



Wellington Mills Estate  
Lambeth  
London

Report on New Heating & New Electrical Mains  
Installation Proposals

December 2017

**Project:** Wellington Mills Estate  
comprising:  
Holst Court, Oakey Lane, Mead Row  
Lambeth  
London  
SE1 7JG

**Client:** Wellington Mills Housing Co-operative  
24 Mead Row  
Lambeth  
London  
SE1 7JG

**Document:** Report on New Heating & Electrical Mains Installation  
Proposals

**Date:** 15<sup>th</sup> December 2017

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Revision	Date	Description	Prepared	Checked	Approved
-	15-12-17	For Comment	SG	RW	HD

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## 1.0 EXECUTIVE SUMMARY

Green Building Design Consultants have been appointed by the Estate Management Team led by Isaac Essuman at the Wellington Mills Housing Co-operative to comment on proposals for an updated heating system to the Wellington Mills Estate in Lambeth, South London, and to comment on the tender received and recommended from T. Brown Group.

The Wellington Mills Estate is a series of apartment blocks built in approximately 1976 by the Greater London Authority, and which are now a mix of privately owned and council-tenanted properties. The estate comprises 8no. blocks of between two and four storeys height on a roughly triangular site between Kennington Road, Westminster Bridge Road and King Edward Walk in Lambeth. Heating for the estate is from a central boiler house located centrally on the estate with heating pipework distributed to the blocks either underground or through the garage block before rising up and distributing through the apartments.

### Mechanical Services

- The Wellington Mills Estate is heated from a central boiler house containing 4no. 500kW Hoval Ultra Gas condensing boilers dating from 2003. Based on CIBSE Guide M, the expected economic lifespan of these boilers is 20 years so they should provide another six years' service. It is likely that the boilers will continue to function after this time, although it is probable that running costs will increase.
- The pipework distributing from the boiler house appears to be original from the date of construction of the estate. It distributes from the boiler house through the garage block or underground to the apartments where the pipework is run through apartments. Based on CIBSE Guide M, it is considered that the pipework has reached the end of its economic life, although no major leaks have been reported.
- We could consider testing the pipework thickness and corrosion to see if the pipework has additional life.
- As the pipework distributed through the apartments, disruption can be caused to other apartments if one apartment needs to be isolated. The new proposed heating system will allow individual properties to be isolated without affected neighbouring apartments.
- The current system requires hot water for the Hot Water System to circulate almost constantly and provides a source of heat into the apartments, even during hot weather. This is reported as causing the apartments to suffer from summer overheating. With the new heating system using pipework distributed external to the apartments and not requiring a constant flow through the system, this heat transfer will cease reducing summer temperatures and possible winter time temperatures.

## Electrical Services

We have not seen any electrical documentation on the proposed works, during our meeting with the Council on the 15<sup>th</sup> December 2017, it was explained that the Council plan to change the main intake distribution boards, supply cables from the high voltage transformers to the distribution boards and the sub-main cables out to each flat.

Currently no design has been completed on detailed review of the cable routes to and inside each flat. It is planned to install 16mm 3-core cables to each flat, regardless of route, length of run or prospective short circuit current each flat.

Mechanically, it is assumed that the T. Brown quote has been priced to include all items on the Frankham Documents.

We have only seen the mechanical services specification and tender return, so neither decoration nor in-flat builders' works are believed to be included in these costs. However, the costs do include for BWIC with the communal heating, including trenches and boxing in communal areas, patch repairs only are included.

## Costs

All sums in the quotation for asbestos removal are provisional sums and therefore liable to change (up or down).

Assuming all flats in each block are charged equally, costs per flat for each block for the mechanical services work, including communal area works, are:

Holst Court 1-10	-	-	£10,053.14
Holst Court 11-32	-	-	£10,447.07
Mead Row 1-16	-	-	£12,181.65*
Mead Row 17-40	-	-	£10,949.63*
Oakey Lane Odds 1-19	-	-	£10,053.04
Oakey Lane Odds 21-71	-	-	£10,132.80
Oakey Lane Evens 2-48	-	-	£10,427.92
Oakey Lane Evens 50-60	-	-	£11,052.67

\*There are two different types of apartment in these blocks, and the figure shown is the average for the block. It is likely that the smaller flats will be charged slightly less and the larger flats slightly more than the figure shown.

## Concerns and Thoughts

- The existing pipework has not been tested and could be serviceable for many more years, the project could be delayed if the pipework test, passes.
- The use of gas fired boilers in each flat has not been considered, some flats have gas mains already.

- Standing heat losses need to be considered and confirmation existing boilers are sized for the loss.
- Details of the external thermal installation to be provided with options to increase this, with paybacks on the main pipework runs.
- Council have confirmed the route of central and entry to each flat will be discussed in detail and agreed with each tenant before starting work.
- Council have agreed to put plate heat exchanges in, to prolong life of new pipework.
- Detailed design to be provided when planning approval gained.
- Asbestos R&D survey to be completed before any works start, the estate should really obtain a copy of the current reports and show to all contractors before any works start.
- Electrically no design has been completed, fault current levels and impedance levels are required at each intake and complex cable calculations are required to each flat.
- The route of the cables and entry to each flat needs to be agreed, shown on drawings and agreed with tenants, some routes through garages and directly to the intake should be investigated (Sandra's parents flat).
- We would recommend a electrical report is provided on each flat noting any concerns, defects and safety, consider actions now the supply has been upgraded.
- External lighting is to be replaced and upgraded to LED fittings, full details are needed including lighting levels, cable routes and planning consent

## **2.0 GENERAL**

### **2.1 Purpose of Report**

Green Building Design Consultants have been appointed by the Estate Management Team led by Isaac Essuman at the Wellington Mills Housing Co-operative to comment on proposals for an updated heating system to the Wellington Mills Estate in Lambeth, South London, and to comment on the tender received and recommended from T. Brown Group.

Although the T. Brown tender has been recommended, the Estate Management are still unsure of what exactly has been included within their fee. This report aims to summarise the extent of the works proposed and suggest items requiring clarification from the tenderer.

### **2.2 Reservations**

Green Building Design Consultants have not carried out a survey of the site, and this report is based on a review of the documentation listed below which has been received from the Estate Management Team:

- Frankham Consultancy Group Option Appraisal for 1-10 Holst Court
- Frankham Consultancy Group Option Appraisal for 11-32 Holst Court
- Frankham Consultancy Group Option Appraisal for 1-16 Mead Row
- Frankham Consultancy Group Option Appraisal for 17-40 Mead Row
- Frankham Consultancy Group Option Appraisal for 1-19 Oakey Lane (Odds)
- Frankham Consultancy Group Option Appraisal for 2-48 Oakey Lane (Evens)
- Frankham Consultancy Group Option Appraisal for 21-71 Oakey Lane (Odds)
- Frankham Consultancy Group Option Appraisal for 50-60 Oakey Lane (Evens)
- Section 3.0 of Frankham Consultancy Group Tender Package – Mechanical Services Particular Specification
- T. Brown Group Full Planning Application PP-06504128 covering letter
- Response from Tom Aldrich-Smith to Pre-Application Planning submission dated 05/10/2017, Reference 17/04204/PREAPP
- T. Brown Group Drawing No. TB-WM-G-DET001, Replacement Heating Pipework Boxing Detail (Generic Detail)
- T. Brown Group Section 5.0 Tender Return
- Frankham Consultancy Group Tender Analysis Report
- T. Brown Group pipework elevation drawings TB-WM-ELEV001, 002, 003, 004, 005, 006, 007 and 008 Rev P2
- Frances Murphy comments on T. Brown Group boxing elevations TB-WM-ELEV009, 010, 011, 012, 013, 014, 015 and 016 Rev P2

The tender pack includes for work to both the Wellington Mills Estate and for Kennedy House on the Vauxhall Gardens Estate located approximately 1km away. This report is concerned only with the works to the Wellington Mills Estate.

We have relied on the Frankham Consultancy Reports to ascertain the condition and age of the existing services.

Generally the calculations with respect to the design of the heating and water installations have not been checked in respect to such items as heat losses, cooling loads, pipe sizing, etc. other than to establish the overall capacity of the plant as a rule of thumb. However, the maintenance and service team within the building have stated that these work well, except in the middle of the summer when the flats are prone to overheating.

Inspections or specific advice relating to fungus, spores, substance vapour or gas produced by or arising out of any fungus or spore is excluded from this report.

This report excludes any inspection relating to terrorism.

### **2.3 Record Drawings and Maintenance Manuals**

We have not seen the O&M information on site, but understand that the boilers were replaced in 2003. It is understood from the reports received that the majority of the remaining mechanical services are consistent with being original services from the building construction c.1976.

### **2.4 Building Water Quality**

We have not checked the water quality, but would recommend the Client obtains written confirmation from the maintenance contractor that the water quality in both the closed water circuits and the heating circuits is adequate for the intended use. If these are not available, we would recommend that samples are taken for analysis of the water quality, noting the pump has a bad leak.

### **2.5 Health and Safety**

The health and safety matters relating to the existing building services installations are generally beyond the scope of this report.

### **2.6 Deleterious Materials**

The inspection of deleterious materials associated with the building services installations is beyond the scope of this report.

### **2.7 Asbestos**

Asbestos is believed to be present within the buildings on the Estate. The works are to include for stripping out asbestos within the Boiler House, and for testing of damaged boards which are suspected to be Asbestos Insulating Board.

The T. Brown tender has a provisional sum of £5000 per block for asbestos removal. Depending on the results of asbestos testing and hence the extent of works required, this figure could be higher or lower when final costs are received.



## **2.8 Economic Useful Life**

The economic useful working life for items of plant stated in this document has been taken from data published by the Chartered Institution of Building Services Engineers (CIBSE) Guide M or in direct consultation with the manufacturer. The stated life expectancy can be extended with increased maintenance and / or repair. As plant and equipment ages, breakdown and unreliability will increase, as will the associated maintenance cost.

The pipework could be tested for corrosion and thickness which could prove the pipework is serviceable for additional years and the project delayed, but the works will need to be completed at some stage.

### **3.0 MECHANICAL SERVICES**

#### **3.1 Existing Mechanical Services**

The Wellington Mills Estate is heated from a central boiler house containing 4no. 500kW Hoval Ultra Gas condensing boilers dating from 2003. Based on CIBSE Guide M, the expected economic lifespan of these boilers is 20 years so they should provide another six years' service. It is likely that the boilers will continue to function after this time, although it is probable that running costs will increase.

The proposed works will retain these boilers as they still have a reasonable economic life remaining and a good efficiency. The guidelines on economic lifespan would suggest that the boilers will reach the end of their economic life in approximately 6 years, but the life of the boilers can be extended with a good maintenance regime, albeit running costs are likely to rise as equipment ages.

The pipework distributing from the boiler house appears to be original from the date of construction of the estate. It distributes from the boiler house through the garage block or underground to the apartments where the pipework is run through apartments. Based on CIBSE Guide M, it is considered that the pipework has reached the end of its economic life. Although no major leaks have been reported, it would be recommended that the pipework is replaced before there is a major failure.

As the pipework is currently distributed through the apartments, disruption can be caused to other apartments if one apartment needs to be isolated. The current system does not allow a single apartment's heating to be isolated to allow planned maintenance or repair within that apartment, and works to the pipework within one apartment will necessitate disruption to neighbouring apartments on the same system. The new proposed heating system will allow individual properties to be isolated without affected neighbouring apartments.

The current system requires hot water for the Hot Water System to circulate almost constantly and this provides a source of heat into the apartments, even during hot weather. This is reported as causing the apartments to suffer from summer overheating. With the new heating system using pipework distributed external to the apartments and utilising a heat exchanger, a constant flow through the apartments therefore this source of summer heat will be eliminated.

#### **3.2 Design Conditions of New System**

The new heating system is designed to be able to provide sufficient heating to the apartments to allow the design temperatures to be reached when the external temperature is -3°C. This matches the external design conditions Green Building Design use in calculations for a residential property within London.

In the event of the external temperature being below -3°C for a prolonged period, it is possible that the heating will not be able to maintain the design temperatures below. This scenario has a very low frequency in Central London where the temperature typically drops below -3°C for 8 hours per year. It is possible to design for lower

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temperatures, but this would require larger plant which would be less efficient at normal external temperatures, have a higher upfront cost and higher running costs than plant sized for -3°C.

The Frankham specification requires the system to be designed to provide the following temperatures in different room types:

- Living Room to 22°C. CIBSE Guide A recommends 22-23°C so this is in line with standards
- Bathroom to 22°C. CIBSE Guide A recommends 20-22°C so this is in line with standards
- Hall to 18°C. CIBSE Guide A recommends 19-24°C so this is slightly below the recommended standard. However, the temperature of the hallway is also going to be affected to a degree by the insulation, particularly around the door, and this may be a factor in the lower design temperature for this area.
- Bedroom to 18°C. CIBSE Guide A recommends 17-19°C so this is in line with standards

### **3.3 Description of Proposed System**

The current system relies on hot water being pumped from the boilers into the apartment where the water either flows through the radiators or heats the potable (drinkable) water in the hot water cylinder before returning to the boilers. The current arrangement means that pipework feeding one flat runs through at least one other flat on either the flow or return pipework. This arrangement means that it is not possible to isolate the heating or hot water to a single flat. In the event maintenance is necessary requiring the shutdown of hot water to a flat, other flats will also need to have their heating and/or hot water shut down while the works are carried out, and works may need to be carried out in a different apartment as well as that where the failure has occurred. The radiators and hot water cylinders within the apartments are nearing the end of their economic lifespan, with some having already been replaced, and so it is expected that these shutdowns will become more frequent if the system is retained.

The proposed system will dispense with the pipework routed through the flats and instead will install pipework external to the building housed in aluminium boxing. From this main pipework system fed from the boiler (the primary system), there will be a branch into each flat where the hot water will pass through a plate heat exchange Heat Interface Unit. An isolation valve will be provided to each apartment allowing the water supply to be shut off if required for maintenance. The isolation valve will be fitted on the outside the apartments on all blocks except for 11-32 Holst Court and 21-71 Oakey Lane (Odd Numbers). The use of a heat exchanger will also mean that hot water will not circulate through the apartments at all times which will reduce a major source of heating during summer.

Each apartment will also be fitted with a heat meter, again on the primary side of the HIU. This will allow each property to only be billed for the amount of heating used. The Heat Interface Unit will be of an MID Class 2 type which is approved for billing.

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### **3.4 Pipework and Valves**

The pipework between the plantroom and Heat Interface Unit in each flat is to be in medium grade steel. This pipework is to be run externally in trenching or enclosed in aluminium boxing powder coated to blend in with the surface behind. This is to be covered by pre-formed, non-combustive insulation with a canvas outer cover with reinforced foil face finish secured by non-ferrous bands. The thickness of insulation to meet requirements of BS5422:1990 (this standard is now out of date with the current version being released in 2009) and Building Regulations Part L1A (this is the standard for new dwellings). This system of pipework (known as the primary system) will comprise of main runs external to the apartments which will have smaller branches into each apartment.

The heating pipework within the flats is specified to be half-hard copper pipework connected by capillary joints or compression fittings. It will be surrounded by similar insulation to the copper pipework within the apartments and is also specified as meeting the requirements of BS5422:1990 and Building Regulations Part L1A. The pipework within the apartments is to be enclosed by a skirting cover.

The domestic (i.e. tap) water pipework will be copper connected by lead-free solder rings. This pipework will be chrome-plated where exposed and visible within the apartments. Water will be supplied directly from the mains supply and heated by the heat exchanger.

The Cold Water System supply is to be extended from the existing supply to the new risers. Within the apartments, the hot and cold water pipes will be run in parallel. The Frankham specification has a requirement for the system to be “sufficiently insulated” to prevent the cold water being warmed by the Hot Water System or heating pipework. However, there is no definition of that is meant by “sufficiently insulated”, and as there is always the potential for heat transfer from the hot to cold water pipework when run in parallel, it should be determined what temperature rise in the Cold Water System is acceptable for the term “sufficiently insulated”.

The specification requires Pressure Reducing Valves (Reliance Easiset 320) to be fitted where required. These are required where the water pressure exceeds a set level which can cause damage to pipework and fittings. Pressure Reducing Valves reduce the pressure back to standard levels (typically 1-3 bar). Water pressure reduces with altitude, and so these are most likely to be required on lower floors. The Contractor will need to test the mains water pressure to determine whether or not these are required. Conversely, if the pressure is too low, a water booster will be required. This is most likely to be required on the upper floors. The T. Brown tender has no cost against this item, and it will need to be confirmed whether this is because they have confirmed that boosters or PRVs are not required, or whether this is an item which may be added in later as a variation to the original contract.

### **3.5 Community Heating Primary System**

The communal heating around the estate between the Boiler House and individual apartments is referred to as the Primary System. This system is common to all apartments and we would anticipate that the costs for this system will be shared

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between all occupants. Later in this report, we have provided an estimate of costs per flat; for the primary system T. Brown have provided costs for the whole communal system which we have divided equally between the 138no. apartments in our cost summary.

The Wellington Mills Estate is heated from a central boiler house containing 4no. 500kW Hoval Ultra Gas condensing boilers dating from 2003. Based on CIBSE Guide M, the expected economic lifespan of these boilers is 20 years so they should provide another six years' service. It is likely that the boilers will continue to function after this time, although it is probable that running costs will increase. The project will retain these boilers as the main source of heating to the estate, therefore the total heating capacity to the estate will remain as at present.

While the boilers are to be retained, new Trend controllers will be added to them. The pipework will be replaced as above.

New secondary pumps (Grundfos NB65-160/177) are being installed within the plant room. These will be required to pump the water around the primary system. To maintain the water quality and reduce corrosion and biological activity, a new 50 litre dosing pot is being added to the system.

Detailed design calculations are required, confirm pump inverters are to be installed.

### **3.6 Apartment Heating Secondary System**

The heating system within the apartments are referred to as the Secondary System. The pipework for this system is described in Section 3.4 above, and runs between the Heat Interface Unit and the radiators.

The Heat Interface Unit has a plate heat exchanger where the hot water from the primary system runs across one side of the plate and heats the secondary water which runs along the other side of the plate. The secondary system provides both the heating via the radiators, and the domestic Hot Water System. The HIU in each flat will be controlled by a new hard-wired programmer/thermostat located in the living room of the apartment.

A strainer, expansion vessel, safety valve and drain cock will be installed on the secondary (apartment) side of the HIU. The system is to have an expansion allowance in line with manufacturer's guidelines to prevent the system being overpressured when hot.

Water from the Primary System is required to be at a minimum of 70°C as it passes through the HIU. This will then heat the water in either the heating system or hot water system, with the hot water being prioritised if both are requiring heating. The intention is that the water flowing into the radiators should be at 60°C, with the water returning from the radiator to the HIU being at 40°C meaning that the average temperature of the radiator is approximately 50°C. This is 30K above room temperature, and this difference between radiator and room temperature is termed  $\Delta t$  (delta t).

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The proposal is for the new radiators to be from the Stelrad Compact range and are to be the same size as the existing radiators so as to have minimal impact on the existing décor of the apartments. With a  $\Delta t$  of 30K as proposed, we believe the maximum heat output from each radiator will be approximately 10% higher than the existing. The radiators will be supplemented with new 419W electric towel rails within each bathroom.

During the works, there is a requirement to maintain continuity of services and electric heating will be supplied to the apartments if required.

Council confirm all pipework routes to be agreed with tenant before installation.

### **3.7 Domestic Water Systems**

Domestic Water Systems provide the water used within the flat.

The Cold Water pipework is to be extended to run up the new risers then run to the flats. Should the water pressure be too low (i.e. below 1 bar), booster pumps are to be installed to raise the pressure to this level. Similarly, should the water pressure within a flat be too high (above 3 bar), a pressure reducing valve will be installed to that flat to bring the pressure back down below 3 bar.

The Hot Water System will use the incoming mains cold water, which will be heated to 50°C by the HIU. This will feed the hot taps within the apartment.

Both the Hot and Cold Water Services pipework will be flushed (to remove debris), chemically dosed (to remove contamination) and chlorinated (to eliminate any bacterial growth within the pipework) prior to the systems being made live.

During the works, there is a requirement to maintain continuity of services including both hot and cold water. If there is an interruption to the cold water supply, the specification required that the cold water is restored on the same day. Should the hot water supply be interrupted, the requirement is for it to be restored within 24 hours of the interruption.

At project completion, there will be a period of 12 months during which the Contractor will be providing maintenance and rectifying any defects arising. At the end of the 12 months period, the contract requires a full services of the systems to be carried out.

### **3.8 Other Works**

Electrical supplies to mechanical plant is included. We saw no other information regarding other electrical services works, but understand these are being undertaken as part of a separate project.

The Frankham spec has a general requirement for making the necessary holes through walls and roof, making good, redecoration, reinstatement of fire sealing and barriers etc. but we have not seen information regarding other parts of the tender and so cannot comment on any building works not in connection with the mechanical services work.

Asbestos removal works are required under the Frankham spec as shown in Section 2.7 of this specification. The T. Brown tender has a provisional sum of £5000 per block for asbestos removal. Depending on the results of asbestos testing and hence the extent of works required, this figure could be higher or lower when final costs are received.

### **3.9 Electrical Works**

We have seen no details on the electrical works and understand from our meeting the electrical mains and external lighting will be replaced, currently the Council plan for no detailed design to be sent to the tenants, which is unacceptable and not safe.

This method of working does not comply with CDM Regulations.

Before commenting further on this we will need to see a full design.

### **3.10 Items Requiring Clarification**

1. The Frankham specification required the CWS system to be “sufficiently insulated” to prevent warming of the CWS by the heating and HWS pipework. We would suggest that the “sufficiently insulated” requirement is clarified as to what temperature rise is acceptable (there will always be some degree of heat transfer however much insulation is used) and seek confirmation from T. Brown Group as to what has been allowed within their tender.
2. The spec requires the pipework within the apartments to be enclosed within a skirting cover, but it is not immediately obvious where this has been allowed for in the pricing schedule. Clarification should be sought that the skirting cover has been included for within the costs.
3. The extent of the Builder’s Work In Connection with services should be confirmed, particularly within the apartments.
4. The tender return has N/A against the Provisional Sum for asbestos removal in the Boiler Room. It should be clarified as to whether this is included elsewhere or will be added to the project costs once the extent of removal works are known.
5. The tender return has no cost against Item 10 (Cold water booster instruction(s) (where required)). It should be confirmed whether or not a site survey has been undertaken to determine whether or not this is required. If this has not been confirmed, it is this likely that this may be a variation during the project.
6. The quotation is dated September 2015, and as such is over 2 years old. Confirmation should be sought as to whether or not the quotation is still valid.
7. Note that we have not seen details of electrical services or other works so cannot comment on these.
8. Full electrical design to be issued.

### **3.11 Comments Made Previously**

We have seen comments from Frances Murphy in regard to the routing of the pipework proposed by T. Brown Group. While we cannot provide a definitive response to these comments, we have tried to add to these below.

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- “Pipes distributed on roof for upper duplexes’ drop down into HIU cupboards”.

This is a more visually attractive option than the existing run across the front of the building. However, it does involve penetrating the roof (the comments refer to this as being timber) which is likely to require more work to weatherproof the entry into the flat. If this option is preferred, we would recommend that it is ascertained what, if any, additional costs this will involve.

- “Why not distribute on soffit of garages and rise in each dwelling as existing?”

We understand that the pipework is to be distributed on the soffit of the garages then to rise external to the buildings. We are not aware of anything in the Building Regulations why the existing system of having the pipework rising through the roof of the garage into the individual apartments is not permitted provided that there is sufficient fire-stopping to give a 30-minute rated ceiling (i.e. it would take at least 30 minutes for a fire in the garage to break through to the apartment above), but would suggest that if this route is followed that care is taken that exhaust gases are not able to be transmitted into through the ceiling.

- “Lighting currently on soffit. Is this to be replaced?”

We have not seen anything in either the Frankham specification nor the T. Brown quotation for replacement of the lighting.

- “Reduced Light to windows, reduced door opening height” – 50-60 Oakey Lane

The T. Brown Group drawings show the boxing running across the front of the doors and windows of the Ground Floor of 50-60 Oakey Lane. Their sections show the boxing as being close to the front wall, which makes the boxing as visually unobtrusive as possible. If the boxing were to be relocated to the front of the balcony soffit, it would be more visually intrusive from within and from outside the apartments, and create a greater reduction in light entering the apartment (although we do not expect a significant reduction). We believe that the location shown on the drawings is a better compromise than the suggested location in the comments provided that the doors and windows open inwards to the apartments. It is not immediately obvious where else the pipework could be run to these apartments.



#### **4.0 OPERATING AND MAINTENANCE MANUALS**

T. Brown Group have allowed in their tender for Operating and Maintenance (O&M) Manuals for the central plant and for each block of flats. It is not clear whether the O&M manual for the blocks of flats are one manual per block, or per apartment. We would suggest clarification is sought, but would expect a manual to be provided to each apartment for all new services installed therein.

## 5.0 CONCLUSIONS

From the information we have been given, it appears that the Frankham specification provides a viable system which should provide many years of operation. The replacement and rerouting of the pipework should mean another 35 years before this needs replacing again, and with isolation valves on each flat future maintenance within the apartments will be easier and cause less disruption. The main cost remaining after these mechanical services works would be the replacement of the existing boiler plant which have an estimated economic lifespan of 6 years, although it is likely that they will continue to operate for a number of years after that.

We have only seen the tender breakdown and drawings from T. Brown Group and therefore cannot give a full analysis of their planned works. However, they will need to comply with the Frankham specification, and should all works be undertaken their costs of £10,000 to £12,000 per apartment seem fair.

It is possible that the costs will change slightly as there are currently only provisional sums for asbestos removal. An asbestos survey would be required to firm up these costs. It should also be clarified that the quote is still valid given it dates from over two years ago.

There are some items which we would suggest are clarified prior to the project commencement. These are shown in more detail in Section 3.8, but are summarised below:

1. The Frankham specification requires the CWS system to be “sufficiently insulated” but we suggest clarification of the meaning of “sufficiently insulated”.
2. Clarification should be sought that the skirting cover within the apartments has been included for within the costs.
3. The extent of the Builder’s Work In Connection with services should be confirmed, particularly within the apartments.
4. The tender return has N/A against the Provisional Sum for asbestos removal in the Boiler Room. It should be clarified as to whether this is included elsewhere or will be added to the project costs once the extent of removal works are known.
5. It should be confirmed whether or not a site survey has been undertaken to confirm whether a cold water booster is required as this may be a variation during the project.
6. Asbestos reports to be issued.
7. All routes agreed with tenants before install.
8. Plant heat exchanges to be fitted.
9. Full electrical design to be issued.
10. Full electrical external lighting design to be issued.

## 6.0 GLOSSARY OF ABBREVIATIONS USED IN THIS DOCUMENT

**BWIC** – Builders' Work In Connection (with)

**CWS** – Cold Water Services

**CIBSE** – Chartered Institution of Building Services Engineers

**CCTV** – Closed Circuit Television

**DB** - Distribution Board

**$\Delta t$**  – Delta t – Used to signify a difference in temperature

**EPC** – Energy Performance Certificate

**HIU** – Heat Interface Unit – The heat exchanger being installed to each apartment

**HWS** – Hot Water Services

**K** – Kelvin – A unit of temperature equal to 1°C, but with a scale starting at absolute zero. 0°C = 273K

**kW** – Kilowatt – Measurement of Power

**LTHW** – Low Temperature Hot Water system – Radiator based heating system

**LV** – Low Voltage

**MCB** – Miniature Circuit Breaker – Installed to the distribution board

**MCCB** – Moulded Case Circuit Breaker – Installed to the main panel board

**M&E** – Mechanical and Electrical

**MID** – Measuring Instruments Directive – All meters used for billing must have MID approval

**O&M** – Operation and Maintenance Manuals – Documents and drawings detailing the installed services including M&E

**Phase** – Electrical term referring to the type of power supply

**RCD/RCBO** – Residual Current Device – Device installed at the distribution board or power outlet to help reduce the risk of electrocution and electrical fires.

**REC** – Regional Electricity Company – Electricity service provider

**TRV** – Thermostatic Radiator Valve – Self Regulating Valve