

<b>Committees:</b>		<b>Dates:</b>	
Community and Children's Services Committee		11/01/2019	
Projects Sub Committee		18/01/2019	
<b>Subject:</b> Crescent House/Cullum Welch House Heating Replacement		<b>Gateway 3/4 Options Appraisal (Regular)</b>	<b>Public</b>
<b>Report of: Andrew Carter</b> Director of Community & Children's Services			<b>For Decision</b>
<b>Report Author:</b> Jason Crawford, Asset Programme Manager			
<b>Recommendations</b>			
Members are asked to:			
<ul style="list-style-type: none"> <li>• note the contents of this report</li> <li>• approve option 2 for communal heating</li> <li>• note the total estimated cost of £3,146,321 (including expenditure to date)</li> <li>• note the expenditure to date of £18,207 (+VAT)</li> <li>• approve the additional budget of £132,000 needed to reach Gateway 5</li> <li>• note the costed risk of £215,000. This is not included in the total estimated cost but is intended as a contingency and will only be drawn down if required.</li> </ul>			
<b>Summary</b>			
<b>Dashboard:</b>			
Project status	Green		
Timeline	<ul style="list-style-type: none"> <li>• Gateway 3/4 approvals – Jan 2019</li> <li>• Appoint consultant to manage the employer's requirements – Jan/Feb 2019</li> <li>• Invitation to tender (works) – Mar 2019</li> <li>• Tenders received and analysed – Mar/Apr 2019</li> <li>• Gateway 5 – May 2019</li> <li>• Start on site – Jun 2019</li> </ul>		
Programme status	Regular		
Latest estimated total costs (including fees)	£3,146,321		
Expenditure to date	£18,207 (+VAT)		
<b>Progress to Date:</b>			
<ol style="list-style-type: none"> <li>1. The original Gateway 3/4 report was submitted to the Committee in July 2015 and a number of options were put forward. The recommended option to replace boilers on a like-for-like basis was approved.</li> </ol>			

2. However, due to the listed status of Crescent House and Cullum Welch House, and the complexities around planning and legislative requirements for flues, it soon became apparent that we couldn't proceed on a like-for-like basis, and this was holding up the works across the wider estate. Consequently an issues report was submitted and approved at Committee in 2016, allowing us to separate these two blocks from the original heating replacement programme while we investigated alternative solutions.
3. We initially engaged with a consultant to explore the viability of renewable technologies such as ground source or air source heat pumps. We considered the practicalities of both systems and it quickly became apparent that, while we may be able to overcome planning and legislative requirements around the flue issue, these systems would not be practical for a number of wider reasons.
4. First, the air source heat pump option would require fitting the heat pump units to the rooftops of the buildings and it was considered that this would not meet planning approval. Second, the ground source heat pumps would require drilling boreholes and the only suitable site was the tennis courts at Fusion Lifestyle Centre at Golden Lane Sport & Fitness. Due to the disruptive nature of these works, and the uncertainty about their viability, a decision was taken not to further explore these options.
5. We then engaged with a ventilation consultant to explore options around communal flues. However, it became apparent that this would not be a viable option either, as it would involve situating chimney stacks in the communal areas (such as the light wells in Crescent House). It was considered that this would not be an option that would meet planning requirements and would in fact be detrimental to the appearance and character of the building and local surrounds.
6. Having discounted these options, we engaged Phoenix Compliancy Management (PCM) to provide an updated feasibility report. PCM were instructed to focus solely on Crescent House and Cullum Welch House and to make recommendations on replacement or upgrading the existing equipment and services.
7. The premise was to examine capital costs, maintenance and running costs of a considered life cycle for each option. Therefore, short-term capital costs are considered, along with long-term running costs and maintenance costs, including carbon emissions and sustainability.

**Overview of Options:**

8. The options are considered from a technical nature in terms of feasibility, practicality, functionality and end users.
9. In terms of regulatory considerations, the options account for the requirement that the heat source cannot be served from a worse fuel source than is already installed without written consent (that is, where

systems are installed that use electricity as the primary heat source, they can be upgraded to a gas or communal-based system; whereas a system that uses gas as the primary heat source generally cannot be changed to electricity as the primary fuel, but can be replaced to be served by a communal system).

10. Bearing in mind that some options had already been considered and discounted, there was a limited number of remaining options. While PCM did include sub-options around renewable technologies – such as ground source and air source heat pumps – we will not be presenting these as options as they were not considered feasible during earlier investigations.

### ***Option 1 – Individual Systems (not recommended)***

11. The information detailed in this option allows for the requirements of Building Regulations Part L1B (Conservation of fuel and power in existing dwellings) regarding switching fuels, ensuring that carbon emissions are improved, and the listed building requirements to remove boiler flues from the external façade of the building.
12. In principle, it is not allowable to switch from a gas-fired system to an electric on-peak/off-peak system. However, where existing gas boilers are to be removed due to the flue not being allowed, the regulations do allow for the use of an electric flow boiler.
13. The majority of the existing properties in Crescent House and Cullum Welch House have either gas-fired or electric type heating. Option 1 would involve replacing like-for-like; where the flat's location does not allow for a gas boiler, and the existing system is water based, the use of an electric flow boiler could be considered. This would mean that residents would at least be familiar with the similar operation of the system. The heating system in the flat would also be replaced or updated in line with Building Regulations requirements.
14. While the provision of combination boilers may be the obvious choice, it should be noted that installing combination type boilers would possibly mean upgrading the gas mains network to meet the required boiler operating pressure and peak demand.
15. The installation of individual systems within the properties as outlined will not cause much of a change from the current levels of CO<sub>2</sub> emissions. Due to the increased efficiency created by modern plant and building regulation requirements, less fuel would be consumed. This is likely to be a reduction in order of 5% to 10%.

### ***Option 2 – Communal Heating (recommended)***

16. Although communal heating was considered in the original Gateway 3/4 report in 2015, and discounted on the basis of cost, we consider that this option is now a much more viable solution. This is due to the cost and also because we can potentially connect to the Citigen power supply at a later

date, once connections are in place to the City of London Primary Academy Islington (COLPAI) and The Denizen (formerly known as Bernard Morgan House) sites.

17. The major benefit is that all associated carbon emissions can be reduced to only one source. Also, once the infrastructure is in place to connect to a heat network (such as Citigen), we can achieve lower overall consumption costs and higher system efficiencies.
18. The connection to a communal system does not reduce the level of control that individual property owners/occupiers would have. The intention is to install individual heat metering to each property. While it is not a new technology, heat metering, has recently become a popular method to meet changes in legislation associated with providing building occupants with the means to measure heat use and encourage energy savings.
19. The intended approach will be to install a shielded 'hard-wired' system, as this does not suffer from the connectivity problems sometimes associated with systems that use telephone networks, where signal strength in certain blocks may be weak. A hard-wired system is therefore more suited to this type of building. Heat metering equipment installed in the heating flow and return branches to each flat can be wired back to a central monitoring station. This can be monitored either physically or remotely by landline telephone.
20. The hard-wired method is the preferred means of reading the meter at a central point. However, the final metering strategy will be part of the brief to the specialist meter-reading organisation. We are currently consulting with Switch2 who are the appointed managing agents for a similar system based at the Twelve Acres development at Avondale Estate to assess which metering system would be best to use.
21. New boiler plant could be located in the old empty oil storage area in the lower ground area of Great Arthur House (adjacent to the existing Great Arthur House boiler room). Alternatively, it could be situated in the existing plant room, as there is adequate space. Equipment will need to be separated from the existing plant for Fusion Lifestyle, the Leisure centre located on Golden Lane Estate.
22. The plant would consist of high-efficiency gas-fired boilers, interconnecting pipework, heating system pressurisation plant, buffer vessel and pumps. From the plant room distribution, pipework would extend through communal areas connecting to each dwelling. At each dwelling, an interface between the internal dwelling system and the main distribution network would be installed. The interface between the two would act as a hydraulic break and as a means to control the amount of heat supplied through a heat meter.

23. Within each dwelling, the system would operate and be controlled in the same way as an individual system with programmers, room thermostat and/or thermostatic radiator valves. The interface unit would also contain any heat metering equipment to enable individual billing of each dwelling, and all systems and pipework would be installed in accordance with any listed building consent and building regulation requirements.
24. Estimating any carbon emission savings from a communal system is always difficult at feasibility stage, given that the heat generation mix has not been selected, and other factors not currently considered (i.e. potential use of renewable energy from ground or air sourced heat pumps, and efficiencies of the boilers in general, as well as heat loss through the system) might have significant bearing. However, what can be indicated is that the larger the system, the greater the carbon reduction estimate will be. This is due to the level of diversity that can be applied to a communal system when selecting the capacity of the heat generating plant.
25. It can be shown that the capacity of a boiler provided to an individual gas-fired system that has a cylinder would be around 11kW (for example, heating load of around 8kW and hot water load of 3kW). In a gas-fired system using a combination boiler, the boiler output would be around 24kW to achieve a satisfactory hot water supply. However, in the same property connected to a communal system of around 218 properties, the diversity factor is 0.1 – that is, a 90% reduction.

### **Proposed Way Forward**

26. Option 2 is recommended.
27. The estimated values in Appendix 2 show that the initial cost of an individual system installation is the least cost. However, when factoring in running and replacement costs over a 35- year period, it becomes more expensive than the communal system. Option 1 is also the least secure when considering fuel security and its cost.
28. While the communal system is not initially the least expensive, it is more cost-effective over the 35-year life cycle, as shown in Appendix 2.
29. It should also be noted that the installation of the communal plant will facilitate connection of the remaining blocks across the estate, should this become a requirement in future. Furthermore, once the infrastructure is in place, we may have the option to connect to Citigen. By doing so, it is anticipated that we can further reduce overall running costs and carbon emissions, as well as provide the benefits of lower running costs to our residents.
30. We will be allowing leaseholders at Crescent House and Cullum Welch House the option to 'buy in' to the communal system. If we connect other blocks at a future date, this will be extended to leaseholders in those blocks. We have undertaken an initial consultation with residents and,

while turnout was relatively low, the feedback was very positive. Early indications from the leaseholders present would suggest that some would want to buy in to the system.

### Procurement Approach

31. The preferred approach is a tailored procurement process, in conjunction with City Procurement, to ensure that value can be achieved from specialist suppliers.

### Financial Implications

Estimated works cost	Consultancy fees & staff costs 12.5%	Total (incl. expenditure to date)	Estimated service charge contribution*	Estimated Housing Revenue Account (HRA) contribution
£ 2,780,546	£ 347,568	£ 3,146,321	£ Nil	£ 3,146,321

\* Leaseholders will be given the opportunity to buy in, but there is no obligation. Leaseholders who do buy in would pay a contribution to future maintenance going forward.

**Options Appraisal Matrix** – See attached.

### Appendices

- Appendix 1 – PT 4 Procurement Form
- Appendix 2 – Whole Life Costing
- Appendix 3 – Costed Risk

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## Options Appraisal Matrix

	<i>Option 1 – Individual Systems</i>	<i>Option 2 – Communal System</i>
<b>1. Brief description</b>	Replacement system using individual heating systems.	Replacement system using gas-powered communal heating system.
<b>2. Scope and exclusions</b>	<p>Scope: All residents (tenants) at Crescent House and Cullum Welch House</p> <p>Exclusions: Leaseholders</p>	<p>Scope: All residents (tenants) at Crescent House and Cullum Welch House. Leaseholders will be given the option to 'buy in'.</p> <p>Exclusions: Wider Estate (although infrastructure will be in place to allow other blocks to connect in future)</p>
<b><i>Project Planning</i></b>		
<b>3. Programme and key dates</b>	<ul style="list-style-type: none"> <li>• Gateway 3/4 approvals – Jan 2019</li> <li>• Appoint consultant to manage the employer's requirements – Jan/Feb 2019</li> <li>• Invitation to tender (works) – Mar 2019</li> <li>• Tenders received and analysed – Mar/Apr 2019</li> <li>• Gateway 5 – May 2019</li> <li>• Start on site – Jun 2019</li> </ul>	
<b>4. Risk implications</b>	Difficulties arranging access to individual properties could delay the project.	Difficulties arranging access to individual properties could delay the project. However, this is mitigated by the fact that most of the infrastructure can be installed up to the point of access to the property.

	<b><i>Option 1 – Individual Systems</i></b>	<b><i>Option 2 – Communal System</i></b>
	<p>An approach cannot be agreed with Planning regarding some boiler flues and outlet pipes, meaning that this option cannot be fully implemented.</p> <p>There is a potential additional cost for cold-water booster pumps which may be required for these blocks, as modern ‘combination’ boilers draw immediately from the water supply rather than the tanks. The electrical risers may also need to be upgraded to accommodate the use of modern boilers.</p> <p>There could be objections from residents who may be forced to convert to electric boilers as a result of Planning and legal requirements.</p>	<p>Residents might object to not being able to choose their own suppliers and tariffs. However, this can be offset through the potential savings negotiated by City of London with utility providers on a corporate contract.</p> <p>An approach cannot be agreed with Planning for the communal pipework/infrastructure. However, options to use exiting conduits have been considered as a viable option and detailed involvement with Planning will be undertaken.</p>
<b>5. Benefits and disbenefits</b>	<p>Benefits:</p> <ul style="list-style-type: none"> <li>• Where gas boilers are acceptable, they are replaced, meaning the majority of residents keep the same service.</li> <li>• Where gas boilers are unacceptable, a viable alternative is provided, such as electric boilers.</li> <li>• Improved energy efficiency can be achieved by installing modern individual gas boilers (however, not nearly as much as through a communal system).</li> <li>• The majority, if not all, are individual systems that allow residents to remain independent.</li> </ul>	<p>Benefits:</p> <ul style="list-style-type: none"> <li>• A new communal system would offer a solution to the planning concern regarding individual flues and outlet pipework.</li> <li>• This will have a positive impact on the future windows replacement programme.</li> <li>• The environmental impact (carbon emissions) is much lower through a communal system.</li> <li>• Potential for lower operating costs and fuel consumption for residents.</li> <li>• Positive effect in reducing fuel poverty through lower consumption and fuel costs.</li> </ul>

	<b>Option 1 – Individual Systems</b>	<b>Option 2 – Communal System</b>
	<ul style="list-style-type: none"> <li>• Replacing traditional system boilers with ‘combi’ (combination) boilers will enable the removal of hot water storage tanks, releasing space for resident storage.</li> </ul> <p>Disbenefits:</p> <ul style="list-style-type: none"> <li>• Electric boilers have lower levels of energy efficiency and they are more expensive for residents to run. The installation of electrical boilers will be kept to a minimum.</li> <li>• Where residents refuse electric boilers, we may have to take enforcement action or seal windows if they do not meet the required distance from the flues.</li> <li>• The current configurations mean that some venting is through the glazed windowpanes, and this will have a direct impact on future window replacement.</li> <li>• The electrical mains in the building may need to be upgraded to accommodate the additional demand.</li> <li>• Over the 35-year life cycle, we may need to replace individual boilers at least twice. Accounting for the energy consumption, this works out to be approximately £24,000 more expensive per property.</li> </ul>	<ul style="list-style-type: none"> <li>• Individual billing can still be achieved through use of heat metering.</li> <li>• Across the 35-year life cycle (accounting for costs of energy consumption), when compared to the costs of installing new individual boilers during the same period (they may need to be replaced at least twice) the communal system works out approximately £24,000 cheaper per property.</li> </ul> <p>Disbenefits:</p> <ul style="list-style-type: none"> <li>• While there are challenges in installing a distribution network owing to the decay of previous routes, we anticipate that much of the pipework can be accommodated within existing conduits.</li> <li>• Planning – gaining Listed Building Consent would be challenging for major changes to the appearance of the building in both internal and external areas of the blocks. However, the use of existing conduits will mitigate this and minimise visual changes.</li> <li>• Tenants may also object to the change of service. However, this equally applies to option 1, where some residents may be forced to convert to electric boilers.</li> </ul>

	<i>Option 1 – Individual Systems</i>	<i>Option 2 – Communal System</i>
<b>6. Stakeholders and consultees</b>	<ul style="list-style-type: none"> <li>• Members</li> <li>• Ward Members</li> <li>• Residents</li> <li>• Town Clerk</li> <li>• City Surveyor</li> <li>• Chamberlain</li> <li>• City of London Procurement Service (CLPS).</li> </ul> <p>The Planning team in the Department of the Built Environment will be a key consultee; they may in turn consult with English Heritage and other organisations as required.</p> <p>Residents of the affected blocks will be advised about potential works.</p>	
<b>Resource Implications</b>		
<b>7. Total estimated cost</b>	£2,045,939 (including consultancy fees and staff costs) For ease of comparison, this is based on full replacement of all boilers in both blocks.	£3,146,321 (including consultancy fees and staff costs) For ease of comparison, this is based on communal heating based on full take-up.
<b>8. Funding strategy</b>	HRA – The works solely apply to tenants’ homes, therefore there is no financial recovery from leaseholders. However, should leaseholders elect to opt-in to a communal system, they would be charged for connection, and would have an obligation to contribute towards future maintenance costs. The anticipated unit price is £14,000.	
<b>9. Estimated capital value/return</b>	N/A	

	<i>Option 1 – Individual Systems</i>	<i>Option 2 – Communal System</i>
<b>10. Ongoing revenue implications</b>	<p>As per existing equipment – circa £120 per gas boiler for the annual CP12 safety checks.</p> <p>Where electric systems are the only option, there may still be an obligation to undertake the safety checks if tenants have a gas cooker.</p> <p>Operating costs are the sole responsibility of the resident.</p>	<p>The rate at which heating and hot water provision is made to the Golden Lane Estate would be variable, dependent on the contract with the supplier of the communal system.</p> <p>The operating costs for the system would be funded by the City of London Corporation. However, if leaseholders opt in, they will have an obligation to contribute to future maintenance. The level of contributions would be purely dependant on how many people decide to opt in.</p> <p>Appendix 2 has whole life cost estimates and a comparison of costs for both systems.</p> <p>Residents would be billed individually for their energy use through individual heat metering. While the billing administration is not currently a City of London liability, we are engaging with Housing Management to establish if a management company might be appointed under a service contract, or whether an existing contract (such as the one at Twelve Acres with Switch2) can be amended to accommodate the two blocks at Golden Lane.</p> <p>Note: residents would no longer have the option of switching utility suppliers for gas to achieve a better deal. However, contract negotiations with suppliers</p>

	<i>Option 1 – Individual Systems</i>	<i>Option 2 – Communal System</i>
		enable bulk buying of energy and the potential of achieving lower unit costs.
<b>11. Investment appraisal</b>	<p>The works are a necessary replacement of existing facilities.</p> <p>Mixed approach of gas and electric boilers. Approximately half of the properties in Crescent House would be forced to revert to electric boilers.</p> <p>Costs can be stated with a good level of certainty owing to the fact that works of this type are frequently carried out, both as planned projects and reactive repairs.</p> <p>Service life: A gas boiler has a service life of 15 to 20 years, so a similar project will be required in 2030–2035</p>	<p>The works are a necessary replacement of existing facilities.</p> <p>Uniform approach across both blocks. All tenanted properties served from one source and leaseholders will be encouraged to buy in.</p> <p>There is a likelihood of variation in the cost estimates, as these have been based on visual appraisal and desktop feasibility assessment rather than detailed structural survey and analysis.</p> <p>Service life: The length of contract for district heating supply will be negotiated. Pipework has a service life of 40 years and Heat Interface Units (HIUs) – where the communal system is connected to the property and metered – have a service life of 15 years.</p>
<b>12. Affordability</b>	<p>Individual gas boilers offer the least expensive installation option and the least expensive running costs of the individual systems.</p> <p>Installing electric boilers is a low-cost option; however, they have higher operating costs. Therefore, careful consideration around fuel poverty should be given to the installation of electric boilers.</p>	<p>Installing a communal heating system has a greater cost uncertainty.</p> <p>Although the communal system has a higher initial cost outlay, over the 35-year life expectancy, this is the more cost effective option. When compared to the individual installations, the cost difference is in the region of £5 million.</p>

	<b><i>Option 1 – Individual Systems</i></b>	<b><i>Option 2 – Communal System</i></b>
	Initial outlay cost is lower but, when compared to the 35-year life expectancy of a communal system, the whole life cost is more expensive.	Contract negotiations with utilities providers can provide greater economies of scale, which can benefit residents and assist in alleviating fuel poverty.
<b>13. Legal implications</b>	There are currently interrelated legal implications of breaches of safety and planning consent regarding the existing gas-fired boilers in Crescent House and Cullum Welch House.	Contracts would need to be agreed with district heating, hot water and/or utilities suppliers to power a communal system.  This project will resolve the issues around the siting of flues and secure a solution for future installations.
<b>14. Corporate property implications</b>	It is important that the City's assets remain in a good, safe and statutory compliant condition. Therefore, all necessary action should be taken to ensure that assets are kept as such throughout their lifetime.	
<b>15. Traffic implications</b>	Any necessary traffic arrangements for contractors' vehicles will be made locally on site.	
<b>16. Sustainability and energy implications</b>	Due to the increased efficiency of modern plant and building regulation requirements, less fuel would be consumed. This is likely to be a reduction in the order of 5% to 10%.	Connection of 218 properties to a communal system would be expected to achieve a 90% reduction.
<b>17. IT implications</b>	N/A	The communal system will be monitored using Building Management IT systems.

	<i>Option 1 – Individual Systems</i>	<i>Option 2 – Communal System</i>
<b>18. Equality Impact Assessment</b>	The City of London Corporation has a duty of care towards residents, particularly those who are vulnerable, such as the elderly and those with children. This project will assist in combating fuel poverty by providing modern, more efficient equipment to enable them to keep their homes warm.	
<b>19. Recommendation</b>	Not recommended	Recommended
<b>20. Next Gateway</b>	Gateway 5 - Authority to Start Work	Gateway 5 - Authority to Start Work

	<i>Option 1 – Individual Systems</i>	<i>Option 2 – Communal System</i>																								
<b>21. Resource requirements to reach the next Gateway</b>	<table border="1"> <thead> <tr> <th><b>Item</b></th> <th><b>Reason</b></th> <th><b>Cost (£)</b></th> </tr> </thead> <tbody> <tr> <td>Staff time</td> <td>Managing the design, procurement and contract-letting process</td> <td>£20,000</td> </tr> <tr> <td>Architect</td> <td>Listed Building Certificate application</td> <td>£10,000</td> </tr> <tr> <td>Design consultant</td> <td>Help develop employees' requirements and system design</td> <td>£85,000</td> </tr> <tr> <td>Principle designer</td> <td>Satisfy the legal requirements of the Construction (Design and Management) Regulations 2015</td> <td>£10,000</td> </tr> <tr> <td>Pre-planning fees</td> <td>City of London building regulations application</td> <td>£7,000</td> </tr> <tr> <td></td> <td style="text-align: right;"><b>TOTAL</b></td> <td><b>£132,000</b></td> </tr> <tr> <td>Funding source</td> <td colspan="2">HRA (including proportional recovery from long leaseholders)</td> </tr> </tbody> </table>		<b>Item</b>	<b>Reason</b>	<b>Cost (£)</b>	Staff time	Managing the design, procurement and contract-letting process	£20,000	Architect	Listed Building Certificate application	£10,000	Design consultant	Help develop employees' requirements and system design	£85,000	Principle designer	Satisfy the legal requirements of the Construction (Design and Management) Regulations 2015	£10,000	Pre-planning fees	City of London building regulations application	£7,000		<b>TOTAL</b>	<b>£132,000</b>	Funding source	HRA (including proportional recovery from long leaseholders)	
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