Boiler House Condition Report, Energy Appraisal and Cost Comparison of Heating Replacement Options at:-

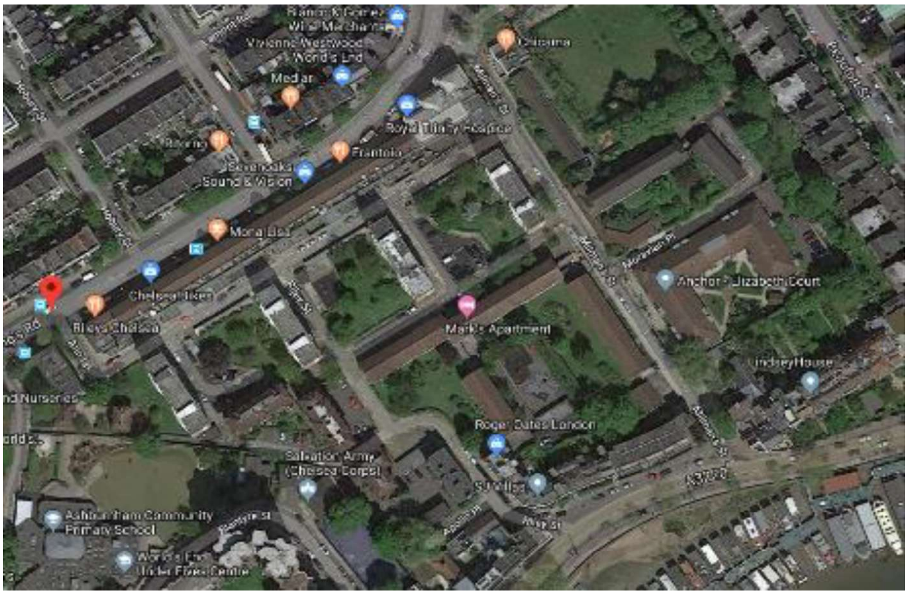
Cremorne Estate, Ann Lane, London, SW10 0BS

For and on Behalf of:

Royal Borough of Kensington & Chelsea

The Town Hall
Hornton Street
LONDON
W8 7NX

Date	**December 2019**
Ref	**L170302/0030**



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1 EXECUTIVE SUMMARY

Following a number of substantial/major heating pipework failures and continuing deterioration of the underground heating mains, calfordseaden undertook a high level feasibility survey and cost appraisal and put forward considerations for upgrading/replacing the aged district underground heating mains.

It was noted from an earlier survey that the underground heating pipework is in a very poor condition and the insulation provided is not a proprietary product for underground services and nor does it provide adequate thermal properties for the pipework.

Feasibility

The options initially considered for replacement were:

- Replacing on a like for like basis, but with an alternative underground pipework network and new central equipment.
- Domestic boilers for each flat.
- Block Communal Heating boilers located adjacent to each block.

Connecting Ann Lane properties to either the Block Communal Heating or new U/G services was considered as a follow up investigation. With the location of the existing distribution pipework potentially within the existing retail units and the potential for asbestos, to resupply/connect the Ann Lane properties, the pipework would need to be installed at high level externally along the rear of the flats. The pipework would also need architectural gantries/supports where the pipes cross the walkway and traverse to the pedestrian opening between The Kings Road and Ann Lane. For Ann Lane it is considered that individual domestic boilers would offer a less disruptive more efficient solution. Albeit the internal pipework and radiators will need replacing.

In considering the underground heating main replacement versus Block Communal Heating, it was concluded that the Block Communal Heating offered a less costly option with far less disruption.

Energy

Subsequent to issuing the initial report, calfordseaden were asked further to review the efficiency of the existing heating system versus the Block Communal Heating versus a new underground heating distribution.

For the energy appraisal a number of key assumptions were made as concise information such as pipe sizes and insulation are not known.

The efficiency/energy consumption of any heating system is affected by its age, condition and design/control philosophy. As the existing system is in very poor condition with ineffective insulation, dated design philosophy and aged equipment this is reflected in a low system efficiency.

The energy appraisal uses the existing system as a “bench mark” and other systems considered were compared against it.

Overall the energy consumption is greatly improved for a Block Communal Heating system over that of the existing central estate wide distribution, showing an approximate increase in efficiency of 20%. Against a new estate wide system a 6% increase is anticipated.

Condition

calfordseaden were also asked to undertake a condition survey of the existing estate boiler house (located under Gilray House) as it was considered by the residents to be sufficiently adequate in condition and performance to satisfy the estate and so costs should not be taken into account when considering the new U/G distribution.

The existing boiler house condition survey identified that the majority of the boiler house is approximately 17-18 years old, with obsolescence being a feature of the existing boilers. On this basis we recommend that the boiler house should be replaced. As a result the costs were added to the option for the underground heating main replacement (Option A-1).

Our surveys have not considered nor take into account replacement of the heating risers and pipework/radiators within the flats. Furthermore, the hot water distribution was also not considered albeit the hot water pipework is also installed as an underground service.

For the most part the existing estate distribution mains are circa 65+ year's old.

Therefore, if the decision is to proceed with a like for like replacement, the boiler house should also be replaced at the same time. However, our recommendation would be to install Block Communal Heating which would be slightly less costly and offer greater resilience, a reduction in the programme with substantially less disruption.

Roof Works

Following a survey and specification prepared by Baily Garner, they propose that Lacland, Riley, Gilray and Millmans House will benefit from a new roof structure/covering.

The specification not only identifies a new roof but also replacement of heating and domestic water services at roof level.

This element of work can be carried out in isolation to that of the new estate distribution heating as its not directly associated. Nevertheless, both disruption and administration costs would be reduced if undertaken at the same time as the replacement heating mains.

Consideration will also need to be given when replacing the roof to facilitate a possible future upgrade of the heating pipework to a full "central" heating scheme.

The new roof potentially should facilitate extra/new roof openings for a 2 pipe distribution system.

2 BRIEF

calfordseaden LLP have been instructed by Royal Borough of Kensington & Chelsea (RBKC) to prepare a high level cost comparison and high level feasibility survey for the alternative heating replacement solutions proposed for the Cremorne Estate, Ann Lane, London SW10 0BS; as follows:

Option A1: Renewal of central plant & district heating mains
Option A2: District heating mains replacement (only)
Option B: Creation of 7 new local plant rooms (decentralisation)

calfordseaden have been subsequently instructed to carry out a condition/age survey of the existing estate boiler house and to carry out a high level energy appraisal between Option A and B, also considering the affect on Ann Lane maisonettes.

The proposed scope excludes the hot water and heating distribution to the blocks and individual flats. This estimate also excludes the Decent Homes upgrade works which are scoped and priced out of a separate budget and will apply to both options.

Please see Appendix A for location plan, site plan and potential boiler house locations.

We have identified that the following services are in the proximity of the proposed routes for the replacement of the underground heating mains.

Electricity, gas, water, sewers, communication and telephone network

Although a minimum clearance of 300mm is a general rule for adjacencies to gas or electricity utilities, given the operating pressure of the heating pipeline. Statutory Utility companies may insist that a greater clearance be maintained, to safeguard their apparatus against a possible pipework failure

Due to the size and type of these utilities, finding a route which avoids clashes and enables sufficient clearance to be maintained will in our opinion incur diversion costs.

For Options A (1) and (2), it is assumed that the Main Plant will be replaced (as part of DH mains renewal) and a temporary boiler will be required whilst the existing plant is replaced. In addition, this option will involve the new distribution pipework being laid into new trenches with new pipework installed on the rear elevation to provide heating to the Ann Lane properties.

For Option B, which involves the creation of new Plant Rooms, new pipework will only be required within the plant room areas along with reconnection to Ann Lane properties similar to Options A (1) and (2). While different sizes of plant equipment will be required to suit the various sized blocks, the price is anticipated to be similar for each Plant Room.

3 COST APPRAISAL

[redacted]

3.2. RISK REGISTER/UNKNOWNS

The identified costs are somewhat similar, but the risk components of Option A are more considerable in terms of programme and pricing.

Calfordseaden LLP have identified the following issues that could impact upon the scheme delivery – comprising:

In respect to Option A (1) and (2):
- Ground Conditions + Contamination
- Services Obstructions/Diversions
- Reconnections to the blocks

In respect to Option B:
- Reconnections to the blocks
- Planning approval for Boiler Pods

These risk items are quantified in terms of programme (anticipated to be + 6 months for Option A) and costs (likely surcharge impact of up to [redacted] for Option A and [redacted] for Option B.)

However these risks may not be the only consideration as to the choice of which option to pursue, as the decision may rest with operational resilience of the preferred option.

3.3. COST ESTIMATE

OPTION A – (1) RENEWAL OF CENTRAL PLANT AND DISTRIBUTION MAINS		Quantity	£ Rate	£
1	Enabling Works			
2	Surveys			
3	Removal			
4	Temporary Plant			
5	Alterations to Plant Room			
6	Control Modifications			
7	Central Boiler replacement			
8	Changeover arrangements			
9	Builder Work in Connection			
10	Pipework & Trenches			
11	Utility Diversions			
12	New Block Isolation Valves + Pits			
13	Pipework to Ann Lane properties including architectural supports, pipe boxing, internal pipework and radiator and decorations.			
	SUB TOTAL			
	Preliminaries @ [redacted] SAY			
	TOTAL BUILDING WORKS			
	Professional Design Team Fees @ [redacted] SAY			
	CONTINGENCY @ [redacted] SAY			
	PRELIMINARY ESTIMATE TOTAL			

Subject to:

- Obtaining statutory licences and planning & Building Control fees
- Inflation beyond 3rd Quarter 2019
- Excludes cost of works within the apartments
- VAT

OPTION A – (2) **RENEWAL OF DISTRIBUTION MAINS ONLY**	**Quantity**	**£ Rate**	**£**
1 Enabling Works			
2 Surveys			
3 Removal			
4 Temporary Plant			
5 Alterations to Plant Room			
6 Changeover arrangements			
7 Builder Work in Connection			
8 Pipework & Trenches			
9 Utility Diversions			
10 New Block Isolation Valves + Pits			
11 Pipework to Ann Lane properties including architectural supports, pipe boxing, internal pipework and radiator and decorations.			
SUB TOTAL			
Preliminaries @ SAY			
TOTAL BUILDING WORKS			
Professional Design Team Fees @ SAY			
CONTINGENCY @ SAY			
PRELIMINARY ESTIMATE TOTAL			

Subject to:

- Obtaining statutory licences and planning & Building Control fees
- Inflation beyond 3rd Quarter 2019
- Excludes cost of works within the apartments
- VAT

OPTION B –
BLOCK COMMUNAL HEATING

		Quantity	£ Rate	£
1	Surveys			
2	Alterations			
3	Structural Alterations			
4	Electric and Controls Boards			
5	New Boiler Equipment			
6	Construct New Plant Room			
7	Plate exchangers			
8	Builder Work in Connection			
9	Pipework modifications			
10	Diversions/Drainage			
11	Individual domestic boiler for Ann Lane, including internal pipework, rads, decorations and gas.			
	SUB TOTAL			
	Preliminaries @ SAY			
	TOTAL BUILDING WORKS			
	Professional Design Team Fees @ SAY			
	CONTINGENCY @ AY			
	PRELIMINARY ESTIMATE TOTAL			

Subject to:

- Obtaining statutory licences and planning & Building Control fees
- Inflation beyond 3rd Quarter 2019
- Excludes cost of works within the apartments
- VAT

3.4. PROGRAMME OBSERVATIONS

This indicates that the Block Communal Heating plant rooms option can be constructed more speedily with concurrent work. Furthermore the changeover will be local and less impacting and disruptive to the residents.

3.5. CONCLUSIONS

This exercise has identified a number of risks and reservations in terms of cost and programme expectations. calfordseaden LLP consider there are site specific issues that materially jeopardise delivery:-

a) The likelihood of contaminated soil found in excavations

b) The disruption to estate roads

c) Possible identification of asbestos

d) Locality of existing gas, electricity and other utilities

e) Replacement of heating with Ann Lane masionettes

Although a specification needs to be developed for both options, we anticipate the disruption and civil engineering works resulting from the district heating replacement Option A (1) and (2) is likely to carry considerably more risk, and be more disruptive than the creation of new pod plant rooms with local modifications to existing pipework.

This is primarily due to the associated builder's work, the costs of diversion of statutory utilities, and the on-costs (i.e. managing traffic).

calfordseaden LLP anticipate the builders work arising from Option B would be the least disruptive of the two options.

calfordseaden LLP believe total spend is likely to be between £4.0m - £4.25m, although Option A is more exposed to the impact of risks.

We consider the resilience and lessor disruption to the residents arising from Option B make it a preferable option, worthy of exploring with the Local Planning Authority.

We therefore conclude that the decision is not solely about the estimated price, but the evaluation of disruption, programme duration, and ultimate benefit to the residents.

We consider the Block Communal Heating (Option B) is therefore the most appropriate choice, especially given it is more resilient in operation, and less exposed to risk impact.

4 BOILER HOUSE CONDITION REPORT

4.1. INTRODUCTION

Following the earlier feasibility survey for replacement of the current heating system installed on the Cremorne Estate, calfordseaden were instructed to undertake a Condition Survey of the existing estate boiler house to determine the age and condition of the current installation and equipment.

4.2. DESCRIPTION OF EXISTING INSTALLATION

Heating to the Cremorne Estate currently is provided by 6 gas fired modular boilers with the boilers manufactured by MHS from their Regency 4 Modulek range. Each boiler has an output of 272.4 kW.

Heated water is circulated around the boiler house by individual shunt pumps which are attached to each boiler. The pumps are manufactured by Grundfos from their Magna 1 range model 50/60F.

Heating is distributed to the estate by 3 separate pumped zones, each with a duty standby variable speed heating pumps. The pumps are currently operating at a fixed speed. The pumps are manufactured by Grundfos from their TPED range with inbuilt inverters. Each zone operates on a variable temperature control arrangement.

The pipework within the blocks is based on a dated 1 pipe ladder arrangement with cast iron column radiators positioned mainly in the lounge and 1 bedroom. Flat 5 of Lacland House was used as a sample.

The boiler flue is a twin wall stainless steel arrangement which discharge at roof level at Gilray House.

The boilers also provide heat to the 2-2,500 litre hot water cylinders. These are also provided with plate heat exchangers to provide hydraulic separation between the old heating pipework and calorifier. This is to aid circulation and prevent the calorifier being contaminated with water bourne contaminants and “debris”.

The plate heat exchangers are fed from the primary circulatory pipework within the boiler house with a duty standby primary pump providing the circulation to the plate heat exchanger. The plate heat exchangers are also provided with a localised shunt pump and 3-port valve. Both the HWS primary pump and plate heat exchanger shunt pump are manufactured by Grundfos. The primary HWS pumps are provided as duty/standby where the plate heat exchanger is a single pump.

Hot water for the estate is provided by two 2,500 litre vertical storage vessels with a single return pump provided to generate circulation.

The HWS return pump is also manufactured by Grundfos.

Control for the heating system is provided by a single wall mounted control panel with microprocessor based controls. The microprocessor is manufactured by TREND.

All the main heating equipment is located in the basement boiler house beneath Gilray House.

4.3. CONDITION OF INSTALLATION

The boiler house underwent major refurbishment in 2003/2004 with new boilers, boiler flue, controls pumps and HWS cylinders. Some sections of the original heating pipework within the boiler house was retained. Generally the distribution pipework throughout the estate and flats remains as original and was installed in 1950-1955.

The control panel was noted to be in hand control, suggesting that either the microprocessor was faulty or the software has been superseded or is obsolete.

4 boilers were installed in 2003, with 2 being installed in 2004. Since the 2003 refurbishment, a number of pumps have since further been replaced, namely the shunt pumps, which we suspect are in the order of 1-2 years old and the HWS primary pumps and 2 of the zone pumps being 5-6 years old.

We anticipate that due to the age and condition, the boilers have a marked reduction in efficiency.

On consultation with the boiler manufacturer, it was confirmed that some boiler components are now obsolete. With the boilers reaching the end of their economic working life and the reduction in efficiency, they should be considered for replacement.

Also the controls should be replaced again as they are reaching the end of their economic life.

Some elements of the heating system equipment could be retained as they are relatively new, i.e. zone pumps, calorifiers. However, this will be dependent on the type of boilers and design philosophy used. Also we are of the opinion that the flues will also need replacing, as the existing flue is designed in association with the boilers.

5 ENERGY CONSUMPTION APPRAISAL

5.1. EXISTING INSTALLATION

The existing plantroom consist of 6 MHS Regency 4 Modulek boilers rated at 272kW each. It is thought that these boilers were installed approximately 17-18 years ago and therefore would be exceeding its economic life. Given the above, it is reasonable to assume that the boilers efficiency would have reduced to approximately 70%.

With regards to the district heating pipework, it is understood that all buried pipework is distributed mild steel in areas where pipework has been exposed, it has been reported that the insulation is either non-existent or of poor quality. Given the status of the buried pipework and that it was first installed in 1950's, we can assume all buried pipework to be insulated in 25-30mm mineral wool insulation at a 0.04W/m/K.

Using the above assumptions, the following energy loss and usage had been derived based on the existing installation.

Total annual heat loss from pipework (kWh)	**187,143.21**

Table 1 - Annual heat loss from buried pipework based on the use of 30mm mineral wool insulation at 0.04W/m.k

Boilers	Assumed Efficiency	Total boiler output (kW)	Total Boiler Input (kW)	Total annual energy usage (kWh)
	70%	1,632.00	2,121.60	**3,097,536.00**

Table 2 - Total annual energy usage from existing energy centre based on an average of 4 hours run time a day (1460 hours per annum)

Total annual energy usage (kWh)	**3,284,679.21**

Table 3 - Total annual energy usage of the existing installation based on annual boiler usage and annual heat loss from buried external pipework only.

The above figures will be used as baseline figures whereby improvements in energy usage will be outlined for each heating option.

5.2. REPLACEMENT OF DISTRICT HEATING PIPEWORK ONLY

The replacement of the district heating pipework would provide an improvement on the total annual heat loss from buried pipework. It is expected that should pipework be replaced, it would be in accordance to the insulation performance as quoted in table 4; this has been derived from Logstor data.

Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/m.K)
65.00	87.00	0.024
50.00	82.00	0.024
40.00	66.00	0.024

Table 4 - Proposed insulation performance for replacement site-wide buried pipework.

Using the assumption stated above, the annual buried pipework heat loss was calculate and displayed in table 5 below.

Total annual heat loss from pipework (kWh)	**63,305.98**

Table 5 - Annual heat loss from buried pipework based on the insulation performance noted in table 4.

Given that for this heating option only buried pipework is being replaced, the total annual energy usage from the energy centre boilers are assumed to be as per the existing installation (refer to table 2). Therefore the following annual energy usage has been calculated.

		Total improvement from existing
Total annual energy usage (kWh)	**3,160,841.98**	**+3.77%**

Table 6 - Total annual energy usage based on annual boiler usage and annual heat loss from improved buried external pipework & insulation.

From table 6, it is noted that there is a 3.77% improvement in the energy efficiency of the development should the buried external pipework be replaced.

5.3. REPLACEMENT OF DISTRICT HEATING CENTRAL PLANT & PIPEWORK ONLY

For the replacement of the district heating central plant, it has been assumed on a "like for like" basis, as the existing boilers are discontinued, the proposed replacements boilers have been selected from the Elco range. A breakdown of the energy usage of this boiler based on improved efficiencies is displayed in table 7 below.

Boilers	Proposed boiler	No. of Boilers	Seasonal Efficiency	Total boiler output (kW)	Total Boiler Input (kW)	Total annual energy usage (kWh)
	Elco ADI-No_X CD - 325	6	93.16%	1,764.00	1,884.66	**2,751,600.10**
Improvement over existing installation						**+11.17%**

Table 7 - Total annual energy usage from the replacement energy centre based on an average of 4 hours run time a day (1460 hours per annum)

From table 7, we note an 11.17% energy efficiency improvement over the existing energy centre installation based on the replacement of central boilers with "like for like" boilers operating at a higher seasonal efficiency (6 no. Elco ADI-No_X CD – 325). It has also been assumed that all the buried pipework has been replaced to match the performance as noted in table 4. Therefore, a total energy efficiency improvement over the existing installation is displayed in table 8 below.

		Total improvement from existing
Total annual energy usage (kWh)	**2,814,906.08**	**+14.30%**

Table 8 - Total annual energy usage based on annual boiler usage and annual heat loss from replacement high efficient boilers and improved buried external pipework & insulation.

From table 8, it is noted that there is a 14.30% improvement in the energy efficiency of the development should the buried external pipework and boiler within the energy centre be replaced.

5.4. BLOCK COMMUNAL HEATING

For the decentralised approach, it is proposed that individual energy centres will be strategically located to provide heating and hot water to nearby blocks. The heating and hot water demands were calculated for each of the blocks using CIBSE Heat Network Code of Practice and CIBSE AM12 guides whereby boilers had been proposed accordingly. Table 9 displays the proposed boilers for each segment of the estate as well as the seasonal efficiencies of the boiler and calculated total annual energy usage.

Boilers	Proposed Boiler	No. of Boilers	Seasonal Efficiency	Total boiler output (kW)	Total Boiler Input (kW)	Total annual energy usage (kWh)
Lacland House	Elco Thision L EVO - 80	3	95.02%	239.10	251.01	366,470.48
Riley House			95.02%	239.10	251.01	366,470.48
Gillray House			95.02%	239.10	251.01	366,470.48
Millmans House			95.02%	239.10	251.01	366,470.48
Apollo House (West)	Elco Thision S Plus - 46	3	96.51%	146.10	151.20	220,750.38
Apollo House (East)	Elco Thision L EVO - 70	3	95.10%	210.00	220.29	321,623.40
Bowling Green House	Elco Thision S Plus - 34	3	96.51%	146.10	151.20	220,750.38
Purcell/Brunel House	Elco Thision L EVO - 80	3	95.02%	239.10	251.01	366,470.48
					Total	**2,595,476.57**
					Improvement over existing	**+16.21%**

Table 9 - Total annual energy usage from all Block Communal Heating plant based on an average of 4 hours run time a day (1460 hours per annum).

Although the above energy centres will be local to their respected buildings, there will be buried distribution pipework from the energy centre to and from relative buildings which will account for heat distribution losses. These have been calculated and displayed below, whereby it is assumed the pipework installed will match the performance as specified in table 4.

Total annual heat loss from pipework (kWh)	**18,058.83**

Table 10 - Annual heat loss from buried pipework based on the insulation performance noted in table 4 and distribution to relative localised plant rooms.

Therefore, the total energy efficiency improvement over the existing installation is displayed in table 11 below.

		Improvement over existing installation
Total annual energy usage (kWh)	**2,613,535.40**	**20.43%**

Table 11 - Total annual energy usage based on decentralised approach with localised district heating per block(s).

5.5. SUMMARY

The energy appraisal is based on a desktop study in order to draw comparisons between various heating options for Cremorne Estate. A number of assumptions were made to produce the calculations displayed in this report – these are as follows:

- 30mm mineral insulation on existing district heating pipework
- Existing boiler is running at 70% efficiency having first been installed 17 years ago
- Heating flow and return temperatures of 82/71^{o}C respectively for all scenarios
- Hot water flow and secondary return assumed to be at 65^{o}C for all scenarios
- Boiler run time of 4 hours per day (1460 hours per annum) assumed for all scenarios
- Only energy usage and loss from plant room boilers and external buried pipework taken into account. Energy usage and loss within each building is considered to be the same in all scenarios and therefore has not been included in the above report

The table below confirms that energy use reduces by approximately 20% over the existing installation when comparing against the Block Communal Heating. The table also shows tha the energy use is reduced when comparing the Block Communal Heating against that of the U/G pipework replacement and that of the U/G pipework and central boilers by approximately 16% and 6% respectively.

	Annual pipework heat loss (kWh)	Annual central plant energy usage (kWh)	Total usage & loss (kWh)	Percentage improvement over existing installation
Existing installation	187,143.21	3,097,536.00	3,284,679.21	N/A
U/G pipework replacement	63,305.98	3,097,536.00	3,160,841.98	+3.77%
Central boilers and U/G pipework replacement	63,305.98	2,751,600.10	2,814,906.08	+14.30%
Block Communal Heating	18,058.83	2,595,476.57	2,613,535.40	+20.43%

6 PROPOSED ROOF WORKS

In 2016 Baily Garner produced a survey for the roof level mechanical services in relation to replacement to roof structure/covering to Lacland, Riley, Gilray and Millmans House.

This was followed up in 2017 with a mechanical services specification again in association with a roof replacement programme. Both the report and specification identified that the roof top mechanical services i.e. heating and domestic cold water would need replacing both due to age/condition and clashes with the proposed new roof.

Essentially it has been proposed by Baily Garner that the roof work will raise the roof height by approximately 300mm and in so doing, this will encompass the existing services. Baily Garner suggest the effect of raising the roof will necessitate also raising the services and indirectly, the cold water storage tanks.

The Baily Garner specification indicates that rather than raising the existing tanks, new GRP tanks are provided to replace the aged galvanised tanks.

The roof works and the replacement mechanical services are not directly dependant on the new heating proposals, however if undertaken at the same time as the replacement heating, disruption to the residents in system “downtime” would be reduced and administration cost “contractor prelim” would be less.

7 ANN LANE MAISONETTES HEATING

Ann Lane maisonettes heating is currently supplied via the estate wide distribution pipework.

The heating distribution is as other blocks on the estate, a 1 pipe “ladder” arrangement. However, Ann Lane maisonettes have horizontal distribution from flat to flat whereas the other blocks have vertical distribution.

2 option were appraised, namely:

a) New individual domestic boiler.
b) Connection either to new Block Communal Heating or the new U/G distribution.

APPENDIX A

DRAWINGS

OPTION A:

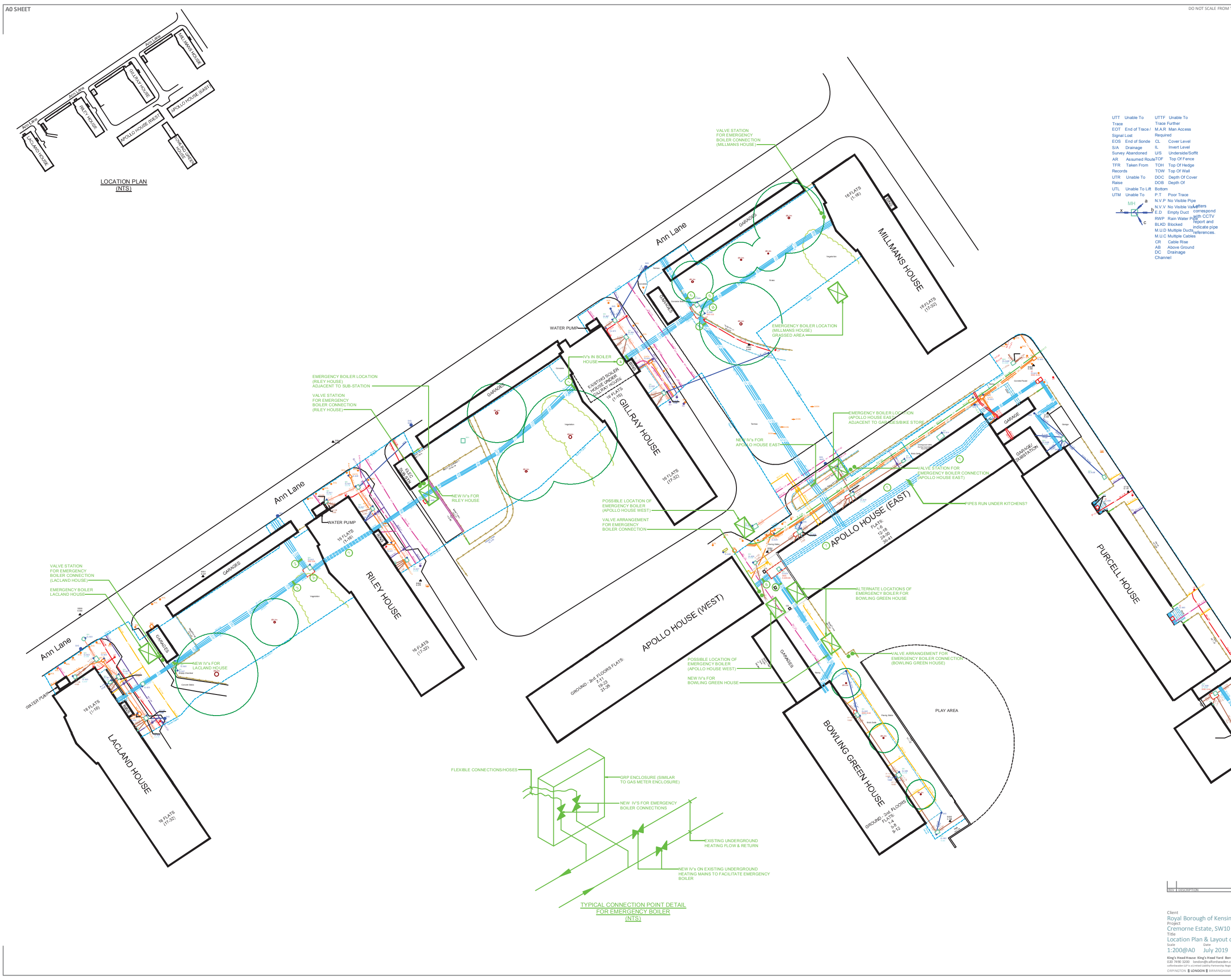
- M/100 – Location Plan & Layout
- GA-300 – Site Plan

OPTION B:

- GA-200 Rev B – Potential Boiler House Locations
- Diagram
- Sample Block Schematic (Lacland House)
- Energy Calculation Tables
- Visuals for Ann Lane Heating (SK01, SK02, SK03)

A0 SHEET

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE VERIFIED BY THE CONTRACTOR ON SITE



NOTES

1. ASSUME ANN LANE PROPERTIES ARE NOT FED FROM DISTRICT HEATING SYSTEM.
2. (A), (B), (C), ETC EXISTING VALVE PIT LOCATIONS.
3. (1), (2), (3), ETC EXISTING ZONE ISOLATION VALVES IN VALVE PIT.
4. NEW BLOCK ISOLATION VALVES (IV's).
5. EMERGENCY BOILER
6. EMERGENCY BOILER CONNECTION IV's - SEE TYPICAL CONNECTION POINT DETAIL
7. POSSIBLE ROUTE OF EXISTING HEATING F&R

Detection Grades

Topographical Survey Key

Sub Surface Key

REV	DESCRIPTION	DATE	INIT	CHKD

calfordseaden

Client
Royal Borough of Kensington & Chelsea
Project
Cremorne Estate, SW10 0BW
Title
Location Plan & Layout of Emergency Boilers & Valve Connections

Scale	Date	Drawn By	Checked By	Project No:	Drawing No:	Revision
1:200@A0	July 2019	TC	PI	L170302	M/100	

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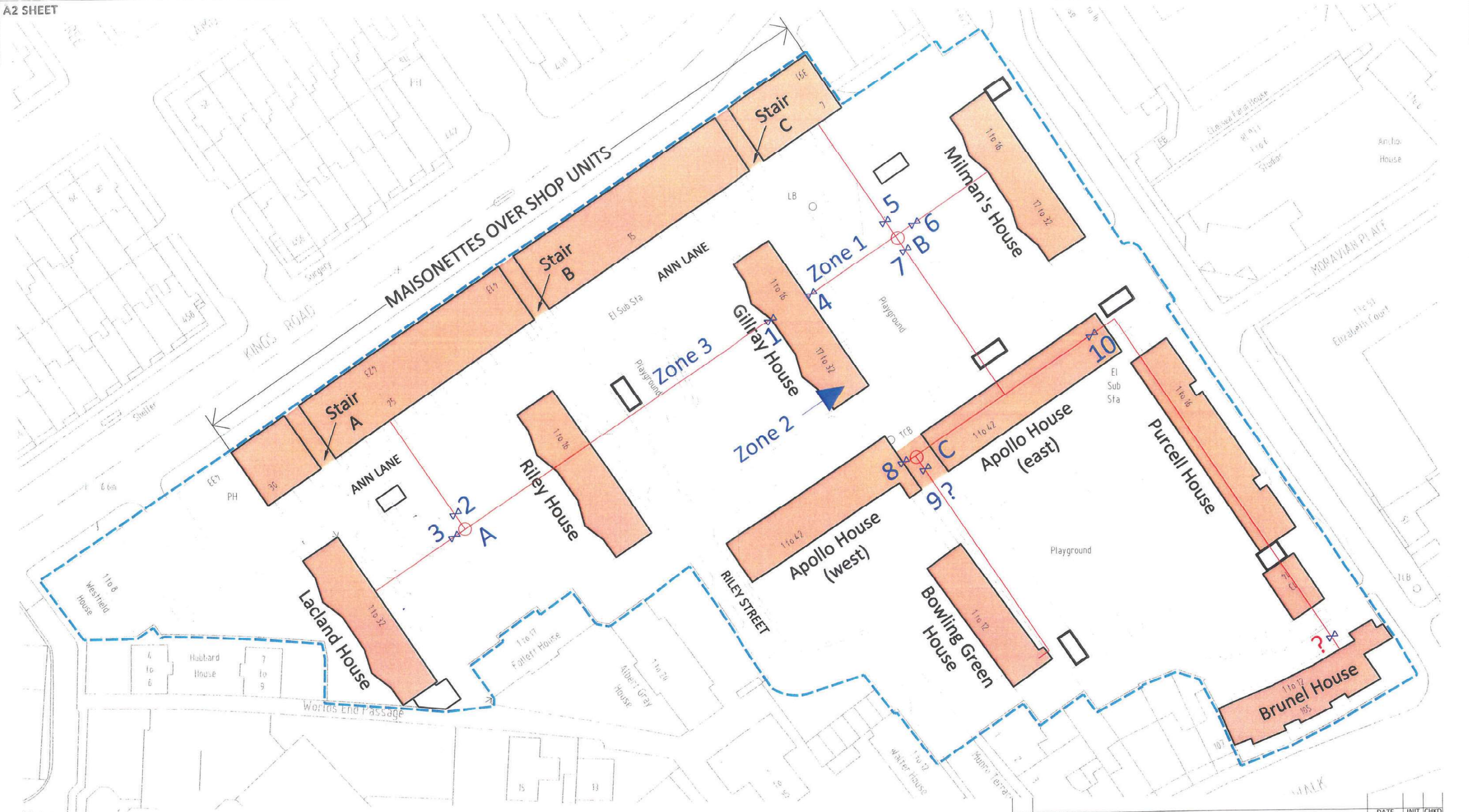
A2 SHEET



Note
The information shown on this drawing is indicative only based upon usual inspections of services and must not be considered to be entirely accurate.

REV	DESCRIPTION	DATE	INIT	CHKD

calfordseaden

Client
Kensington & Chelsea TMO
Project
Cremorne Estate, Kings Road, London SW10
Title
Site Plan - showing zones and sub-branch valves

Scale	Date	Drawn By	Checked By	Project No:	Drawing No:	Revision
NTS	1.4.19	rs	tb	L170302	GA-300	

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A1 SHEET

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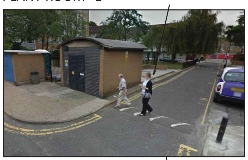
PLANT ROOM "E"

Boiler house in paved area behind sub-station



PLANT ROOM "A"

Boiler house in paved area (within site boundary)

KEY

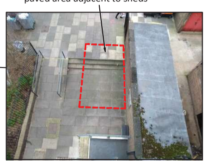
- Sheds, garages etc.
- Possible boiler house location
- Alternative locations (in soft landscaping)
- Indicative route of existing underground heating pipework

PLANT ROOM "G"

Boiler house in soft landscaping behind sheds

PLANT ROOM "H"

View from above. Boiler house in paved area adjacent to sheds

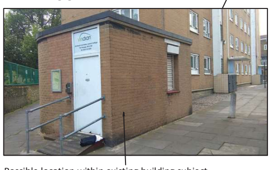


PLANT ROOM "B"

PLANT ROOM "C"

Boiler house in recess between Purcell House and single storey block.

PLANT ROOM "F"



Possible location within existing building subject to existing use (if any) being relocatable

PLANT ROOM SCHEDULE

A. serves Millman House
B. serves Apollo House
C. serves Purcell House and Brunel House
D. serves Bowling Green House
E. serves Gillray House
F. serves Lacland House
G. serves Riley House

PLANT ROOM "D"

Boiler house in paved area adjacent to garages

REV	DESCRIPTION	DATE	INIT	CHKD
B	schedule added	20.07.18	rs	tb

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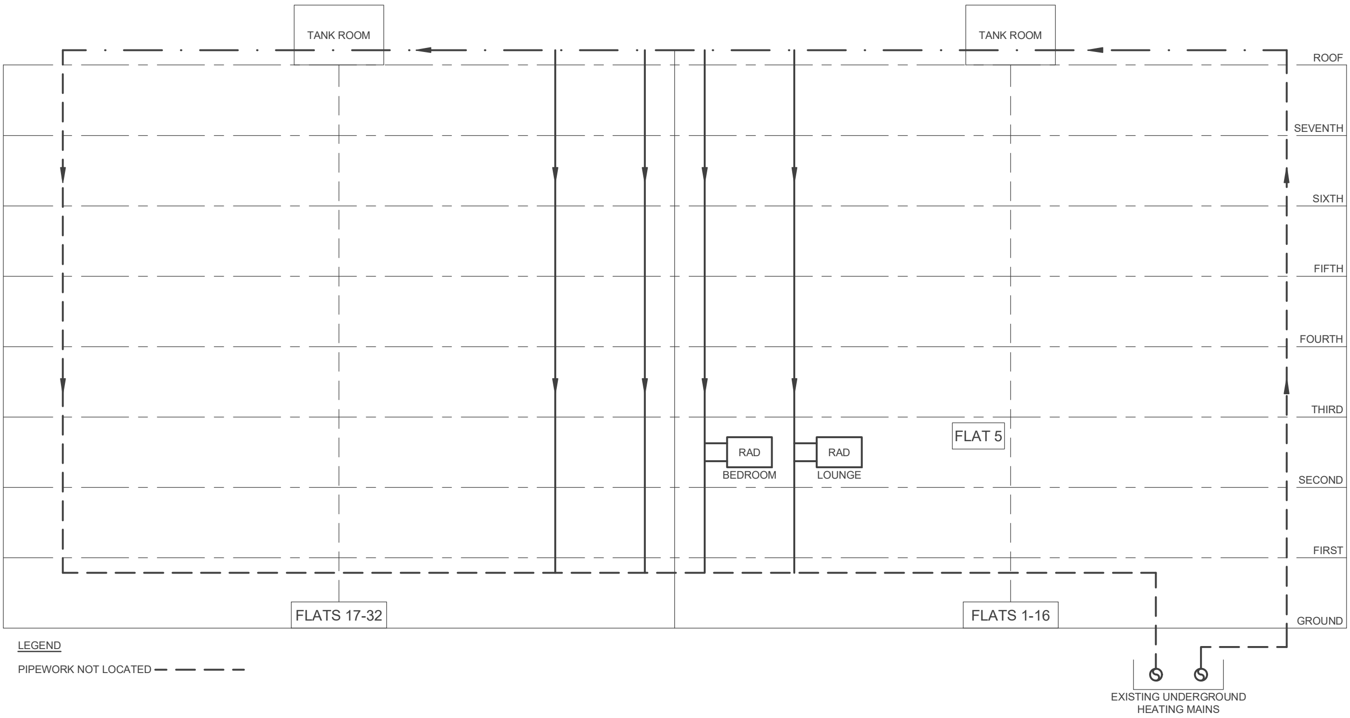
Client
Kensington & Chelsea TMO
Project
Cremorne Estate, Kings Road, London SW10
Title
Potential Boiler House Locations

Scale	Date	Drawn By	Checked By	Project No:	Drawing No:	Revision
1:500 A1	05/01/2018	rs	tb	L170302	GA-200	B

King's Head House King's Head Yard Borough High Street London SE1 1NA
020 7940 3200 london@calfordseaden.com

A3 SHEET

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE VERIFIED BY THE CONTRACTOR ON SITE



calfordseaden

Client
Royal Borough of Kensington & Chelsea
Project
Lacland House, Cremorne Estate, Chelsea, London, SW10 0BP
Title
Sample Block Schematic - Lacland House

Scale	Date	Drawn By	Checked By	Project No:	Drawing No:	Revision
NTS@A3	Jan 2020	TC	PI	L170302	SK/01	-

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REV	DESCRIPTION	DATE	INIT	CHKD

U/G Existing Pipework

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	Annual Heat loss (kWh)
Flow	65.00	30.00	0.04	53.00	28.24	1,496.72	13,111.27
	50.00		0.04	185.00	23.90	4,421.50	38,732.34
	40.00		0.04	20.00	20.56	411.20	3,602.11
	Total					6,329.42	55,445.72

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	
Return	65.00	30.00	0.04	53.00	23.93	1,268.29	11,110.22
	50.00		0.04	185.00	20.25	3,746.25	32,817.15
	40.00		0.04	20.00	17.42	348.40	3,051.98
	Total					5,362.94	46,979.35

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	
Hot water (F&R)	65.00	30.00	0.04	106.00	21.57	2,286.42	20,029.04
	50.00		0.04	370.00	18.26	6,756.20	59,184.31
	40.00		0.04	40.00	15.71	628.40	5,504.78
	Total					9,671.02	84,718.14

Total annual heat loss from pipework (kWh)	**187,143.21**

Boilers	Assumed Efficiency	Total boiler output (kW)	Total Boiler Input (kW)	Total annual energy usage* (kWh)
	0.70	1,632.00	2,121.60	**3,097,536.00**

* Assumed that the communal boiler is running 4 hours a day on average per annum (1460 hours per annum)

Total annual energy usage (kWh)	**3,284,679.21**

New U/G Pipework

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	Annual Heat loss (kWh)	Improvement from existing
Flow	65.00	87.00	0.024	53.00	8.97	475.41	4,164.59	68.24%
	50.00	82.00		185.00	8.13	1,504.05	13,175.48	65.98%
	40.00	66.00		20.00	8.09	161.80	1,417.37	60.65%
	Total					2,141.26	18,757.44	66.17%

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	Annual Heat loss (kWh)	Improvement from existing
Return	65.00	87.00	0.024	53.00	7.60	402.80	3,528.53	68.24%
	50.00	82.00		185.00	6.89	1,274.65	11,165.93	65.98%
	40.00	66.00		20.00	6.85	137.00	1,200.12	60.68%
	Total					1,814.45	15,894.58	66.17%

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	Annual Heat loss (kWh)	Improvement from existing
Hot water (F&R)	65.00	87.00	0.024	106.00	6.85	726.10	6,360.64	68.24%
	50.00	82.00		370.00	6.21	2,297.70	20,127.85	65.99%
	40.00	66.00		40.00	6.18	247.20	2,165.47	60.66%
	Total					3,271.00	28,653.96	66.18%

Totals	**63,305.98**	66.17%

	Assumed Efficiency	Total boiler output (kW)	Total Boiler Input (kW)	Total annual energy usage* (kWh)	Improvement from Existng
Boilers	0.70	1,632.00	2,121.60	**3,097,536.00**	**0%**

* Assumed that the communal boiler is running 4 hours a day on average per annum (1460 hours per annum)

		Total improvement from existing
Total annual energy usage (kWh)	**3,160,841.98**	**3.77%**

New U/G Pipework New Plant

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	Annual Heat loss (kWh)	Improvement from existing
Flow	65.00	87.00	0.024	53.00	8.97	475.41	4,164.59	68.24%
	50.00	82.00		185.00	8.13	1,504.05	13,175.48	65.98%
	40.00	66.00		20.00	8.09	161.80	1,417.37	60.65%
	Total					2,141.26	18,757.44	66.17%

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	Annual Heat loss (kWh)	Improvement from existing
Return	65.00	87.00	0.024	53.00	7.60	402.80	3,528.53	68.24%
	50.00	82.00		185.00	6.89	1,274.65	11,165.93	65.98%
	40.00	66.00		20.00	6.85	137.00	1,200.12	60.68%
	Total					1,814.45	15,894.58	66.17%

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	Annual Heat loss (kWh)	Improvement from existing
Hot water (F&R)	65.00	87.00	0.024	106.00	6.85	726.10	6,360.64	68.24%
	50.00	82.00		370.00	6.21	2,297.70	20,127.85	65.99%
	40.00	66.00		40.00	6.18	247.20	2,165.47	60.66%
	Total					3,271.00	28,653.96	66.18%

Total	**63,305.98**	66.17%

Boilers	Proposed boiler	Number of Boilers	Assumed Efficiency	Total boiler output (kW)	Total Boiler Input (kW)	Total annual energy usage* (kWh)	Improvement from existing
	Elco ADI-Nox CD 325	6	0.93	1,764.00	1,884.66	**2,751,600.10**	**11.17%**

* Assumed that the communal boiler is running 4 hours a day on average per annum (1460 hours per annum)

		Total improvement from existing
Total annual energy usage (kWh)	**2,814,906.08**	**14.30%**

Communal Block Heating

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)	Annual Heat loss (kWh)	Improvement from existing
Flow	65.00	87.00	0.024	-	8.97	-	-	100%
	50.00	82.00		43.00	8.13	349.59	3,062.41	92%
	40.00	66.00		33.00	8.09	266.97	2,338.66	35%
	Total					616.56	5,401.07	90%

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)		Improvement from existing
Return	65.00	87.00		-	7.60	-	-	100%
	50.00	82.00	0.024	42.00	6.89	289.38	2,534.97	92%
	40.00	66.00		33.00	6.85	226.05	1,980.20	35%
	Total					515.43	4,515.17	90%

	Pipework diameter (mm)	Insulation thickness (mm)	Insulation conductivity (W/mK)	Length of pipework (m)	Heat loss from pipework (W/m)	Total Heat loss (W)		Improvement from existing
Hot water (F&R)	65.00	87.00		-	6.85	-	-	100%
	50.00	82.00	0.024	84.00	6.21	521.64	4,569.57	92%
	40.00	66.00		66.00	6.18	407.88	3,573.03	35%
	Total					929.52	8,142.60	90%

Total	**18,058.83**	**90%**

Boilers	Proposed Boiler	Number of Boilers	Assumed Efficiency	Total boiler output (kW)	Total Boiler Input (kW)	Total annual energy usage* (kWh)	
Lacland House	Elco Thision L EVO - 80	3	0.95	239.10	251.01	366,470.48	Improvement from existing
Riley House			0.95	239.10	251.01	366,470.48	
Gillray House			0.95	239.10	251.01	366,470.48	
Millmans House			0.95	239.10	251.01	366,470.48	
Apollo House (West)	Elco Thision S Plus - 46	3	0.97	146.10	151.20	220,750.38	
Apollo House (East)	Elco Thision L EVO - 70	3	0.95	210.00	220.29	321,623.40	
Bowling Green House	Elco Thision S Plus - 34	3	0.97	146.10	151.20	220,750.38	
Purcell/Brunel House	Elco Thision L EVO - 80	3	0.95	239.10	251.01	366,470.48	
Total						**2,595,476.57**	**16.21%**

* Assumed that the communal boiler is running 4 hours a day on average per annum (1460 hours per annum)

		Total improvement from existing
Total annual energy usage (kWh)	**2,613,535.40**	**20.43%**

a) Domestic Heating Boilers:-

Sample maisonettes were inspected (Nos 21 & 22) to determine the practicality of installing individual boilers for each maisonette also considering the gas supply.

It was determined that individual boilers could be incorporated relatively easily within the kitchen of each property albeit modifications would be needed to kitchen furniture/cupboards.

It was further noted that each maisonette is currently provided with gas supply. However, the supply was “capped” and meter removed.

It was unclear why the gas had been removed and if, in fact, was “live”.

For new domestic boilers we would recommend because of the age and uncertainty of the condition of the old gas pipe, that a new gas supply and meters are provided.

A single or several gas supplies can be taken from the main gas main in Ann Lane penetrating the slab under the pedestrian cross overs between The Kings Road and Ann Lane where new meters can be provide next to each maisonette door, new internal heating pipework and radiators would be required.

b) Connection to New U/G Mains or Block Communal Heating:-

New heating mains would cross Ann Lane (underground) before rising to the surface in the location of the pedestrian links between The Kings Road and Ann Lane. The pipe would then rise up adjacent to each stairway or penetrate the structure where the pipework will be installed on a steel gantry or support. The gantry could be architecturally treated to help provide a more pleasing aesthetic.

The pipe would then transverse at high level across the face of the block before dropping to low level where the pipes would enter the flat (within the kitchen).

The pipework at high level would be masked by a colour coated architectural bespoke boxing.

The existing pipework and radiators within the maisonettes could be retained and reconnected based on the main entry and leaving point from the maisonettes being located.

However, it is considered that new pipework and radiators would be needed.