Confidential

Building Services Feasibility Report
Riverside Housing

South Kesteven District Council

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14/08/2024

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Document History

Issue	Date	Comment	Author	Chk'd
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SOUTH KESTEVEN DISTRICT COUNCIL

PICK EVERARD

Contents

1. Executive Summary

1.1 Recommendations

The below table summarises the short term (0-2 years) and long-term recommendations captured from the main report below. Please refer to the main recommendations section of the report for further detail.

Short Term Options – 0-2 Years

The table below is represented in full in section 4.0. The below table summarises the recommendations into work that is required for rectification and work associated with enhancements to the current system.

Type	Total Budget Cost
Works to Rectify the defects in the existing system	**£86,100.00**
Works associated with enhancements to the existing systems	**£77,000.00**

Long Term Options – 3+ Years

The below table provides the summary of the Options proposed (within Section 5.0). Including two options for enhancement (EN1 and EN2). Please note that the full breakdown of costs is provided in section 6.0.

Option	Description of Works	Primary Pros	Primary Cons	Budget Cost
1	Retain District Heating (Full Refurb)	- Low Capital Cost - Improvement to Defects. - Re-use of existing System - No Change in demand - Reduced embodied carbon	- Billing would remain unchanged. - No Grant Funding	**£930,836.79**
2	Decentralised (Local Gas Fired Boilers)	- Medium Capital Cost - Tenants metered and responsible for utility cost. - Can be phased. - Reuse of systems within flats	- No Decarbonisation - No Grant Funding - Increased Tenant Cost - New Gas infrastructure throughout.	**£1,553,658.37**
3	All Electric – Panel Heaters	- All new system. - Full Decarbonisation – gas removed. - Low Capital Cost - Removal of SKDC provision of utility cost	- Tenant utility bills would increase. - Risk on local electrical infrastructure upgrades. - Higher Tenant Disruption for installation but could be phased.	**£1,167,075.47**

4	All Electric – Air Source Heat Pumps	- Modern efficient system - Full Decarbonisation – gas removed. - Medium Capital Cost - Removal of SKDC provision of utility cost - Grant Funding Likely	- Tenant utility bills would increase. - External plant required. - Higher Tenant Disruption for installation but could be phased.	**£2,176,493.77**
EN 1	Fabric Improvements	- Reduction in Energy Use - Better Thermal Comfort for Tenants - Reduction on energy cost - Futureproofing the estate	- Higher Capital Cost - Not likely to comply for Govt grant funding (limited fabric upgrade grants). - More intrusive upgrade works to each tenant's residence required.	**£2,784,361.25**
EN2	Photovoltaic	- Onsite Renewable Generation - Low/medium Capital Cost - Eligibility for Grant Funding	- Beneficiary likely to be the tenant. But could assist in increase in electrical bills	**£527,800.00**

No direct recommendation is provided within this report as to which option is preferred. This is primarily due to there being varying outcomes for each option. For example, budget capital costs are provided, but as noted in the report the operational cost and subsequent cost increase to the tenants would need to be factored in. Some of the option costs are higher than others but might be favourable depending on any grant funding that would form part of the capital costs, the restrictions of the funding is unknown at this point in time. Timescales, are also a significant factor. As the report splits the recommendations into short term and medium/long term, both sections require review and the amount done in the short term will have a bearing on the options for long term.

2. Introduction

2.1 Overview of Report and Brief

Pick Everard have been appointed by South Kesteven District Council to provide the following services.

Surveys – Completed 16th/17th July 2024

- To undertake a Building Services Condition Survey of the existing heating/hot water systems and provide an assessment of the current condition, with recommendations for rectification and/or replacement.
- Building Condition Survey – to determine current building condition with recommendation for remedial works.

Feasibility Study

- The Building Services Condition Survey outcome feeds into an assessment of the current condition of the system and identifies short term (1-2 years) recommendation for remediation and enhancement.
- Building Services Feasibility Study then looks at options, regarding heating and hot water, for future improvements (3+ years). Including options to have independent utility connections for 50% of the current units to enable tenant billing directly.
- Building Condition Survey - Recommendation for remedial works to the current building fabric – see separate report.
- Sustainability - Desktop high level strategic sustainability review & advice from decarbonising & upgrading heating plant, with next steps recommendations.
- Quantity Surveying – High Level budget costs of the recommendations.

The report, outline below, is based on the following limitations;

- Non-intrusive Survey – the inspections completed were visual only and did not comprise of any opening up or intrusive inspections.
- Visual inspections of flats were limited to a selection of units. It is assumed the sample flats surveyed represent the remaining flats.
- The report highlights the main defects noted and does not include an exhaustive list of minor defects.
- It is noted that the recommendations are from a point in time survey. The survey was completed in July and although the boilers were running, as there was a heating and hot water demand, it was not during peak heating season. Additional defects may be present at other times of the year.
- No record information of the MEP systems was available to determine actual routing of buried pipework and so the report makes assumptions from what was visually inspected on site.

2.2 The Site

The Site comprises of 90 residential units and a single common room. The units are located along Welham Street and Agnes Steet. The units are split into the following blocks. The naming of the below blocks is provided to assist the commentary within the report.

- Block A – Flats 1-16
- Block B – Flats 20-22
- Block C – Flats 17-19 and Flat 23
- Block D – Main Block – Comprising of;
    - Flats 24-42
    - Guest Flat

- Communal WC
- Warden Flat
- Communal Space including kitchen.
- Plant Room
- Gas Intake Room

- Block E – Flats 43-47
- Block F – Flats 45-46
- Block G – Flats 48-55
- Block H – Flats 56-62
- Block I – Flats 63-76
- Block J – Flats 77-82
- Block K – Flats 83-90

The Site plan, provide by SKDC is presented in Appendix A. The Block numbers have been added for clarity.

As part of the survey works, the following flats were surveyed;

- Flat 1 – 2 Bed – Block A
- Flat 10 - 1 Bed – Block A
- Flat 15 – Limited Access – Block A
- Flat 19 – 1 Bed – Block C
- Flat 31 – 1 Bed – Main Block
- Flat 56 – 2 Bed – Block H
- Flat 64 – 1 Bed – Block I
- Flat 83 – 1 Bed – Block K

2.3 History of Site

The units have been predominantly used for over 65's as sheltered housing. A quantity of the units have been moved from sheltered housing to General Needs Housing in the last few years. The ratio and quantity of sheltered vs general is unknown and has been requested from SKDC.

In 2019 a large-scale refurbishment of the heating and hot water system was completed. This comprised of retaining the core heat generating plant (see further descriptions), providing partial replacement of distribution pipework (external above ground only) and replacing the heating and hot water system within each unit. The works only

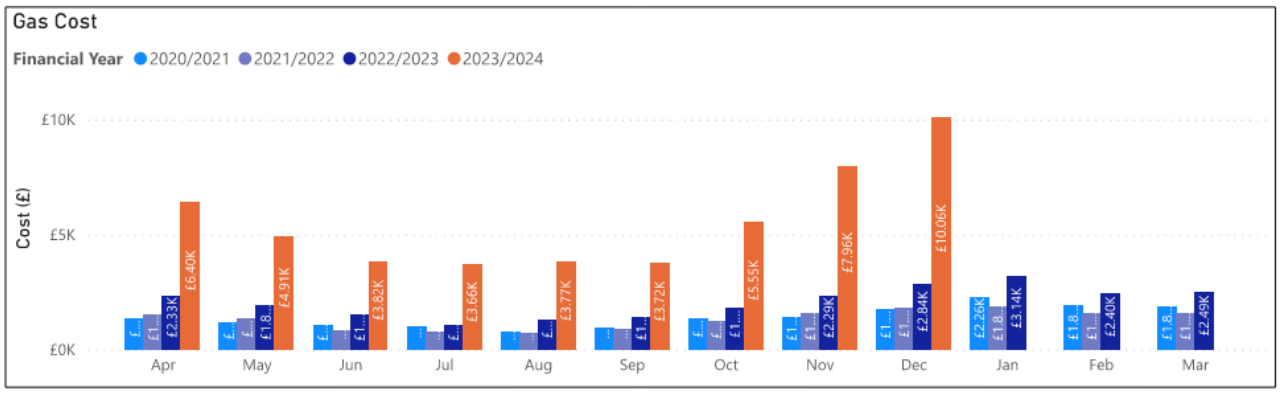
included for the replacement of the interfaces in the flats. This was in the form of changing the hot water calorifiers and direct fed radiator circuits with a new heat interface unit. A previous report was commissioned due to concerns over the installation quality of the 2019 installation. Limited work has happened since 2019 but it is noted that the below has occurred on site;

- All but 8no Heat Interface Units have been removed and hot water calorifiers reinstalled.
- Periodically over the years, electric showers have been installed within tenant bathrooms.
- 2 port valves have been replaced when faulty.
- Reactive replacement of system parts due to failure, primarily boilers
- Replacement of the 2019 installed plate heat exchanger plate pack.
- Annual Boiler Servicing
- Fire Stopping Works – recently completed.

Utility Billing

The existing tenants currently pay for their own water and electrical usage via meters within each flat. The heating system is currently provided by the district heating system. Tenants currently pay a nominal weekly amount.

Due to the increase in energy costs the expenditure from SKDC has increased from a monthly average of £1.5k-£2.3k up to an average of £5.5k. The peaks are within the winter heating season but as can be seen from the below graph (supplied by SKDC) the cost is still significant in the summer months.



From discussions with SKDC, no increase has been made to the amount the tenants are paying for the heating/hot water (£10/week) leading to an increased shortfall of expenditure vs chargeable recovery. It is understood that SKDC are currently charging £46k/annum for energy use with a gas bill between £80-100k per annum (circa 40-55% non-recovered cost).

An increase to tenants billing has been considered previously, but due to the faults/issues in the current system with heating/hot water being unreliable, at times, an increase cannot be fully sought until the system is fixed.

Due to the increase in general needs housing, the aspiration of SKDC, is to provide up to 50% of the flats as general needs housing. It is understood that tenants of General Needs housing are responsible for their utility bills. The brief and subsequent report looks into the options for separating the systems in order for the General Needs tenants to be independent of the district heating scheme, thus reducing the energy cost for the council.

2.4 De-Carbonisation and Sustainability Objectives

The current project objectives are noted as:

- Explore options for affordable decarbonisation of the existing social housing stock for the Riverside site in Grantham, which currently uses an inefficient gas-fired district heating system.
- Seek to reduce, or preferably eliminate, the energy cost burden on SKDC within the provision of this LA social housing.
- Review options to enable tenants' heating energy use to be paid directly by the tenant against their own consumption (except for the supported living provision). All existing electricity consumption costs are currently paid by the individual tenants.
- High level review of the buildings' fabric condition and outstanding maintenance /repair requirements, to provide greater energy efficiency.

Note this excludes all aspects relating to any asbestos, fire or security.

- Facilitate individual point of use energy systems, with 'smarter' and adjustable controls.
- Maintain occupancy control by tenants where possible.
- Explore how the works could be implemented in a phased rolling programme, with minimal tenant disruption and decanting.

As part of a ongoing path to Net Zero, SKDC have a commitment to reduce the energy and carbon emissions. Grants have been received in the past as part of tranche 2.1 of the SHDF (Sheltered Housing Decarb Fund). It is understood the grants have been used on decarbonisation projects on other sites (mainly Air Source Heat Pump Installations). The Tranche 3 funding of the SHDF is available for application in Q3 of 2024/2025 and it is SKDC's aspiration to be successful for additional grant money.

The current EPC scores have been received and reviewed and summarised into the table below;

Rating Achieved	Quantity of Flats
EPC Rating B	1
EPC Rating C	53
EPC Rating D	35
Not Known	1 (Flat 89 not available)

It should be noted that 19 flats have an expired EPC Certificate (2019 expiration), this includes the single flat that has an EPC rating of B (Flat 28).

The current legislation requires that all Landlords must ensure that all properties have a valid EPC and that rented properties meet at least an E rating, of which the current properties are compliant.

Key Note

Whilst moving to an electric based system (air source heat pump for example) and reducing/omitting gas use will have a large impact on carbon emissions and energy efficiency, it will not directly reduce energy bills.

Gas is currently operating at 6p/kWh compared to electricity use being 24p/kWh (UK wide averages not the current contractual arrangement SKDC are paying). If an all electric solution is taken forward the gas consumption would reduce and thus reduce or omit the gas cost SKDC are currently paying. But the electricity cost would likely increase at a higher rate than the reduction in gas. As the tenants pay their electricity bill directly, the increase would be passed onto the tenants. This would need to be considered in any decision.

2.5 Existing Estate Condition

The existing residential buildings are grouped in clusters within the Riverside estate. They are generally in overall sound condition, built with cavity brickwork, elements of roof insulation upgrade and having replacement double-glazed uPVC windows/ doors. Refer to the Pick Everard Fabric Condition Survey for detail description of the existing condition of this housing stock.

The existing residential heating provision is by an inefficient and aging centralised district heating system, split into 3 zones. This is presently fired by gas boilers within a central plantroom with heat pipework distribution through below-ground ductwork and single pipe heating supply system to the residential units.

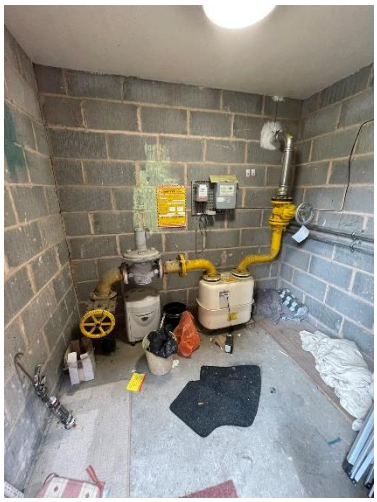
Initial assessment of this centralised district heating system illustrates inefficiencies for the Local Authority of; heat losses through areas of uninsulated heat ducting, limited controls within individual residential units and significantly increased estate-wide energy costs under set agreements only able to be partially recharged to tenants, with no correlation to individual tenant heating energy use consumption.

3. Existing Services Installation

3.1 Gas Intake Room

3.1.1 Description of Existing

The Gas Intake room is located adjacent to the Main Plant room. The Incoming gas pipe size is 125mm and gas pipe serving the boilers in the plantroom is 76mm (Mapress). There is a Itron MDA 65 Gas meter inside the Gas Intake Room. The installation appears to be satisfactory.



Gas Meter Room – Uninsulated Heating Pipework on Right Hand Side

Gas Meter

3.1.2 Potential Issues

The meter room itself, is in suitable condition with adequate venting.

There is no line diagram of the meter arrangement provided within the meter room, this should be provided along with clear labelling of meters and service valves.

The meter cupboard was being used partly as a store room, this should be a sole use room and anything not related to the incoming gas service, removed.

There is uninsulated heating pipework passing through the gas meter room, which is an unheated space. This should be rectified and insulated to avoid unnecessary heat loss.

3.2 Boiler Room

3.2.1 Description of Existing

Within the Plantroom are 6no. Gas fired Boilers (Buderus Logamax Plus GB162-100) that are wall mounted, via a unitstrut frame. The boilers are connected to two combined flue headers that rise and terminate through the roof above.

The boilers were last serviced on the 31st January 2024, as seen by the inspection report. For some reason only 5 of the six boilers were included on the commissioning sheet. At the time of servicing, one boiler was not safe to use and not operational. It is understood that the work to rectify this boiler was completed after the service. The boilers are approximately 14 years old. We would expect boilers to have a life expectancy of 15-20 years, if maintained correctly. During our survey, two of the boilers were out of action, requiring replacement parts.

The boilers generate heat, via individual shunt pumps (Grundfos UPER 25-80 130) into a combined header that serves the primary side of the plate heat exchanger. The plate heat exchanger was installed in 2017 with the plate pack replaced recently.

The secondary side of the plate heat exchanged serves a 1000 litre buffer vessel. From the buffer vessel, the flow pipework continues to a header where there are three circuits identified, and pumped independently via Grundfos TPE-3 pumps. Pipework circuits, exiting the pipework drop into a trench and then connect onto original pipework. The plantroom pipework appears to of been replaced in 2017 but it connected to uninsulated pipework within the trench. It is also noted that there is Asbestos located within the trench. It is currently poorly labelled by a hand written note on the pipework.

It would appear that the heating circuit runs at 80°C Flow. There are no temperature gauges or sensors on the primary circuits and so it is not known what the return temperature is. There is not Building Management System to monitor and control the system. The only form of control is a manufacturer supplied boiler control panel (Logamatic 4121). This is a basic unit and it is not known if the unit actually functions correctly. When heating was initiated, all boilers fired and the pumps appear to all run on constant speed. This seems to tie up with the control unit not providing the control to the system.

Ideally there would be a BMS system installed in the plantroom but as a minimum we would expect a boiler control panel to function and control the following parameters, as a minimum;

- Boiler Sequencing and Controlled Start
- Boiler Control and Monitoring
- Weather compensation
- System Pressurisation
- Pump Speed Control and monitoring
- System Temperature Monitoring
- Energy Metering

This would control the system to not allow the system to come on to 100% duty when heating is required but rather sequence the boilers to come on one by one, thus improving energy efficiency of the system.

This is further enforced by the boiler output. The boiler output of all 6no. units would be approximately 600kW. We would estimate that the system duty would be around 350-400kW at peak heating season. Requiring 3 or 4 boilers running with the other two being used to cycle the boilers in use. Currently all 6 boilers appear to run which appears to be because of poor system control and monitoring.

The system is pressurised by 2no. Flamco pressurisation units, each with 300L expansion vessels. One is on the primary circuit and one on the secondary. It was noted that system pressure is not maintained and when the boilers are enabled, most go into fault due to low system pressure. The pressurisation unit then has to pressurise the system to enable the boilers to run. As above, a simple control system would negate this issue as the system could be ensured to be pressurised prior to the first boiler being enabled.

There is a pressure relief valve on the circuits that currently discharges into an open pit. With no drainage. This needs to be rectified so it discharges over a suitable drainage gulley.

A Magnaclean Industrial magnetic water filter and a Flamco Pro PDS 231 combined pressurisation and dosing unit are installed on the primary circuit between boilers and buffer vessel. Indication from the survey is that there is no dosing procedure as part of the FM strategy. When the system was overhauled in 2017, there are no records to determine if any chemical inhibitor was added to the system.

Boilers and Flues

Pressurisation Unit

Existing Boiler Controller

Temperature Gauges on Boilers

3.2.2 Potential Issues

The installation in the plant room is of a mixed age. Remedial work has been done in the plantroom but the general installation quality was viewed as quite poor. Below are issues identified within the space;

- It is highly recommended that water samples are taken of the current heating system. If the system has been operating with no corrosion inhibitor for the last 7 years, extensive corrosion could of happened on the internal surface of the pipework. Furthermore, as it is evident that large parts of the system were not replaced in 2017, some of the pipework could be 30+ years old. There is a potential that there could be unknown leaks on the system. The pressurisation units are to be metered to determine if the system is being topped up regularly, a clear sign of a potential leak. It is not known the reason why the plate pack on the plate heat exchanged was replaced recently. But it is likely that sludge and deposits from the system blocked up the small channels and water ways in the plates. Further emphasising that there is unlikely to be inhibitor in the system and that the system was not thoroughly flushed in 2017.
- No temperature sensors on the system, only pressure gauges were evident. The boilers have an analogue temperature display only. There is therefore no way to monitor the temperature of the flow and return of the system leading to poor control of the boilers.
- The 3no. Circulation pumps, serving the heat to the buildings, were installed in 2017 and were poorly installed. The pumps are not fixed to the frame, but have the flanges resting on a Unistrut bar. The pumps are not level and could easily move leading to increased wear on the pumps. It is recommended that the pumps are removed, the pipework realigned, secure supports added and the pumps then fixed in accordance with the manufacturers guidelines.
- Pressure Relief – to be rectified so it discharges above a suitable drainage location.
- Provide a new control panel to monitor and control the boilers and pumps including weather compensation to reduce the system temperature in summer to 60°C.
- A plantroom schematic, including incoming gas should be produced of the existing to assist in maintenance.
- Uninsulated pipework to be insulated, including outgoing circuits within trenches. But note that this would required remediation works to asbestos.
- Asbestos information was not received for the plant areas but it is noted that there is asbestos evident within the trench the pipework drops into. It is recommended that this is surveyed and correct labelling is applied to the area to avoid exposure to maintenance personnel. This is a significant H&S risk, SKDC should review the current Asbestos registers/survey's it has to ensure there is full coverage.

3.3 Site Distribution

3.3.1 Description of Existing

From the plantroom there are three circuits noted that extend to serve various parts of the site. The circuits consist of independent pumps, within the plantroom, that then run via buried pipework to each block.

There is no record information regarding the routing of pipework and which blocks are served from which circuit. The below assessment has been derived from assumption on site only.

- Circuit 1 – Blue – The circuit appears to serve the north end of the site encompassing flats 43-82 and consists of buried heating flow and return pipework.
- Circuit 2 – Green – The circuit serves the main block. It splits within the plantroom into three sub circuits. We believe one of these runs to serve an external block (Flats 83-90). This is evident from scarring of the tarmac but it is unclear why this block is treated differently. The majority of the pipework is internally run within the main block.
- Circuit 3 – Red – This circuit serves the southern end of the site and all block from the main block (Flats 1-17) and consists of buried heating flow and return pipework.

This is graphically represented below.

No pipework routing is shown on the below, as there is no information on site to determine where the pipework is routed and a large amount of assumptions would have to be made leading to incorrect interpretation.

Pipework is generally run using pre-insulated pipework sections. They are buried directly in the ground in continuous sections and therefore the routing is hard to determine with out having specialist ground penetrating radar equipment.

Pipework section rise out of the ground to serve each block. Where the pipework rises above the ground it converts to crimp fit carbon steel and is complete with a valve set within an enclosure, see below;

Heating Enclosure – Serving Flats 83-90

Heating Enclosure – Serving Flats 63-76

The pre-insulated pipework was installed in 2017 and appears in a suitable condition. It should be noted that the installation of the pipework does not conform to best practice and likely to not conform to manufacturers installation guidelines. This is predominantly that pipework should be buried a minimum of 400/500mm below the surface. There is evidence that the pipework has been installed shallower than this. It was also noted, on site, that recent re-paving works, uncovered the pipework sitting at 200mm below the surface. This increases heat loss of the pipework but more importantly does not provide enough cover to avoid damage from any groundworks.

Within each riser enclosure are isolation points, differential pressure control valves (DPCV's) and strainers. It should be noted that the isolation valves would isolate multiple flats at a time. There is currently no way to isolate flats independently, without access internally.

Whilst having the DPCV valves in encouraging, there is no information as to whether they have been commissioned and set. Further more, some of the DPCV valves have been damage and miss control heads or partner valves to take a pressure differential pressure reading across the flow and return, rendering then unusable.

A proportion of the riser enclosures were viewed, all appears to have different valve set ups and in different state of condition.

All of the enclosure showed uninsulated pipework being evident from the point of the pre-insulated pipework rising, from the ground, to the pipework entering the flats. The enclosure are all external and therefore there is a large amount of heat wasted through poor installation of insulation.

The full routing of pipework could not be determined, but as a large number of sections of pipework were found to be uninsulated, the problem is likely worse across the whole system. The pipework being uninsulated , aside from the obvious issue associated with energy wastage, poorly insulated pipework located externally will be susceptible to freezing in the event that there is no heat in the pipework for whatever reason during cold weather. Without further

intrusive survey work, the extent of uninsulated pipework cannot be determined but from the non-intrusive survey, there is clearly substantial sections

A large external manhole was opened adjacent to Flats 1-16. There were multiple issues that were observed;

- Pipework not supported but just left to rest on the floor. Non-conformity with manufacturers guidance.
- The pre-insulated pipework connects to original pipework, then converts to newly installed steel crimped pipework (2017).
- The Steel crimped pipework (installed in 2017), runs and is distributed in an under croft below the block. None of the pipework is insulated leading to extensive heat loss.
- Pipework supports are very limited, with signs that pipework is sitting on the floor and or bending from lack of support.
- The pipework distribution is within a crawlspace with a single point of entry. This would not conform to H&S regulations and would pose a significant hazard that would have to be managed if access was required into the space.

External Manhole Serving Flats 1-16

Pipework Running Within the Undercroft

Access to the external distribution pipework is satisfactory. Where pipework is above ground it is in either the enclosed riser sections, that have doors on, or within metal clad external boxing.

3.3.2 Potential Issues

The items listed below are provided in the previous section but summarised below;

- Control Valves – it is recommended that the defects on the control valves are rectified. A commissioning engineer appointed to balance the system throughout would assist in validating the current balancing of the system. As no commissioning information was evident from the 2017 refurbishment, it is likely the system is not balanced. This would lead to system inefficiency and certain blocks/flats not getting heat efficiency. As part of the process it proposed that additional temperature sensors are installed and commissioning sets to help to balance and monitor the systems.

- Uninsulated pipework – Large sections of pipework are uninsulated. We would recommend an intrusive survey of the pipework and uninsulated pipework rectified. It is noted that a full asbestos survey would be required, this may be in existence. At the time of the survey, only asbestos surveys, relating to the flats surveyed was received by Pick Everard.

- It would be recommended that a ground penetrating radar (GPR) survey is commissioned to trace the buried service routes of pipework to determine the depth and location of existing pipework.

3.4 Installation Within Flats

3.4.1 Description of Existing

Within each flat, there is a mix of installations. The majority of flats have had the Heat interface units (HIUs), that were installed in 2017, replaced back to a direct heating system with a hot water cylinder.

8 no Heat interface units are still present from the 2017 refurbishment. It is unclear as to why these 8 units were not converted back to the calorifiers, at the same time as the others. The HIUs are found in units 10, 11, 51, 53, 69, 70, 87 and 89.

In the majority of flats, the heating flow and return pipework runs from the external district heating mains, enters the flats and runs to the airing/service cupboard.

Within the cupboard the heating pipework splits to provide two circuits. Each of the circuits has a 2 port valve to turn on/off the heating, dependant on a control signal from the in flat controller.

The first circuit serves the heating. The heating system is original and consists of a one pipe radiators circuit serving original steel pressed radiators. There is no control on each of the radiators with the only control being a thermostat in the main hallway. The controller has a simple temperature set point dial which is set by the tenant. It should be noted that a number of the dials were set to 25°C and above. On the day of the survey (June) the external temperature was 19°C but as the set points in the flats were high, the majority of flats had the heating system running with radiators outputting heat into the rooms.

The one-pipe radiator system is original and not installed in current times. A 2 pipe system is commonly used now and provide increased efficiency in being able to heat rooms independently based on the use of thermostatic radiator valves. In a one pipe system, all rooms are heated linked to a single thermostat. This is inefficient and has limited control which leads to increased input required from the central district heating system.

Thermostatic Controller (Set to 30°C)

Example of Single Piped Radiator

Supplementary to the wet heating system, bathrooms are complete with electric towel rails in addition to a wet radiator. These have been recently installed and are complete with their own controls.

It is also noted that 2 of the sample flats observed, had electric fan heaters also installed in the bathrooms. It is suspected that this was reactively installed when there were issues with the heating system.

The second circuit provides the hot water. Hot water is produced within a 110 litre Gledhill Hot water calorifier. The heating flow and return is controlled to the primary coil within the cylinder by a wall mounted controller in the hallway and via internal controls. The hot water from the cylinders are used for the kitchen sink and the bathroom basin. It is though that originally the unit would have served the showers/baths in addition. All of the flats surveyed had electric showers installed and so were not using hot water from the cylinder.

Of the 8 no flats surveyed. Only one had a bath, that is connected to the hot water cylinder. This flat was vacant and going under refurbishment. With the hot water load, within each flat, being limited to a sink and basin only, the cylinder is oversized for the tenant use. We would expect a cylinder size closer to 50 litres being required for the sink and basin only.

This leads to excessive heating required to maintain the water temperature in the cylinder. This will be one of the contributors to the reason why all of the boilers were running, during the survey.

It should be noted, that we do not currently know which flats still have baths within them.

From information received, it is noted that flat 89 has been sold and is a leasehold. It was note surveyed, during the day and it is not known what services or refurbishment has happened within the unit.

Typical Service Cupboard with Hot Water Cylinder

Typical Wet Room with Electric Shower

As a common theme to externally piped services, the majority of pipework within the flats is uninsulated.

A single roof void was surveyed during the day (Flat 31). Roof insulation was evident and in good condition.

Ventilation within the flats is predominantly naturally ventilated via opening windows. Background ventilation is provide by trickle ventilators on the windows. Bathrooms and kitchens are provided with local wall mounted extract systems. The fans were generally in good condition. Some of the units were isolated in the room. This is common, as the fan will come on with the light switch, a common complaint is the noise associated with the fan, in particular at night. It is essential the units are operational as they also assist in providing an air exchange in the flat assisting with the mitigation of mould growth.

3.4.2 Potential Issues

The commons issues are summarised below

- Immersion heaters for the hot water cylinders, a number of the electric immersion heaters were installed but not electrically installed, thus providing no back up to the hot water system. It is recommended that these are completed.
- Missing/lack of insulation – all pipework is recommended to be insulated. As a minimum this is to include pipework from the external mains and the pipework within the service cupboard.
- Survey of all flats to determine which flats have baths. It is recommended that any baths are replaced with wet room complete with electric showers.
- Thermostats – we would recommend that the current controls systems are replaced for a new proprietary system that includes as a minimum;
    - 7 Day Programmer

- 24 Hour Programmer
- Remote monitoring and control via a external app based software.

- Heating system – replacement of single pipe heating system for a two pipe system and replacement of radiators with new convection radiators with Thermostatic Radiator Valves. This is to be in conjunction with any longer term recommendations. As a minimum we would recommend a professional flush and clean of the in flat heating systems and inclusion of inhibitor.
- Refer to Building condition report for recommendations around fabric improvements.

3.5 Installation Within Communal Space

3.5.1 Description of Existing

There are limited communal spaces within the site. The communal spaces are limited to corridors and a central communal room within the main block. The main rooms also contains a small kitchenette.

Heating for the communal spaces is via radiators (2 pipe with TRVs) in the corridors and fan convectors within the main rooms. The fan convectors are greater than 15 years old and would be deemed life expired. During the survey we only got one to engage and run, with the others isolated electrically. Large sections of pipework were seen as been uninsulated, as per other areas of the site. It is noted that the radiators have TRVs on them but the settings are easily amended by tenants, as has been noted previously. All TRVs were turned off, at the time of the survey.

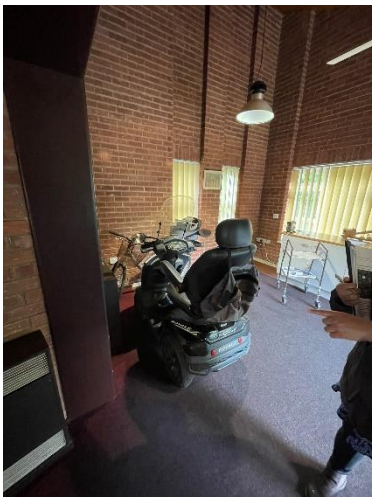
The kitchenette has a small under sink electric water heater serving two sinks. The kitchenette is understood to not be used.

There is a laundry that has a large hot water cylinder (fed from the heating system). It is not clear what the cylinder serves as there is only a sink in the room and the washing machines are cold feed only. It is suspected that the washing machines used to have hot feeds to them. Therefore the cylinder is oversized for its current purposes. There is also a hot water flow pipe exiting the laundry but it is unclear what the cylinder serves and is likely that it serves basins in the guest WC.

Lighting in the corridors has been replaced and is all LED with PIR occupancy control.

Another note is around fire protection. It is noted that tenants use the common room to charge electric scooters. This is not in line with the current fire strategy and poses a high risk. Along with the fire risk of batteries charging, they also present a risk of the release of hydrogen gas when batteries are charged and so should be in a well ventilated space.

Uninsulated pipework to radiators



Common Room Scooter Charging

Common Room Kitchenette

Laundry Hot Water Cylinder

3.5.2 Potential Issues

The below items are recommended as short term remediation;

- Install insulation on pipework that is currently missing.
- Trace and identify what the laundry cylinder currently serves and potentially replace the unit with a small direct electric water heater to provide hot water to the laundry sink.
- Thermostats radiator valves – replace TRVs on radiators with lockable TRVs to mitigate tenants turning the output of the radiators up.
- Determine use of the common room and replace fan convectors for radiators.
- Determine if the kitchen is to be operational. If not, isolate and drain the hot water cylinder.
- Determining a suitable space for the storage and charging of electric scooters. Ideally this should be within a lockable shelter, externally, with a power supply to enable charging.

3.6 Known Electrical Issues

This report predominately focuses on the heating and hot water systems within the site. But it has been brought to our attention a number of electrical issues on site that require us to mention within this report.

Within the main block, there are two electrical supplies incoming into the main electrical room. One does the landlord systems and the other the tenant individual meters. The warden flat, which is being repurposed, highlighted the issue, as it is currently fed from the landlord circuit. The District Network Operator (DNO) has advised that the to number incoming supplies violate current regulations as a building should only have a single supply.

The recommended measures include a new Low voltage supply being brought into the property with a new sectional board and new meters. It is understood that National Grid have accepted an interim measure that involves upgrading the main distribution board to allow for the connection of the warden flat.

Outside of the main block, tenant electrical meters are located internally within the service cupboard with remote reading point externally. There is currently no safe form of external isolation to each of the flats, which does not provide a safe way to isolate the electrical supply to the flat without going into the flat. The internal electrical systems are quite outdated and would be recommended to be replaced and re-wired as part of any wider works.

It is understood that conversations between SKDC and National Grid have begun and so the recommendations associated with the electrical works are not included within the budget costs outlined in this report.

2 No. Incoming Electrical Supplies

Main Landlord Board

4. Short Term Recommendations - 0-2 Years

This section provides recommendations associated with the current systems, and any rectification work we would recommend to either fix known issues, or to provide enhancement to the system. These enhancements are to provide a reduction in energy usage to reduce the energy consumption of the systems in the short term whilst a longer term decision is made and implemented.

The costs presented are provided as a high level budget cost only. All of the items below are based on assumptions of the work that is required based on the non-intrusive survey. Further investigations would be required, via the SKDC supply chain for intrusive survey works prior to obtaining accurate costs.

Item	Rectification/Enhancement	Budget Cost
Insulate existing pipework both external and internally. This will have significant benefits to energy efficiency but also provide mitigation around frost protection and freezing of pipework. This is estimated to include; - 12m of pipework internally within each flat from external connection to internal service cupboard - 5m of pipework at each riser for each block - 250m of pipework within the under croft in Block 1 - 200m of pipework insulation within Main Block	Rectification	£28,000
Complete water quality testing and Chemically Dose the system	Rectification	£3,300.00
Rectify support for pumps within plantroom	Rectification	£4,800.00
Provide a control panel for the boilers and pumps	Enhancement	£20,000
Compile Asbestos Registers for all areas to determine gaps in coverage and commissioning any remaining spaces to be surveyed	Rectification	N/A
Rectify issues with control valves within the external risers and appoint a commissioning engineer to balance the system including; - Temperature Gauges (10no. Assumed) - Addition of Commissioning Sets (3no. in Plantroom, 1no. at each block, a 1no. in the connection to each flat)	Enhancement	£28,000
Complete wiring of immersion heaters within flats (assumed 30% incomplete)	Rectification	£9,000.00
Replace existing baths with electric showers (quantity unknown)	Enhancement	N/A
Replace Thermostats with intelligent modern controllers	Enhancement	£27,000

Flush, clean and chemically dose the heating systems in the flats.	Rectification	£20,000
Replace Laundry Hot water Cylinder with a new point of use electric unit.	Enhancement	£2,500.00
Replace common room fan convectors with new radiators, including pipework and valves.	Rectification	£20,000
Isolate, drain and remove the hot water system in the common room kitchenette (subject to use confirmation)	Rectification	£1,000.00

5. Medium to Long Term Recommendations 3+ Years

5.1 Summary

As the existing electrical use and the existing shower hot water provision is generally by individual electric showers, this review will focus on options for the improvement and decarbonisation of the space heating and sink/ basin hot water provision for the residential units.

The strategic estate decarbonisation options identified for this review are shown below.

- Option 1 - Existing district heating system improvements - Major overhaul to the existing district heating system, improving distribution insulation and providing new 2 pipe heating system to residential units with an upgraded central thermostat and point of use TRVs to individual radiators. Central plant would be replaced including boilers and primary pumps.
- Option 2 - New Decentralised heating provision - Provision of new local gas-fired boilers to each residential unit with their own temperature controls and metering facilities. This would make the existing centralised heating system redundant.
- Option 3 - New All-Electric heating system – Provision of new all-electric local panel heaters to each residential unit with their own temperature controls and metering facilities. This would make the existing centralised heating system redundant. Hot waster would be derived via direct electric storage units.
- Option 4 - New All-Electric heating system - local point of use ASHPs - Provision of new all-electric local heating system to each residential unit using individual ASHPs and new LTHW radiators, with their own temperature controls and metering facilities. This would make the existing centralised heating system redundant.

In addition to the above the two below supplementary options have been identified that would enhance the energy efficiency measures above.

- Fabric upgrading to reduce the heating and energy demand - An energy efficient 'Fabric First' should also be considered, making upgrade improvements to the existing fabric U values and airtightness. Depending on the level of fabric upgrading, this could significantly reduce the energy demand within each residential unit, reducing the level of heating provision needed, and improving tenant thermal comfort. This option could be applied to all the above options 1 to 4, with different levels of impact. It should be noted that the air tightness

of the units needs to be assessed by the current ventilation systems within the space to ensure adequate air movement. Current ventilation is limited to opening windows and bathroom extract fans.

- Addition of Photo Voltaic panels - Adding new Photo Voltaic panels (PVs) as on-site renewable energy provision could also make the heating provision more efficient and assist in providing an improved SAP/ EPC rating. To be able to generate renewable electricity for individual tenants energy needs, individual PV arrays and inverters/ meters would need to be provided. A full assessment would be required to be completed to ascertain if all the roofs would be capable of having PV panels installed. i.e. angles, shading, shadows from tree's etc.

Following the confirmation of a strategic option to be developed by SKDC, there is also further potential to adopt hybrid combination options of the above to reflect available project budgets and specific requirements of the different tenant types.

5.2 OPTION 1 - Retain District Heating (Full Refurbishment)

Capital Cost	●●○○○	Energy Co2 Savings	●●○○○
Reduction in LA Energy Costs	●○○○○	Grant Funding Likelihood	●●●○○
Positive Impact on Tenant	●●●○○	Negative Cost Impact on Tenant	●○○○○

Option 1 would see the current systems retained in principle but overhauled, this would include;

- Full intrusive survey and investigation of the current systems, including pipework tracing.
- Rectification of all items include in the short term recommendations above.
- Replacement of the 6no. primary boilers and pumps alongside new pipework headers.
- A new BMS system for monitoring the plant equipment as well as outstations at each block monitoring temperatures.
- Replacement of all heating equipment within the flats with a new 2 pipe radiators system including new controls linked to the main BMS for monitoring.
- External Pipework validated and re-used where possible.
- Full recommissioning of the systems.

Pros

- Lower capital cost option.
- Utilises existing district heating provision (lower embodied energy)
- Reduced energy heat distribution losses through insulation of pipework.
- Efficiency improvement of existing heating system.
- Improvement on controllability of heat outputs in residences.

- Reutilisation of large sections of existing system
- No increase demand to the current utility supplies.

Cons

- Large sections of the system condition is unknown and would require intrusive survey works to determine final costs and scope.
- Generation will remain being from Gas, not part of the SKDC route to net-zero carbon. Does not decarbonise the primary energy.
- Billing situation would remain unchanged, SKDC would still be required to bill all tenants whether they are classed as Sheltered Housing or General Needs.
- Not likely to comply for Govt grant funding (due to fossil fuel gas boilers).
- Still involves intrusive upgrade works to each tenant's residence.

5.3 OPTION 2 – Decentralised Local Gas Fired Boilers

Capital Cost	●●●○○	Energy Co2 Savings	●●○○○
Reduction in LA Energy Costs	●●●●○	Grant Funding Likelihood	●○○○○
Positive Impact on Tenant	●●●○○	Negative Cost Impact on Tenant	●●●○○

This option would look to replace the current district heating scheme, with central plant, and provide each flat with an independent gas connection, that would serve a new combi boiler.

- Decommission and removal of central district heating system
- New gas infrastructure allowing for independent supplies to each of the 90 flats plus a landlord supply for the common areas in the main block.
- Boilers would be connected to a new heating system, complete with new radiators and pipework.

Pros

- Medium capital cost option.
- Tenants' energy use individually metered and responsible for all own heating energy costs.
- Improvement on controllability of heat outputs in residences.
- Re-use of existing heating/hot water systems within flats.
- Limited impact on tenants
- No increase demand to the current utility supplies.
- Increase in efficiency to the current strategy and reduction in energy use.

Cons

- Generation will remain being from Gas, not part of the SKDC route to net-zero carbon.
- Not likely to comply for Govt grant funding (due to fossil fuel gas boilers).
- Increased heating energy costs for the tenants.
- Increased multiple gas boiler maintenance costs.
- Gas meters would need to be located externally on the facades, locations would have to be determined.
- Disruption to each flat, but the installation could be phased.
- Flues from each boiler required, with penetration to the fabric.
- Risk associated with capacity of local gas infrastructure.

5.4 OPTION 3 - All Electric Solution – Panel Heaters

Capital Cost	● ● ○ ○ ○	Energy Co2 Savings	● ● ● ○ ○
Reduction in LA Energy Costs	● ● ● ● ●	Grant Funding Likelihood	● ● ● ● ○
Positive Impact on Tenant	● ● ○ ○ ○	Negative Cost Impact on Tenant	● ● ● ● ●

This option would look to replace the current district heating scheme, including central plant, and provide each flat with an independent heating/hot water system using direct electric supplies.

- Decommission and removal of central district heating system
- Strip out and removal of existing heating and hot water systems within each flat.
- Install new electric panel heaters, including automatic controls. The controls would be aligned to current industry guidance and LOT20 regulations and be complete with 24/7 time programmers and window sensors (to turn off the units if a window is open). The panel heaters have modern connectivity and can be controlled via an app as well as on the unit.
- Hot water would be provided via a smaller direct electric water heater providing hot water to the kitchen sink and bathroom wash hand basin. Showers would be via the current retained electric shower. Any remaining baths would be replaced with electric showers.
- Landlord areas would proposed to be served from electric panel heaters with lockable controls to provide background heating. The laundry would have a local point of use electric water heater to serve the sink.

Pros

- Shift of billing from SKDC to independent billing to tenants from utility provider. But note previous comments that this would include an increase to the tenants current electricity bill. Tenants responsible for all own heating energy costs, so likely reduction in energy consumption.
- No gas use on the development.

- Likely to comply for Govt grant funding.
- Lower capital cost option.
- Local control of systems within each flat and within each room allowing for greater efficiency
- Sensible and simple controls to improve the efficiency and reduce waste from heating being provided whilst windows are open.
- Lower maintenance requirement, depending on contract/lease agreements.
- No increase demand to the current utility supplies. A full demand calculation would need to be completed, but early indication shows that the supply size would be sufficient.
- Increase in efficiency to the current strategy and reduction in energy use as there is no distribution losses on the systems.
- Removal of existing external pipework will restore facades to the original brick finish.
- Improvement on EPC Rating.

Cons

- Increase in utility cost for the tenant but reduction for SKDC. Substantially increased heating energy costs for the tenants (electricity 4x unit cost than gas currently).
- Local electrical infrastructure capacity is unknown. The increase in electrical supply requirements could require upgrades to the local infrastructure. Within the flats we would expect the incoming supply would remain the same but a new consumer unit would be required to cater for the additional circuits.
- Disruption to each flat, but the installation could be phased. As units are omitted from the district heating scheme the boilers and output would reduce but still provide heating to the remaining flats.
- Potential tenant 'Fuel Poverty' issues, with possible increased LA rent arrears issues.
- Existing district heating provision made redundant.

5.5 OPTION 4 - All Electric Solution – Air Source Heat Pumps

Capital Cost	●●●○○	Energy Co2 Savings	●●●●○
Reduction in LA Energy Costs	●●●●●	Grant Funding Likelihood	●●●●○
Positive Impact on Tenant	●●●○○	Negative Cost Impact on Tenant	●●●●●

This option would look to replace the current district heating scheme, including central plant, and provide each flat with an independent heating/hot water system using air source heat pumps.

- Decommission and removal of central district heating system
- Strip out and removal of existing heating and hot water systems within each flat.

- Install new air source heat pumps (ASHP). These would need to be located externally. It would be proposed that the ASHP's would be located externally within a gated enclosure or secure metal enclosure. Each ASHP would be dedicated to an individual flat, with ASHP's grouped together externally.

- Internally would be a dedicated cylinder, within the service/airing cupboard. That would provide a pumped low temperature hot water system that would provide heating to the flat. This would be in the form of a new radiator system using a lower temperature medium as opposed to the 80°C flow provided by the district heating system. Existing radiators would be required to be replaced due to the lower temperature i.e. they would need to be larger to provide similar output.

- Hot water would be provided by a new hot water cylinder, fed from the ASHP, with a direct electric immersion heater. Showers would be via the current retained electric shower. Any remaining baths would be replaced with electric showers.

- The controls would be aligned to current industry guidance and be complete with 24/7 time programmers The ASHP system would have modern connectivity and can be controlled via an app as well as on the unit.

- The Central common area would be required to have its own system.

Pros

- Shift of billing from SKDC to independent billing to tenants from utility provider. But note previous comments that this would include an increase to the tenants current electricity bill. Tenants responsible for all own heating energy costs, so likely reduction in energy consumption.

- No gas use on the development.

- Likely to comply for Govt grant funding.

- Lower capital cost option.

- Local control of systems within each flat and within each room allowing for greater efficiency

- Sensible and simple controls to improve the efficiency and reduce waste from heating being provided whilst windows are open.

- Increase in efficiency to the current strategy and reduction in energy use as there is no distribution losses on the systems. Air Source Heat Pumps would provide greater efficiency over electrical panel heaters and the current district heating scheme.

- Removal of existing external pipework will restore facades to the original brick finish.

- Improvement on EPC Rating.

Cons

- Increase in utility cost for the tenant but reduction for SKDC. Substantially increased heating energy costs for the tenants (electricity 4x unit cost than gas currently).

- Noise – External ASHP units will generate noise. Depending on the location, they could be close to opening windows which could cause a nuisance, acoustic treatment may be required to the external enclosures.

- Capacity – ASHP systems are not usually provided for 1 bed flats due heating required being small. Whilst they can work and operate for a small flat, the efficiency benefit is generally reduced. Usually, you would have

a small district heating scheme, fed from ASHPs, to provide heat to the flats. The reason this is not included is that it would go against the proposals of moving the council away from paying for tenant heating/hot water.

- Local electrical infrastructure capacity is unknown. The increase in electrical supply requirements could require upgrades to the local infrastructure. Within the flats we would expect the incoming supply would remain the same but a new consumer unit would be required to cater for the additional circuits.
- Disruption to each flat, but the installation could be phased. As units are omitted from the district heating scheme the boilers and output would reduce but still provide heating to the remaining flats.
- Potential tenant 'Fuel Poverty' issues, with possible increased LA rent arrears issues.
- Existing district heating provision made redundant.
- Security of external plant, the units can be caged to protect them but there is a risk of damage.
- Without improvement to the façade, to reduce heat loss, the system will not reach its full potential of energy efficiency. This would be better paired with improvements suggested in section 5.6.

5.6 Enhancement 1 – Fabric Improvements

Capital Cost	●●●●●○	Energy Co2 Savings	●●●●●
Reduction in LA Energy Costs	●●●●●	Grant Funding Likelihood	●○○○○
Positive Impact on Tenant	●●●●●○	Negative Cost Impact on Tenant	●○○○○

Please refer to separate Building Surveyors report for list of minor defects that are recommended to be completed. This section of the report focuses on larger enhancements to the building fabric to reduce energy use and improve thermal comfort.

- Upgrade insulation to roof voids – a large number of lot spaces are insulated. The insulation is not correctly installed, In a number of occurrences. It is not known the extent of the insulation (due to limited voids being surveyed).
- Overclad the façade with a pre-insulated panel system (breathable) that would provide greater air tightness and improve thermal efficiency. By reducing the overall heat loss of the fabric, the heating load of the building would reduce. This is more important if the cost of the heating goes to an electric based system, where the cost is borne by the tenant.
- Replace existing double glazed windows with a modern, high performing unit. A considerable amount of heat is lost through glazing. Although the windows are currently in satisfactory condition, the performance of them would be in line with the requirements of the year of install, circa 15-20 years old. Modern glazed units would perform far better and reduce the heating load of the flats whilst improving thermal comfort. Proposed windows would be high performing double glazed units with compression seals, with high insulating properties and sound reduction. A consideration should also be given for triple glazed windows.
- Provide insulation to the undercroft underneath Block A. IT is currently believed that the undercroft covers the majority of the block and is currently uninsulated. This means that a high amount of heat is escaping the ground floor flats into a cold void below them.

- Air Tightness improvements – We would recommend a specialist provide an in depth review of the building fabric and complete an air tightness improvement scope of works. The scope of the works would be limited, at this point of time, to further investigation only. This is due to an unknown requirement as to how the current construction performs. A cavity closure inspection, would be required. This would include for the removal of a window to each block to ascertain the presence of cavity wall closures and condition at openings including lintels and cills. If defects are found it would be expected that the scope would include works to improve the air tightness of the buildings. Primarily involving providing a greater seal around windows, walls, doors, roof etc. The less heat is lost, through infiltration, the lower the heat output. It should ne noted that adequate ventilation should be provided. The current provision of natural ventilation, trickle ventilation and bathroom extract fans should suffice. If the scope allows for a high increase in air tightness, additional ventilation may be required. This is excluded from the budget costs at this stage.

Pros:

- Can significantly reduce heating energy demand and C02.
- Greater thermal comfort, increasing tenant health & well being.
- Reduced heating plant outputs and costs.
- Efficiency improvement of existing heating system – more stable internal environment with potential overheating reduction benefits too.
- Potential for tenants' energy use and energy costs to be significantly reduced by up to 70%.
- Futureproofing upgrade to LA's estate.

Cons:

- Increased capital cost option (for ASHPs & radiator upgrading).
- Not likely to comply for Govt grant funding (limited fabric upgrade grants)
- Potential tenant 'Fuel Poverty' issues, with possible increased LA rent arrears issues.
- More intrusive upgrade works to each tenant's residence required.
- Possible 'Right to Buy' issues following notable property upgrade.
- Existing district heating provision made redundant.

5.7 Enhancement 2 – Photovoltaic (PV)

Capital Cost	●●○○○	Energy Co2 Savings	●●●●●
Reduction in LA Energy Costs	●●●●●	Grant Funding Likelihood	●●●○○
Positive Impact on Tenant	●●●●○	Negative Cost Impact on Tenant	●○○○○

It would be proposed to install PV panels on the roof of each block. The PV systems would be independent to each flat to provide direct electrical input to the flats. This would directly benefit the tenants energy bills and assist to offset the increase to any electrical utility costs. Funding should be considered, as SKDC would not benefit from the

savings generated from the PV, but would assist the tenants. The landlord electrical load is relatively small and could have its own PV system, on the main block but within each block the landlord electrical load is limited to stair core lighting only.

The current provision of batteries storage has not been included within this option. This is primarily due to available space, within the flats, and the additional cost associated. As a number of the tenants are occupying the spaces, in the day, the requirement for battery storage is lessened. It would be advised to investigate the use of batteries, with a specialist, should this option be considered.

Pros:

- On-site renewable energy provision, giving Primary Energy CO2 saving.
- Minimal capital cost (depending on extent and sub-division of PV arrays)
- Likely eligible for Govt grant funding.
- Assists improvement of SAP/ EPC levels, upgrading the SKDC estate.
- Generates 'free' electrical energy – but need to define who the beneficiaries are to be.
- Minimal installation intervention.

Cons:

- If provided for SKDC benefit, then disruption for tenants with no energy cost reduction for tenants.
- If provided in individual small arrays for each tenant benefit, then additional capital cost with no energy cost benefit for SKDC.
- Some roof areas may not be suitable due to pitch angle, orientation and any existing shading from other structures or tree's.

5.8 Options for Phasing

The options described above apply to all units. This has been done to allow for comparison of the proposals from a cost point of view.

Phasing of any of the options would be required to;

- Limit impact on tenants where work is required within the flats and if heating is lost from central plant.
- The aspiration of the client is that 50% of the units would be classed as general needs. The information in this report could be pro-rated if the works are required to be provided only to 50% of the units.

All of the options provided (apart from Option 1) can be completed in phases. New systems can be installed on a block by block basis. At the time of the conversion the existing district heating scheme can remain operational with the load being reduced when each flat is removed from the system. As there is 6no. boilers it would be proposed that

if 50% of the units were taken off the central scheme then the system could still operate (with new controls) to cycle the boilers to run 2 or 3 at any one time.

We would proposed that the furthest blocks are completed first. This is due to them being the worst performing on the current system. As they are furthest away, greater heat is currently lost on the district heating scheme.

If the 50% target of reclassifying the flats as general needs, and thus moving the tenant onto a greater responsibility of paying for the complete utility costs, then the diagram, on the next page, provides our recommendations to which blocks would make up the 50% quota.

The Green areas (23 Flats) we would propose to be done first, as it is contained as a complete circuit from the current district heating scheme, with the section in blue (21 Flats) making up the remaining 50%.


Saffron House
63 to 76
56 to 62
77 to 82
Foot Bridge
Rising Bollards
1 to 5
AGNES STREET
48 to 55
83 to 90
51.6m
Riverside
RIVERSIDE
51.5m
24 to 42
New Court
Drakes Court
51.9m
WELHAM STRE
1 to 8
9 to 16
17 to 19
20 to 22
11
14
18

6. Budget Cost Plan

A budget cost plan has been completed to provide high level costs associated with the options described within the report.

Please note that a separate Building Condition Report accompanies this report. The building condition report also highlights defects found, to the building structure, internals and external site conditions. Some of the recommendations and costs are duplicated across both reports. This is primarily due to some of the imminent recommendations form part of the options. As the timescales for the works is unknown, some of the costs described below, may have been completed, prior to the main option works occurring, hence the duplications. Regardless of which option is taken, it is still recommended to target works associated with the short term remediations (see section 4).

The costs represented below are high level only, based on the information that was present at the time of the survey. Assumptions have been made to overall areas, due to no drawings being available. Therefore, the measurements and rates contained in this order of cost estimate and this order of cost estimate report must not be relied upon for any purpose other than the formulation of this order of cost estimate itself. The costs are purely to provide a guide at this early feasibility stage.

The costs do not include for any high-level access costs such as scaffolding or MEWPs nor does it include for other associated project costs such as contractor's preliminaries, overheads and profits or professional fees.

Allowance has been made for inflation and future cost risk for the period up until 3rd quarter 2027. But as the timescales of the works is unknown, the costs could increase from the budgets provided, at this point in time.

Please note the following items are excluded from the budget costs;

- VAT
- Professional fees
- Access requirements for carrying out the works
- Asbestos Removal
- SKDC Internal Costs
- Decanting Cost (If a resident needs to move out whilst works are carried out)
- Any upgrades to the existing stats infrastructure
- Plastering of existing walls prior to decoration
- FF&E
- Repairs or works within the properties unless specifically noted

6.1 Option 1 - Retain District Heating (Full Refurb)

Existing district heating system improvements - Major overhaul to the existing district heating system, improving distribution insulation and providing new 2 pipe heating system to residential units with an upgraded central thermostat and point of use TRVs to individual radiators. Central plant would be replaced including boilers and primary pumps.

Order of Costs	Quantity	Unit	Unit Cost	Total Cost	Comments
Fully intrusive survey and investigation of the current systems, including pipework tracing	1	Item	10,000.00	£10,000.00	
Provide Insulation to existing pipework through system	1	Item	N/A	£ -	Excluded - See separate list of short term recommendations in report
Rectify Supports for Pumps	1	Item	N/A	£ -	Excluded - See separate list of short term recommendations in report
Provide Control Panel and BMS System for the Boilers	1	Item	N/A	£ -	Excluded - See separate list of short term recommendations in report
Rectify issues with control valves within the external risers and appoint a commissioning engineer to balance the system	1	Item	N/A	£ -	Excluded - See separate list of short term recommendations in report
Replace internal heating systems, within flats with new radiators and TRV's and pipework to provide a 2 pipe system.	91	Nr	£ 3,000.00	£273,000.00	1 bed 80 x 5 2 bed 10 x 6. 460 in total plus wardens flat
LTHW Water Quality Analysis	1	Item	N/A	£ -	Excluded - See separate list of short term recommendations in report
Rectification of all the items in the short term recommendations	1	Item	N/A	£ -	Excluded - See separate list of short term recommendations in report
Replacement of the 6no. primary boilers and pumps alongside new pipework headers	1	Item	£50,000.00	£ 50,000.00	Based on Quinta Ace Range Boiler or similar
Upgrade central thermostat within each property	90	Nr	£200.00	£18,000.00	

A new BMS system for monitoring the plant equipment as well as outstations at each block monitoring temperatures.	1	Item	25,000.00	£ 25,000.00	
External Pipework validated and reused where possible, faulty and corroded pipework replaced, where required.	1	Item		£ 12,300.00	Assumed, subject to validation. Cost based on 50m (50mm Heavy Grade Steel), 100m (32mm Heavy Grade Steel) and 200m (20mm Heavy Grade Steel)
Full recommissioning of the systems	1	Item	£15,000.00	£ 15,000.00	
Allow for builder's work			5%	£ 20,165.00	
Replace floor coverings	3,514	m²	£50.00	£175,700.00	
Redecoration of complete flat	14,177	m²	£12.00	£170,121.60	
		Sub -Total		**£769,286.60**	
Allow for inflation up to 3rd Quarter 2027			11%	£ 84,621.53	
Add design development			5%	£ 38,464.33	
Add construction risk			5%	£ 38,464.33	
		Total Option 1		**£930,836.79**	

6.2 Option 2 - Decentralised (Local Gas Fired Boilers)

New Decentralised heating provision - Provision of new local gas-fired boilers to each residential unit with their own temperature controls and metering facilities. This would make the existing centralised heating system redundant.

Order of Costs	Quantity	Unit	Unit Cost	Total Cost	Comments
Fully intrusive survey and investigation of the current systems, including pipework tracing	1	Item	£10,000.00	£10,000.00	
Decommission and removal of central district heating system including gas network	1	Item	£20,000.00	£20,000.00	
Drain down and decommission and cap off services in each flat	91	Nr	£300.00	£27,300.00	
New gas infrastructure allowing for independent supplies to each of the 90 flats plus a landlord supply for the common areas in the main block including new gas meter enclosures and trenching of new gas supplies	1	Item		£150,000.00	Allowance Only
Remove radiators / electric heaters and strip out pipework	1	Item	£10,000.00	£10,000.00	
Provide Combi type boiler in each flat plus landlord including radiators with TRV including new thermostat	91	Nr	£6,500.00	£591,500.00	Based on Ideal Heating - Logic Max Combi 2 boiler and Stelrad Classic Compact range or similar radiators
Reconfigure internal cold water supplies to suit new boilers	91	nr	£250.00	£22,750.00	
Provide power supplies for new boilers	91	nr	£200.00	£18,200.00	
Full Commissioning of the new systems	1	Item		£27,300.00	Allow £300 per flat
Redecoration of complete flat	14,177	m²	£12.00	£ 70,121.60	
Replace floor coverings	3,514	m²	£50.00	£175,700.00	
Allow for builders work		Item	5%	£61,143.58	
		Sub - Total		**£1,284,015.18**	
Allow for inflation up to 3rd Quarter 2027			11%	£141,241.67	

Add design development			5%	£64,200.76	
Add construction risk			5%	£64,200.76	
		Total Option 2		**£1,553,658.37**	

6.3 Option 3 - All Electric – Panel Heaters

New All-Electric heating system – Provision of new all-electric local panel heaters to each residential unit with their own temperature controls and metering facilities. This would make the existing centralised heating system redundant. Hot waster would be derived via direct electric storage units.

Order of Costs	Quantity	Unit	Unit Cost	Total Cost	Comments
Fully intrusive survey and investigation of the current systems, including pipework tracing	1	Item	£10,000.00	£10,000.00	
Decommission and removal of central district heating system	1	Item	£20,000.00	£20,000.00	
Drain down and decommission and cap off services in each flat, strip out and removal of existing heating and hot water systems within each flat.	91	Nr	£300.00	£27,300.00	
Local amendments to cold water service within each flat	91	Nr	£150.00	£13,650.00	
Install new electric panel heaters, including automatic controls. The controls would be aligned to current industry guidance and LOT20 regulations and be complete with 24/7 time programmers and window sensors (to turn off the units if a window is open). The panel heaters have modern connectivity and can be controlled via an app as well as on the unit.	1	Item		£161,350.00	Based on Dimplex PLXE Electric panel heater - Series C (1 bed 80 x 5 2 bed 10 x 6. 460 in total plus wardens flat)
Hot water would be provided via a smaller direct electric water heater providing hot water to the kitchen sink and bathroom wash hand basin. Showers would be via the current retained electric shower. Any remaining baths would be replaced with electric showers.	91	Nr	£1,500.00	£136,500.00	Based on Megaflo Eco Direct Unvented Cylinder
Landlord Provision of electrical panel heaters (Assumed 18no.)	1	Item		£10,000.00	
Replace distribution board in each flat	91	Nr	£650.00	£59,150.00	

New power supplies to Direct Cylinders	91	Nr	£200.00	£18,200.00	
New power supplies to Panel Heaters (Average 4 per Flat)	360	Nr	£250.00	£90,000.00	
Provide electric showers to bathrooms that don't currently have electric showers - (Assumed 25%)	22	Nr	£550.00	£12,100.00	
Full Commissioning of the new systems		Item		£15,000.00	
Redecoration of complete flat	14,177	m²	£12.00	£170,121.60	
Replace floor coverings	3,514	m²	£50.00	£175,700.00	
Allow for builders work			5%	£45,453.58	
		Sub - Total		**£964,525.18**	
Allow for inflation up to 3rd Quarter 2027			11%	£106,097.77	
Add design development			5%	£48,226.26	
Add construction risk			5%	£48,226.26	
		Total Option 3		**£1,167,075.47**	

6.4 Option 4 - All Electric – Air Source Heat Pumps

New All-Electric heating system - local point of use ASHPs - Provision of new all-electric local heating system to each residential unit using individual ASHPs and new LTHW radiators, with their own temperature controls and metering facilities. This would make the existing centralised heating system redundant.

Order of Costs	Quantity	Unit	Unit Cost	Total Cost	Comments
Fully intrusive survey and investigation of the current systems, including pipework tracing	1	Item	£10,000.00	£10,000.00	
Decommission and removal of central district heating system	1	Item	£20,000.00	£20,000.00	
Drain down and decommission and cap off services in each flat, strip out and removal of existing heating and hot water systems within each flat.	91	Nr	£300.00	£27,300.00	
Local amendments to cold water service within each flat	90	Nr	£150.00	£13,500.00	
Install new air source heat pumps (ASHP). These would need to be located externally.	91	Nr	£10,000.00	£910,000.00	Mini type ASHP 1 per flat. Includes base, fenced enclosure to house the ASHP
Provide new radiators and pipework	466	Nr	£300.00	£139,800.00	Based on Stelrad Classic Compact range radiators or similar. 1 bed 80 x 5 2 bed 10 x 6. 460 in total plus TRV
Provide hot water cylinder to be fed from ASHP with a direct immersion heater.	91	Nr	£ 2,000.00	£182,000.00	
New power supplies to Internal Cylinders	91	Nr	£200.00	£18,200.00	
New Power Suppllies to External ASHP units	91	Nr	£250.00	£22,750.00	
Provide electric showers to bathrooms that don't currently have electric showers - (Assume 25%)	22	Nr	£550.00	£12,100.00	
Full Commissioning of the new systems	1	Item		£15,000.00	

Redecoration of complete flat	14,177		£12.00	£170,121.60	
Replace floor coverings	3,514	m²	£50.00	£175,700.00	
Allow for builders work			5%	£82,283.58	
		Sub - Total		**£1,798,755.18**	
Allow for inflation up to 3rd Quarter 2027			11%	£197,863.07	
Add design development			5%	£89,937.76	
Add construction risk			5%	£89,937.76	
		Total Option 4		**£2,176,493.77**	

6.5 Enhancement 1 - Fabric Improvements

Fabric upgrading to reduce the heating and energy demand - An energy efficient 'Fabric First' should also be considered, making upgrade improvements to the existing fabric U values and airtightness. Depending on the level of fabric upgrading, this could significantly reduce the energy demand within each residential unit, reducing the level of heating provision needed, and improving tenant thermal comfort. This option could be applied to all the above options 1 to 4, with different levels of impact. It should be noted that the air tightness of the units needs to be assessed by the current ventilation systems within the space to ensure adequate air movement. Current ventilation is limited to opening windows and bathroom extract fans.

Order of Costs	Quantity	Unit	Unit Cost	Total Cost	Comments
Upgrade insulation to loft spaces where insulation is not provided or installed incorrectly.	350	m²	£ 5.00	£ 1,750.00	Allow for a further 200mm insulation to be added to existing. (10% of roof areas)
Replace existing double glazed windows with a modern, high performing unit.	675	m²	£ 325.00	£219,375.00	
Provide insulation to the undercroft underneath Block A.	500	m²	£ 150.00	£75,000.00	Allow for timber battens, insulation panels (celotex or similar) with vapour control layer and timber boarding. Obtain floor area. Block A only.
Further investigation into Air tightness improvements to doors, windows, lofts etc.	1	Nr	£ 5,000.00	£5,000.00	Intrusive investigation costed only.
Overcladding - Allowance for external wall insulation scheme	8000	m²	£ 250.00	£2,000,000.00	Area approx.. 9000m2 based on average building height of 9m. Less approx. 10% for windows, doors and openings etc.
Allow for inflation up to 3rd Quarter 2027			11%	£253,123.75	
Add design development			5%	£115,056.25	
Add construction risk			5%	£115,056.25	
			Total EN1	**£2,784,361.25**	

6.6 Enhancement 2 – Photovoltaic Panels

Adding new Photo Voltaic panels (PVs) as on-site renewable energy provision could also make the heating provision more efficient and assist in providing an improved SAP/ EPC rating. To be able to generate renewable electricity for individual tenants' energy needs, individual PV arrays and inverters/ meters would need to be provided. A full assessment would be required to be completed to ascertain if all the roofs would be capable of having PV panels installed. i.e. angles, shading, shadows from tree's etc.

Order of Costs	Quantity	Unit	Unit Cost	Total Cost	Comments
Provide 3 PV Panels per flat, to include inverters, electrical installation and controls. This cost excludes integration of battery storage.	91	Nr	£5,000.00	£455,000.00	Cost is based on an assumed discounted rate due to volume of units.
Allow for inflation up to 3rd Quarter 2027			11%	£50,050.00	
Add construction risk			5%	£22,750.00	
			Total EN2	**£527,800.00**	

Appendix A – Site Plan


Saffron House
63 to 76
I
Foot Bridge
77 to 82
J
Rising Bollards
H
56 to 62
1 to 5
AGNES STREET
48 to 55
G
83 to 90
K
51.6m
F
Riverside
D
E
51.5m
24 to 42
EAST STREET
New Court
Drakes Court
C
B
51.9m
GE STREET
WELHAM STRE
A
9 to 16
1 to 8

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