Committee(s):	Date(s):	Item
Residents' Consultation Committee Barbican Residential Committee	3 March 2014 17 March 2014	
Subject: **Barbican Estate Background Underfloor Heating System**		**For Information**
Report of: Director of Community & Children's Services		**Public**

Summary

1. In September 2013 your committee approved the setting up of a working party to review the current background underfloor heating system and potential alternatives. This report, which is for information, updates Members on the progress made by the working party.
2. The working party was formed and first met on 8th October 2013 comprising of officers and resident members. A list of the members can be found in Appendix 1. The terms of reference for the working party can be found in Appendix 2.
3. The initial focus of the working party has been to review the current contract with EDF Energy and the future energy provider from 1st October 2014. The working party has also started to look at the performance of the existing system by setting up temperature monitoring trials in various flats across the Barbican Estate.

Recommendation

4. That the Committee notes the progress of the Background Underfloor Heating Working Party.

Main Report

Background

5. The electric background underfloor heating system on the Barbican Estate has been in existence for over 40 years and has been an integral part of the electrical services provided to flats during this time.

6. The background underfloor heating system remains unchanged from its original design. A high standard of maintenance, servicing and minor repairs has enhanced the life of the system.
7. With the approval of your committee on 26 February 2004 a full technical survey was undertaken by specialist consultants NIFES Consulting Group following a successful tender bid. The purpose of their survey was to determine the life expectancy of the existing system and to consider possible replacement heating systems taking into consideration latest legislation, best practice and modern techniques. The survey was completed on 19 May 2006.
8. The survey concluded that the existing background heating system, embedded electric heating cables on an off-peak supply, was the most appropriate for the Barbican Estate at that time.

9. EDF Energy and UKPN were formerly part of London Electricity Board (LEB). The current contract for the supply of electricity was taken out in 1982 with LEB and provides for a 13-hour off-peak charging period with prices per kWh fixed every 2 years. However, due to the changes in the electrical supply industry, UKPN and EDF Energy now operate as separate companies.

10. There is no formal agreement between either EDF Energy or UKPN to maintain the Cyclo-Control or indeed between UKPN and CoLC. EDF Energy stated that they intended to withdraw from the electricity supply agreement with the COLC for the supply of electricity to the background underfloor heating system. This is in accordance with the termination notices contained within the original contract set up with LEB

Current Position

11. A working party has been established and consists of residents and officers. The working party is chaired by the Chairman of the Barbican Residential Committee. A list of members can be found in Appendix 1. As there were a number of residents who offered to be a member of the working party it was agreed that a separate advisory group be set up. This group would provide an additional resource and expertise via an online forum. The advisory group is administered by the RCC Chairman.

12. At the time of this report the working party has met on 6 occasions and a summary of their work to date is as follows:

- Terms of Reference agreed (Appendix 2)
- Communications Plan agreed (Appendix 3)
- Review 3 year breakdown costs and faults over the previous financial year (Appendix 4). The underfloor heating system continues to function well with less than £10,000 per year being spent on repairs. The majority of call outs attended by Property Services Officers have been for trimmer adjustment, no fault found, failure of trimmer (temperature control unit) or blown fuses.
- Review of current contract with EDF Energy. The existing contract with EDF Energy for the supply of electricity to the underfloor heating system came to an end in January 2014. The City has negotiated an extension to May 2014 (the end of the current heating season). The tariff during the extended contract is similar to the current tariff and based on previous usage, the cost will be slightly lower. A condition of the extension is to replace the existing single rate meters with dual rate meters. The working party is considering changing the meters to ½ hourly meters. This would satisfy the condition set by EDF Energy but may also increase the tariff options available for any future energy supply contract.
- Review the progress of the new electricity supply contract from September 2014. The working party have discussed the options available for a 1-2 year contract whilst the review of the underfloor heating system continues.
- Review of existing control systems. Appendix 5 details how the current system is controlled. The working party is reviewing this system and has commissioned a trial to monitor temperatures across a range of Barbican flat types. Details of the monitoring project can be found in Appendix 6. It is important to note that the project is being delivered at zero cost. The equipment has been provided by Reading University and the data will be analysed by working party members
- Produce a consultant's brief for the future options of the background underfloor heating system.
- The RCC Chairman has produced an update for Leaseholders on the work of the working party which will be included in a letter that is shortly to be sent by the Revenues and Service Charge section to all long leaseholders. A copy can be found in Appendix 7.

13. The working party will continue to meet on a regular basis and thanks should go to all the resident members who have been actively involved in all areas of work.

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APPENDIX 1

Working Party Members

Gareth Moore – Chair and BRC Chair
Tim Macer – Willoughby House Resident and RCC Chairman
Ted Reilly – Shakespeare Tower Resident
Renu Gupta – Willoughby House Resident
Craig Allen – Shakespeare Tower Resident
Garth Leder – Defoe House Resident
Kate Wood – Brandon Mews Resident
Sarah Bee – Shakespeare Tower Resident
Mary Hickman – Andrewes House Resident
Helen Davinson - Resident Services Manager
Sarah Styles – House Officer
Mike Saunders – Asset Manager, Barbican & Housing
Lochlan MacDonald – Asset Programme Manager, Barbican & Housing
Michael Bennett – Barbican Estate Manager
Paul Kennedy – Corporate Energy Manager, City Surveyor's Dept
Anne Mason – Revenues Manager
Mick McGee – Senior Engineer, Barbican & Housing
David Downing – Asset Monitoring Officer, Barbican & Housing

In addition to the working party members listed above an advisory group has been set up consisting of approximately 13 resident members. Information to and from this group is managed by the RCC Chairman.

APPENDIX 2

Background Underfloor Heating Working Party ("UHWP")
Terms of Reference

1. EDF Energy have given notice of their intention to withdraw from their contract with the City of London Corporation (COLC) for the supply of electricity for the Barbican Residential Estate's background underfloor hearing system (currently 13 hours off-peak energy) by either January 2014/April 2014. Therefore, the COLC must tender a new contract for the supply of electricity from either January or October 2014 (the next winter heating period). The UHWP should:

- propose a (i) energy supply profile and (ii) tariff structure for the supply of electricity for the background underfloor heating system from 2014 onwards;

- determine whether that new supply contract should be on a short, medium or long-term basis (in part on the basis of their findings in relation to the second point below).

The UHWP should also consider, amongst other things:

- COL (and Barbican Residential Estate) economies of scale and negotiating power.

- Alternative supply arrangements, such as using energy brokers, direct negotiation with energy wholesalers/electricity generating companies, international suppliers.

The UHWP should inform the RCC and BRC of its recommendations.
Milestone*:* as a matter of urgency, with a requirement of 31 January 2014 to prepare a report with recommendations for the RCC and BRC, to allow the COLC to get a new contract in place by 1 October 2014.

2. The current electric background underfloor heating system on the Barbican Residential Estate has been in place for over 40 years. UKPN have given notice that it will cease to maintain the Cyclo-Control (control and switching system) beyond March 2015. The lease requires the provision of *background heating* to the flats from 1 October to 30 April in each year and at other reasonable times. The UHWP should determine its view on, *inter alia*, each of the following options (or a combination thereof):

- **Maintain both the current heating and control systems with on-going repairs as and when required**. Consider, amongst other things: the efficiency of the systems; cost of the electricity supply; current/future projected maintenance costs; availability of a maintenance provider; and basic terms of any Service Level Agreement. Also consider potential improvements, such as: hours of charge; triggers for charge (forecast/current temperature); and adding individual heating controls;

- **Replace both the current heating and control systems**. Consider: efficiency and sustainability; different heating systems both at an individual flat level (e.g. storage heaters, radiators) and at a Barbican Residential Estate level; systems used on other COL and local estates and buildings (including the system used in Frobisher Crescent (which is out of the scope of this UHWP)); feasibility and costs of retro-fitting a new heating system in all flats (whether underfloor heating or other); and other appropriate issues and feasible solutions. This includes consideration of various energy generation sources (including, but not limited to, Ground Source Heat Pumps (GSHP), Combined Heat & Power (CHP), Micro-generation sources (eg solar PC, micro-wind), biomass, and heat recovery systems) and, where possible, swift elimination of those sources which are not feasible for use on the Barbican Residential Estate. In terms of the control system, consider, amongst other things: the desirability, availability and cost of new controllers; remote Cyclo-Control transmitters; and individual flat/room controls;

- **Replace the current control mechanism, but maintain the rest of the heating system**. As above, consider the desirability, availability and cost of new controllers; transmitters; individual flat/room controls; and whether any improvements to the rest of the heating system are available/desirable;

- **Replace the current heating system, but retain the control mechanism**. Consider same points as above in relation to replacement of the heating system, and whether any improvements to the control mechanism are available/desirable.

In addition, the UHWP should also address:

- **Benchmarking**. Evaluation of the current system to allow for meaningful comparison to any proposed or implemented changes. This will include, without limitation:

- review of the data from EDF Energy's proposal to carry out half hourly monitoring in 2 blocks on the Barbican Residential Estate; and

- the collection of temperature data in a selection of flats on the Barbican Residential Estate

- analysis and modelling the gathered data and comparison with each other and any other relevant sources of information;

- **Minimising heat loss/wastage.** Consider improving insulation of flats, repair/replacement of windows and doors (in flats and common areas), level of double glazing, increased maintenance standards;

- **What the requirements of the lease are.** The UHWP's view of "background heating" and how that should be monitored/judged going forward;

- **Any possible funding options.**

Following consideration of these issues, the UHWP should inform the BRC and RCC of its findings and recommendations. The UHWP should also consider whether an on-going residents committee is advisable to consider these issues on a long-term basis.

Milestone: To prepare a report on the options considered and give recommendations on which are most feasible. Timescale: to the extent that it impacts on the first point, as soon as possible, otherwise, on a timescale to be determined by the RCC.

3. The UHWP should determine whether they require a specialist consultant(s) to advise it, and if so, specify (i) the scope of each consultant's remit and (ii) their preferred consultant(s). The scope of each consultant's report and the indicative costs are to be approved by the RCC and BRC, so the information should be provided to them as soon as possible.

APPENDIX 3

Background Underfloor Heating Communications Plan – November 2013

Communication	What for?	Responsibility	Frequency	Comments
Email broadcast	Minutes Links to Committee papers General updates	BEO	As required Quarterly As required	
Website	Working Party page – minutes/General updates	BEO	As required	
Letters	Consultations Surveys	BEO	As required	
Noticeboards	General updates General Meetings	BEO	As required	
RCC/BRC	Reports Update reports	BEO	Quarterly	
Minutes Minutes - Actions & requests for information via email	Working Party	BEO BEO – HD/MB	As required	
Closed Online Forum	Share technical skill/expertise for WP & Advisory Group	RCC Chair - TM	As required	
Barbicanews	General updates	BEO	June/December	
Service Charge Letters	Summary Updates	BEO/WP	February/May/September/ November(separate communication)	

APPENDIX 4

BRIEF HISTORY OF HEATING FAULTS 2012 – 2013 HEATING SEASON

1. The total number of recorded faults to the background heating system during 2012/2013 heating season was **518.**

2. The first visit to each reported fault is attended to initially by one of the Barbican Estate Resident Property Service Officers (PSO's).

3. Of the **518** reported faults approx. **50%** were for one of two reasons:

- An adjustment to the trimmer only. The reasons for this vary but can often be attributed to previous adjustments carried out during a period of high or low charge.
- 'No fault found'. This is linked to the above reported faults. There is a perception that the system is faulty if external conditions prevail. i.e if a cold day follows a mild evening or vice versa. Checks are still carried out by the PSO's to make sure the system is functioning correctly.

4. The remaining **50%** of calls were genuine faults or failures and were for various reasons:-

Failure of trimmer device (total for 2012/2013 was 37)
Failure of main fuse to property.
Failure of main fuse supplying the main riser to a number of properties.
Failure of individual heating mat fuse.

Failure of individual heating mat, this is referred on to a specialist contractor (total for 2013/2014 was 12) the contractor is usually able to accurately locate the break in the heating cable and repair accordingly. During this period there were heating mats at three properties that were not repaired due to installation of wooden or laminate floors.

Fault or failure of distribution boards within property. We now replace with modern type boards incorporating RCD and MCB circuit breakers

Failure of main 400amp contactors. Two incidents of this during 2012/13. The contactors were rebuilt by specialist contractor using spare parts held in stock by the Barbican Estate Office.

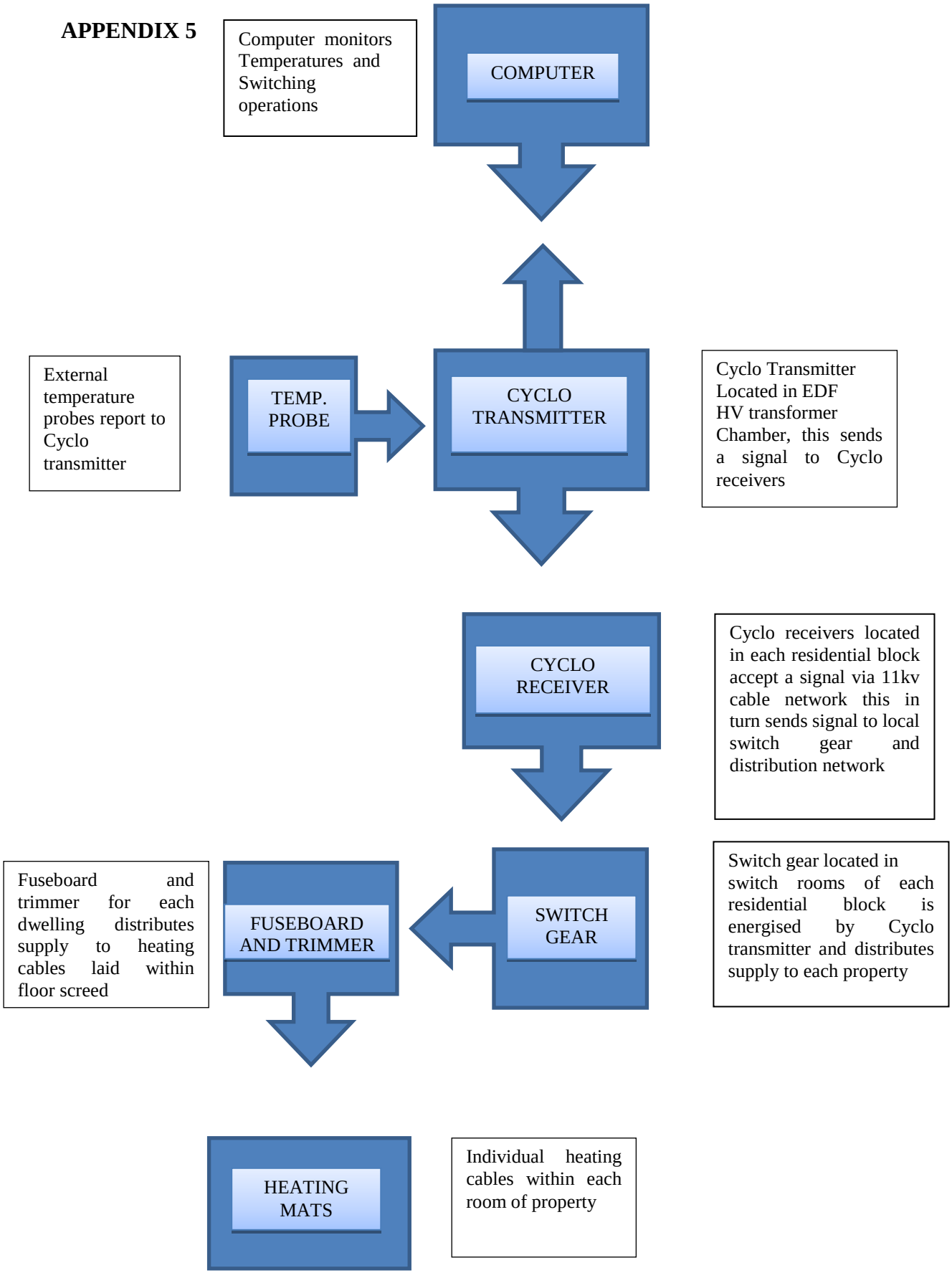
APPENDIX 4

Barbican Background Underfloor Heating

Breakdown of Costs

	Repairs	Parts	Other	Total	Notes
2011/12	£4,740	£60	£1,269	**£6,069**	Other relates to upgrade of BMS Repairs includes £2,247 in respect of storage heater repairs/replacement
2012/13	£7,496	£643		**£8,139**	Repairs includes £685 in respect of storage heater repairs/replacement
April 2013 - Nov 2013	£7,943	£6,202		**£14,145**	Repairs includes 2 major repairs to underfloor heating controls totalling £5,403 Parts includes cost for 40 spare trimmers - £5,800

APPENDIX 5


Computer monitors Temperatures and Switching operations
COMPUTER
External temperature probes report to Cyclo transmitter
TEMP. PROBE
CYCLO TRANSMITTER
Cyclo Transmitter Located in EDF HV transformer Chamber, this sends a signal to Cyclo receivers
CYCLO RECEIVER
Cyclo receivers located in each residential block accept a signal via 11kv cable network this in turn sends signal to local switch gear and distribution network
Fuseboard and trimmer for each dwelling distributes supply to heating cables laid within floor screed
FUSEBOARD AND TRIMMER
SWITCH GEAR
Switch gear located in switch rooms of each residential block is energised by Cyclo transmitter and distributes supply to each property
HEATING MATS
Individual heating cables within each room of property

APPENDIX 6

Temperature Monitoring Project

Proposal to the Barbican Estate Underfloor Heating Working Party

1. Background

This project is a response to the urgent need to get an idea of the range of temperatures which can be found in Barbican flats during the heating season.

Its scope and management must be viewed in the context of very limited, if any, funds which are currently available for this work.

As the Working Party continues its investigations it may be that more comprehensive investigations will need to be carried out, which may involve some expenditure.

2. Objectives

To compare actual temperatures in flats with external temperatures over the winter heating period to test the effectiveness of the existing heating regime. The measured temperature will be related to energy consumption data provided by EDF Energy. This data will then be available to model the effectiveness of any future heating proposals. The data will give an indication of the variation of temperature with height and aspect in Barbican flats.

3. Measurement method

The aim is to obtain a continuous record of internal air temperatures over the winter heating period in a vertical profile of flats in a terrace block and a 360° profile on two tower block floors. The air temperature will be recorded in 15 flats at 30-minute intervals over the winter heating period starting on December 1st.

The temperature will be recorded at one fixed location in each flat. Wherever possible the temperature will be measured in the main sitting room on an internal wall away from heating sources and out of direct sunlight. Temperatures will be recorded on each floor of a terrace block (9 monitors) and on each aspect of two tower block floors (6 monitors).

Once a changeover protocol has been developed it may be possible to include other flat types. A record of external air temperatures over the same period will be obtained from publicly available sources and from our Cyclo switch. The switching cycle times for the Cyclo system will also be recorded, which will provide a good proxy for energy consumption.

4. Additional variables to consider

There are many other factors that can affect the temperature achieved in any flat, some of which will be more difficult to control for in this measurement exercise than others.

4.1 External

The three major external variables, which need to be considered, are

- Ambient temperature,
- Sunshine,
- Wind speed and direction.

Data for these variables are available from public sources. The data for Sunshine, solar radiation in megajoules per square metre (MJ/m2) is available for two stations about 12 miles from here

4.2 Internal

The major factor here is the level of underfloor heating that is deployed in the flat, including trimmers and any fuses that have been removed to isolate heating pads. This information can be provided by the resident, but it would be better checked by our resident engineers, as residents are sometimes unaware of the exact situation.

Additionally the way the flat is managed needs to be recorded. The information and the manner of its collection are specified in the questionnaire. The major factors will be use of supplementary heating, the use of doors and windows for heat control and occupancy patterns of the flat including periods of absence.

5. Recruitment

The location of flats used during the monitoring period will be driven by the location of the EDF Energy half-hourly meters. Volunteers will be sought by direct approach in the relevant blocks with the help of the relevant RCC representatives for the selected blocks and their respective House Group Chairs. At the end of the measurement period volunteers, if they choose, will

be presented with a confidential detailed analysis of their own flat temperature profile comparing it with external variables

Residents will fill in a questionnaire providing additional information during recruitment. There may also be additional questionnaires for them to complete during the measurement programme.

In the past, residents have been very willing to cooperate with such measurement activities and it should not be difficult to recruit volunteers.

Once the panel has been established, flats can be selected on the basis of their location with respect to the sample frame.

6. Consent

Participation by residents in the research will require informed consent. A consent form will be prepared this will be based on the University's standard consent form modified for our special circumstances. Information to be processed will be anonymised. There is no need for any personally identifiable data to retained once meters and any other data have been collected, and it will be uncoupled from the data collected and destroyed after a reasonable period.

Energy information will be supplied by EDF Energy, with the consent of the City of London Corporation, in its role of the provider of residential services to the Barbican Estate.

20 measurement devices are being provided free of charge by the Department of Meteorology at The University of Reading as a part of the wider research undertaken by the University. In return the Barbican Residential Estate will give permission to the University to use data obtained from this measurement programme, in its own research, provided it is anonymised and no personal data are involved.

Personal data will include the name and any other contact information for residents participating the measurement programme, their flat number or exact location within the block (to less than one in ten flats) and any other data which may make that individual identifiable.

7. Technical

Fourtec Microlite monitors will used to record the temperature and humidity. These devices, which are slightly larger than a USB pen drive. They can record 16,000 readings with an accuracy of ±0.3°C, which is adequate for our purposes. With half hourly readings these readings will cover the winter heating period, but the data will be downloaded on a monthly basis. 15

monitors will be deployed for recording and five monitors will be retained for exchange during these changeover times. At the end of the period the equipment will be returned to the University of Reading.

8. Management of the programme

The monitors will be distributed and set up by House Officers or others from the Barbican Estate Office,) in conjunction with volunteers from the Working Party, and under the guidance of Prof. Sue Grimmond.

APPENDIX 7

Background Under-floor Heating: An update for Long leaseholders.

Since the news in September that EDF Energy would be ending the advantageous tariff the Barbican Estate enjoys for its under-floor heating by the end of the year, a working party chaired by the Barbican Residential Committee Chairman, Gareth Moore CC, and comprising BEO and other City officers, plus eight residents, has set to work on finding the best way to keep our heating going without incurring a major increase in costs.

This working party is also supported by a 20-strong advisory group of residents who also responded to my appeal last year for volunteers. There have been very many good ideas and practical suggestions emerging from both groups.
The core of the problem is that the Estate had long benefited from a tariff with 13 hours off-peak electricity per day, whereas standard tariffs on offer now tend to provide only seven hours off-peak energy. That is not enough to provide the warmth we are used to, especially in colder periods. A major concern was that drawing up to five hours at peak rate would see our heating bills soar, and could lead to demands from some residents to decrease the amount of heating – which would not be satisfactory to other residents.

Our working party is pleased to report that is very unlikely to happen, thanks to some very detailed investigations carried out by both officers and resident volunteers. At the end of our first stage of work, we have achieved five outcomes we would like all long-leaseholders to be aware of:

1.A successful renegotiation of the existing tariff from EDF Energy from January 2014 to the end of the current heating season in May has been achieved, so that there will be no price increase during the current financial year.

2.A detailed investigation into the reliability and cost effectiveness of the current system has concluded that the system is in a good state of repair, that there is no justifiable reason to replace it. The failure rate is

low, and is not increasing. Where failures do occur, they are easily and inexpensively repaired. (Even a failed floor pad, which happens rarely, can be revived in most cases with a small in-situ spot repair, unless the occupier has installed hard flooring, as that makes repairs very difficult).

3.The same investigation identified that there would be benefit in changing the Estate-wide control system, to determine the level of overnight charge using predicted temperature rather than actual temperature, which is used at present. This will mean the system can anticipate cold snaps, and also avoid waste when a cold night is followed by a much warmer day.

4.A separate investigation into the detailed load distribution – the actual energy used – and how this varies, hour by hour across the heating season, has shown that we could be paying a lower price overall (compared to the new EDF Energy tariff) by moving to a wholesale contract shaped around our demand profile and based on negotiated 30-minute fixed cost periods throughout the day. Most of our consumption falls at times when prices on 30-minute wholesale tariffs are at their lowest.

5.Some recent exploration by the working party into some of the special energy deals offered to local government buyers (which are still 'dual tariff', based on a peak and an off-peak rate) have shown these too could result in a much better rate than that offered by our current supplier.

As the City starts the actual procurement process for a new supplier, we are therefore in the much more comfortable position of having a well-defined and predictable demand profile worked out, and several supply options already identified. We are confident that this will result in a new supplier being selected for the next heating season with a tariff that will see very little overall increase in energy costs than at present.

The other part of the working party's investigations are continuing – and that is to look for ways in which the Estate can make more efficient use of the heating energy it consumes. At present, with the generous support of the University of Reading, we have put in place a detailed monitoring programme in a sample of flats in both one of the towers and a terrace block.

We will need to collect data until the end of the heating season in May, and it will then take time to analyse the data and make sense of it. In the meantime, the working party is starting to look at more sophisticated control systems, and some of the viable options for cutting down on wastage through improved insulation in flats, for example, and whether such measures can be cost-justified.

No improvement schemes will be pursued, however, or costs incurred without extensive consultation with residents first. The primary assumption of the working party is to maintain or improve the heating provided without incurring cost – which includes seeking ways to avoid exposing ourselves to increased costs over the long term, as energy becomes more expensive.

If you would like to know more, please speak to your House Officer, or take a look at the minutes of the Underfloor Heating working party. These will be included in the RCC papers for its March meeting, and will be available for download from the Committees microsite of City of London's website at http:// democracy.cityoflondon.gov.uk. Look under "Committees" then "Consultative Committees" for the Barbican Estate Residents Consultative Committee page.

The Working Party will provide another update in a few months' time. The officers and resident volunteers who have collaborated on this working party are to be congratulated for their diligent work in achieving a better outcome for all residents in such a short period of time.

Tim Macer
Chairman
Residents Consultation Committee