising main serving the tanks and kitchen outlets. The discussions with residents, indicate a number of issues which vary according to the time of day, notably fluctuating flow rates and pressure on the rising main. The latter would seem to confirm the comment that we had made to us, regarding undersized supply mains.

The review of the general services installation indicated that most of the pipework has exceeded its normal life expectancy as have the water tanks. What parts of the water distribution pipework could be accessed within flats indicated that routing of pipes from one flat to another was complex and convoluted, and for both rising main and down services was generally under sized, further contributing to issues with flow and pressure during peak times.

It was clear that there are a number of issues with the water services that need to be resolved, in some cases the issues are so severe that residents are unable to use locally generated hot water.

We do feel that major alterations and upgrades are required to improve the service to the individual flats. These works we feel would not only be a complete replacement of the distribution pipework serving the flats, but also the risers to the roof void and tanks. The recommended solution would be to install water accumulators in the roof voids, which would be served by a boosted water supply, which would convert all services to an unvented potable supply.

Further details of the options can be found in Section 5 of this report.

We formed the opinion that access to the roof voids was far from satisfactory, and were a potential H & S issue, which should be resolved at the time of carrying out any remedial works, if not before.

2.0 Introduction and Property Details

2.1 Introduction

This report has been produced for Westminster City Council Housing by Frankham Consultancy Group (Building Services) following a request to undertake a review of the existing water services within the three blocks forming Martlett Court, taking into account the age of the installation and comments that have been received from residents referring to lack of adequate flow and or pressure.

This report describes the condition of the existing specific services installation and makes recommendations for repairs/replacement of items that have reached the end of their expected economic lifespan in accordance with CIBSE Guide M–Maintenance Engineering and Management and covers the next 10 years. Consideration has however been given to the existing condition of services , and where it is anticipated that the equipment is likely to remain in serviceable condition beyond the recommended life cycle, this has been indicated.

The referenced standard assumes a 12-hour operational period (Monday–Friday), where operating hours are longer in any particular situation, then these must be taken into account.

The following grading system has been used throughout the report.

Condition Grading	
Grade A	Good. Performing as intended and operating efficiently.
Grade B	Satisfactory. Performing as intended but exhibiting minor deterioration.
Grade C	Poor. Exhibiting major defects and/or not operating as intended.
Grade D	Bad. Life expired and/or serious risk of imminent failure.
Priority Grading	
Priority 1	Urgent work that will prevent immediate closure of premises and/or address an immediate high risk to health and safety of occupants and/or remedy a serious breach of legislation.
Priority 2	Essential work required within two years that will prevent serious deterioration of the fabric or services and/or address a medium risk to the health and safety of occupants and/or remedy a serious breach of legislation.
Priority 3	Desirable work required within three to five years that will prevent deterioration of the fabric or services and/or address a low risk to the health and safety of occupants and/or remedy a minor breach of legislation.
Priority 4	Long term work required outside of the five year planning period that will prevent deterioration of the fabric or services.

The extent of the survey comprised a non-intrusive visual inspection from floor or ground level, of all the associated plant and equipment located in the basement and roof level service areas where these could be accessed, along with the services within a number of the individual flats., and were restricted to:

Cold Water Services

- Cold water mains supply
- Cold water risers
- Cold water distribution
- Cold water storage facilities

No tests or trials were conducted during the surveys and front covers, inspection chamber covers etc., were not removed to allow a more detailed condition assessment to be carried out.

All inspections were carried out from floor level.

Wherever details were available for plant and equipment such as date of installation and duty then this has been recorded.

Specific Exclusions to the surveys were:

- None

2.2 Legionella

We have an obligation to inform you of your legal responsibilities in relation to water management as stipulated under the Approved Code of Practice and Guidance – 'The Control of Legionella Bacteria in Water Systems' (ACOP/L8 Guidance).

It is the Statutory Duty holder's responsibility to identify and control the inherent risks present to both Employees and the General Public by any given water systems, as far as reasonably practical. This responsibility cannot be transferred to any other person under any circumstance.

2.3 Asbestos

Under Regulation 4 of the Control of Asbestos Regulations 2012 it is the Authority's responsibility to manage the risk from asbestos in non-domestic premises.

Regulation 4 requires the duty holders to identify the presence and condition of materials that contain asbestos and keep an Asbestos Register or site. The Register shall be available to any contractors prior to commencing any works in areas containing, or presumed to contain, asbestos containing materials (ACM's) so that any risk can be controlled.

3.0 Site Information

Martlett Court, located in The Covent Garden area of London comprises three separate blocks of flats, Fletcher Buildings, Beaumont Buildings and Sheridan Buildings.

Fletcher and Sheridan Buildings have 50 flats on 5 floors, Beaumont has 40 flats across 5 floors.

Each of the individual blocks is of brick construction, and comprised five floors, including ground. Access to the individual floors is via a central stairway, no passenger or goods lifts are provided. The central stairwell in Beaumont Buildings differs from those in Fletcher and Sheridan Buildings as it runs the full depth of the building compared with only half the depth in the remaining two buildings.

All of the blocks are generally similar, although the sizes of the flats vary.

The individual blocks have their own dedicated gated and security access arrangements.

The three blocks have a dedicated cold water supply fed from a Thames water stopcock in the street, which is routed underground to the central core of each of the building.

In general, any observation made for any block and any identified works will be the same for all blocks unless otherwise indicated.

Whilst Westminster City Council Housing the freeholder and some of the occupants are Council tenants, many of the individual flats are leased.

4.0 Surveys and Investigations

4.1 Plant Life Expectancies (Water Services)

The fixed water services currently installed in each of the three buildings forming the Martlett Court development have been assessed for economic life expectancy, using the Chartered Institution of Building Services Engineers (CIBSE) guidance (See table below). The results show the current installation against recommended guidance, where it can be observed that the electrical and mechanical systems have already exceeded recommended life expectancies.

The Chartered Institution of Building Services Engineers (CIBSE) provide guidance of the economic life expectancy of the following relevant plant and ancillary items – this information can be found in CIBSE Guide M:

Item	CIBSE Economic Life Expectancy (Years)	Approximate Current Age (Years)	Approximate Remaining Economic Life (Years)
Mechanical Services:			
Pipework Valves and Fittings	25	50+	0
Cold Water Storage Tanks	20	50+	0
Cold Water Distribution Pipework	25	50+	0
Local Electric or other Water Heaters	12	Varying	Varying

It should be noted that although it is possible to extend services life beyond this recommended guidance, the performance of the plant deteriorates increasing the likelihood of failure and potentially dangerous occurrences.

There are typically three phases for the life of plant and systems (CIBSE Guide M, 2014):

- **Decreasing failure rate** - this phase occurs when the system is first installed, and is usually a result of installation errors, poor commissioning and faulty components.
- **Constant failure rate** - the system settles and operates with minimal faults; however random faults will always occur, and this phase can vary in length dependant mainly on preventive maintenance regimes.

- **Increasing failure rate** – the final phase is the point of major failure within components such as fans failure, main Luminaire failure, MCB failure, excessive, cable insulation failure. At this final phase the cost of reactive/preventative repair becomes prohibitive and it is more economically viable to replace the system. Furthermore, replacement components are less likely to be available for obsolete equipment.

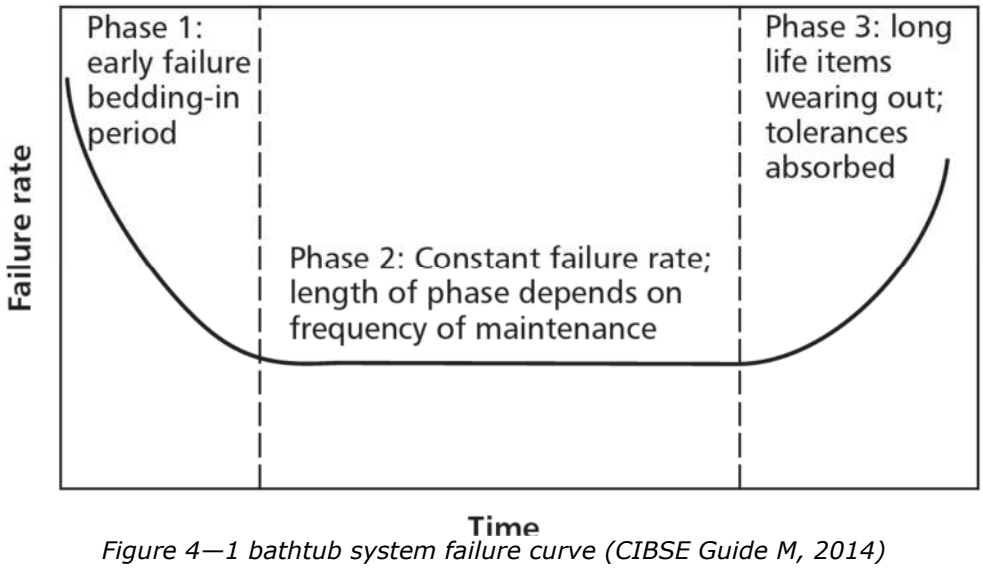


Figure 4—1 bathtub system failure curve (CIBSE Guide M, 2014)

4.2 Cold Water Services

4.2.1 Overview

A visual, non-intrusive site survey was carried out to make an assessment of the installed water services on three separate occasions, due to the difficulty in gaining access to all parts of the site, and to some individual flats.

This report identifies the extent and condition of the existing water services installation. Based upon limited visual access as a result of installation methods and makes recommendations and options relating to those services as appropriate.

4.2.2 General Cold Water Service

Each of the three blocks has a dedicated main supply from its own dedicated Thames Water stop cock external to the site, but close to the perimeter fencing. A feed from this stop cock is fed to a distribution rising main within a service area below the main stairway, from where water is routed to the storage tanks in the relevant roof space. In the case of Beaumont Buildings, this rising main was visible as it ran up the rear wall of the stairwell. With the other two buildings it could not be viewed as it was concealed within the building fabric. What pipework could be viewed was in poor condition and had exceeded its nominal life expectancy.

It was apparent during the survey, that there are branches off the rising mains at each floor level which provides potable water supplies to the kitchens of each of the flats. The bathrooms and toilets of the flats are fed from a down service from the roof storage tanks.

The down service supply pipework where visible was steel with some copper and is likely to be part of the original construction. Most of the distribution pipework and fittings are steel, and are almost certainly, other than in areas where repairs may have been executed, are original to the date of construction of the building, making them more than 50 years old, the CIBSE anticipated life is 30 years.

As a result, both the rising mains, including potable branches, and the down service pipework has generally exceeded its anticipated life span and will need to be considered for replacement.

4.2.3 Water Storage Tanks

As previously indicated, there are a number of water tanks in each of the buildings, located within the roof void, access being via the stairwell.

At the time of the first visit, the only area to which access was gained was the tank space in Beaumont Buildings, however there were no lights within the space, so it was deemed unsafe to access, this was the same during the second site visit, however were able however, to observe a tank close to the access into the roof void, and it was clear from its visual appearance, design and construction that the tank had exceeded its normal life expectancy. There appeared to be no evidence that the tank had been upgraded to current standards and we did not have access to the water risk assessment to verify.

It was not possible to access the roof void in Sheridan Buildings.

No access was gained to Fletcher Buildings during the initial visit, however we did gain access on the second visit and were able to view the tank space access.

It should be pointed out, that in our opinion access to the roof tank spaces, in particular Beaumont and Sheridan Buildings was particular unsafe, and having determined that fact we feel it would have been hypocritical of us to make too much effort to gain access.

The access hatch in Beaumont Buildings is directly above the stairs, and to access, it is necessary to hook a ladder on the underside of the hatch with the bottom of the ladder resting on the top landing, and then climbing above the descending stairs to unlock the hatch. In our opinion, this was unacceptable and the risk of falling is high.

The access in Sheridan Buildings is slightly better, as the access hatch is above the top landing, However, we understand that the accepted method of opening the hatch is to sand the ladder on its side, with the end pushed through the stair railings, to stand on it to open the hatch prior to locating the ladder in the correct position. We also feel that this is unacceptable, as it is an accident waiting to happen.

The access in Fletcher Buildings is the best, as an attempt has been made to improve access by installing a steel framework with a drop down ladder below the hatch. This however is inadequate, as the drop down ladder terminates too far from floor level.

It is clear that extensive works are required, dependent upon the final scheme adopted, which could involve replacing tanks, and that safe access in accordance with current guidelines is established to the roof/tank voids.

4.2.4 Internal Inspections

During our second and third site visits we were able to gain access to a number of the flats, some by appointment and some on an adhoc basis. These inspections not only gave us the opportunity to assess the condition of the pipework within the flats, but also what was more interesting to find out what issues the occupants were experiencing.

Very little information was gained as regard to the pipework as most of it was concealed within the fabric, what was exposed was generally unsatisfactory, time expired and in need of replacement.

There were a number of issues identified when the residents explained their individual experiences.

Those flats on the upper level in all buildings had concerns about the low pressure on the tank fed down service, this is understandable as the static head is minimal.

An interesting fact was that most people questioned stated that the pressure and flow rate of the potable service varied throughout the day, the situation being worse when there was likely to be heavy usage throughout the blocks. This is hardly surprising, as the potable branches we observed were very small and totally undersized for the number of outlets served.

Another point that was raised with us, although we cannot confirm, is that some years ago the paved areas around some of the buildings was excavated for some other underground works to be carried out. At that time, it was apparently noted that the supply main from the board's stopcock appeared to be rather small for the number of properties served. This too could be an influencing factor with flow and pressure fluctuations.

It has already been indicated that the rising mains need to be replaced, but it is also necessary that the internal distribution service should also be replaced at the same time.

4.2.5 Conclusion

The water installations serving Fletcher, Beaumont and Sheridan Buildings at Martlett Court are in poor condition, time expired and are woefully unfit for purpose. And must be replaced, to ensure integrity of supply.

5.0 Water Services Options

5.1.1 General

There are a number of options for rectifying the existing issues with the water services installations. However independent of whatever scheme is adopted there are two issues which must be addressed.

- Prior to any works being carried out, it will be necessary to carry out a full measured survey of the buildings and to prepare site plans to enable a design for the routing of pipework to be determined.
- The underground supply pipes from the Thames water stopcocks to the three buildings should be exposed, and its size, and suitability determined. If it is deemed that these supplies are inadequate, then the pipework should be replaced.
- In the event of plant or services being installed within the roof voids, then safe access to the voids must be provided.

5.1.2 Option 1

Option 1 would be to replace all the existing tanks within the roof voids with new, which would be fully compliant, and to replace all pipework risers, including potable services, and drops, along with distribution pipework in the individual flats.

This would be the cheapest of the options, but it would not overcome all of the current issues, as there would still be fluctuations with flow and pressure at peak usage times, and it would still involve maintenance and cleaning of storage tanks.

5.1.3 Option 2

Option 2 would be to convert each of the buildings to have a totally boosted supply, that is all water outlets within the flats would be supplied by a boosted riser, and there would be no tank fed down service, and all outlets within the flats would be potable.

The installation of pipework with this option would be much simpler and less costly than Option 1, as there would only be the need for risers and distribution at floor level.

The drawback of this system would be that it would be necessary to have a potable boosted set with multiple inverter driven pumps, and mains break tank. Physically the plant installation would be large, and it would be necessary to create a separate enclosure adjacent to each building.

The advantage of this type of installation is that there would always be an adequate supply of water at a suitable pressure, regardless of the time of day.

The main drawback of this installation would be, in the event of a power failure, there would be no water supply to any of the flats.

The existing cold water storage cisterns located within this roof void, would be removed along with any redundant down services and riser pipework.

5.1.4 Option 3

Option 3 would be to replace the existing roof storage tanks, along with new risers from a smaller booster set than that indicated for Option 2, requiring less space. New risers would be installed to supply the tanks, with branches to provide potable supplies to the individual flats. New drops from the tanks would also be installed.

This option would be preferred to Option 1 as it would ensure a continuity of supply for the potable service but would not overcome the low head issues with the tank fed services.

It should also be pointed out, that in the event of a power failure, there would be a loss of potable water, although the tank supplies would remain in use for a period of time.

5.1.5 Option 4

Option 4 would be to remove all of the existing water tanks and risers/ distribution pipework and install a bank of water accumulators in the tanks space/ The function of the accumulators would be to store water under pressure, created by a booster pump either within the accumulators or a separate unit. The pump would only operate when the average pressure in the accumulators has dropped below a certain level requiring them to be recharged.

The water companies and regulations will not allow these devices to be connected direct to a main, so it will be necessary to have a booster set, with two inverter control pipes and a potable water tank. This tank will be much smaller than would normally be required for a boosted system, due to the volume of water stored within the accumulators. It would be possible to locate the booster set in the roof space adjacent to the pumps, this however increases the reliance on the incoming water supply pressure and could possibly create noise or vibration within the building.

The water accumulators are regarded as potable supplies so it would only be necessary to install new riser from the incoming main to accumulators, and then out going drops to the flats where all water, within the flat would be supplied from a common drop.

We would envisage there being one drop for every two adjacent flats, through all floors.

There are a number of advantages of this system;

- Maintenance is reduced.
- All services are potable minimising the installation of pipework.
- Pressure is maintained on all outlets at all times.
- The installation will supply all water outlets for a period of time even in the event of a power failure.

- Potential Health & Safety risks via water infections are reduced.

5.1.6 Option 5

Option 5 would be the same as for option 4, other than the booster set and break tank would be installed within the service cupboard at ground level. It is appreciated that the available space within the service cupboards is small, however it should be adequate, as according to water regulations, where accumulator systems are installed, the capacity of the water break tank is substantially reduced. This however could not be confirmed until an initial design has been completed.

6.0 Recommendations

Having considered all of the options indicated in Section 5 above, we feel that the preferred solution would be to adopt Option 5.

That is, a new booster set would be installed at ground level, in the service cupboard of each building which would be connected into a new riser serving a bank of accumulators within the roof space of each of these said buildings. It is recommended that all new pipework an risers would be installed within the building to supply the proposed accumulators, New drops will be installed to supply individual flats with potable water under pressure from the accumulators.

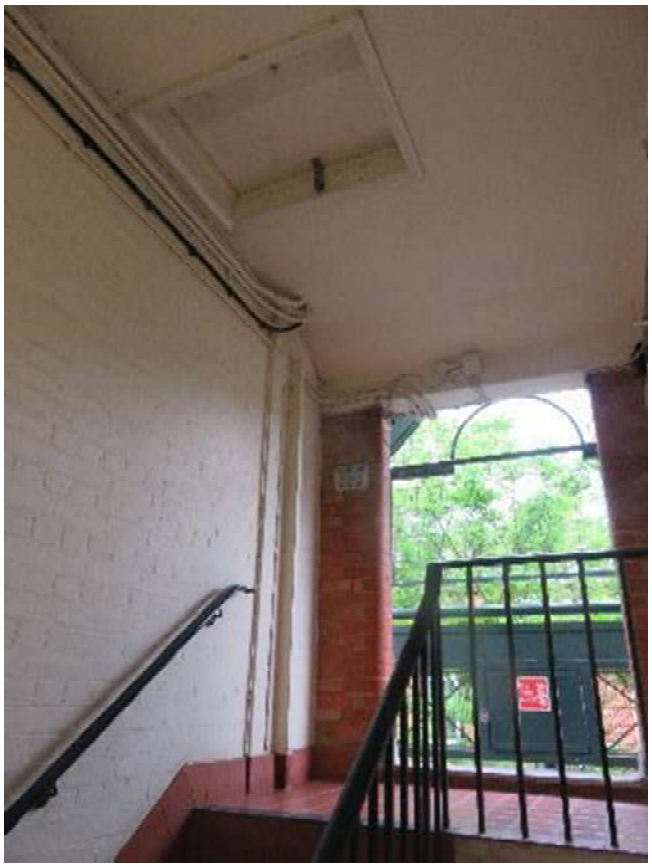
It would be possible with planning to install all pipework within the building, which although requiring insulation, would not require the installation of trace heating.

Appendix A – Photographs

Incoming Water supply in Beaumont Buildings

Rising Main with Potable branch in Beaumont Buildings

Arrangements for gaining access to roof space in Fletcher Buildings



Access hatch over stairs in Sheridan Buildings

Access hatch to roof space in Beaumont Buildings

Some internal Pipework in Beaumont Buildings

Hatch to access pipework above ceiling in flat in Sheridan Buildings.

Some internal pipework in flat in Sheridan Buildings.

More internal pipework in flat in Sheridan Buildings.

Some internal pipework in flat in Fletcher Buildings