The need for change in the heating and hot water systems at Rivermead Court

October 2013

The story so far:

The story starts with a report commissioned in 2011 from Engineering Services Partnership (ESP)

The principal conclusions were:

- All hot and cold water pipework at Rivermead is 80 years old – well beyond its design life – of 25 years by modern standards
- The pipework will need replacing in the foreseeable future
- The vertical arrangement of pipework means that direct replacement is effectively impracticable
- A number of options were presented by ESP, all costing in excess of £3million (including VAT and fees)

And:

- It was possible to infer from the report that the £3million was to be spent in a single 'big-bang' renewal

But, in mitigation:

- It was noted that the pipework was in remarkably good condition for its age, and no immediate problems were identified.

In response to understandable and widespread consternation . . .

- A second opinion was commissioned from Tim Greenwood and Associates (TG).
- This report, dated February 2013, generally concurs with the original report, and investigates in detail the potential impact on individual flats
- In summary, the report concludes that necessary adjustment to pipework within flats is feasible.

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A separate report in May 2012 by ESP identifies a number of issues with the boiler house

Much exploration and detailed work later, today's presentation is the unanimous report of:

John Wells, *Engineering Services Partnership*
Tim Greenwood, *Tim Greenwood and Associates*
Peter Green, Tim Halford and Michael Stevens, *Rivermead Court External Committee*
Ian Gilbert, Graeme Elkington, *Faraday*

The subject in its totality is complex and technical; we will look at the detail costs and some of the technical issues later

First, our objectives:

"To manage and invest in the total heating/water system for the long term, in a way that

- Is cost effective in capital investment
- Reduces operating costs through reduced fuel costs and, importantly, less wastage
- Is simple to maintain
- Delivers a heating and water infrastructure that is commensurate with our prestigious and desirable estate
- Is based on technology fit for the 21st century
- Safeguards and enhances the value of our individual property investment
- And is affordable"

The starting point:

The pipework is in remarkably good condition considering its age.

Experts advise that it may progressively fail within a prudent planning time period, but failure is not imminent.

As we shall see, all options for renewal of the pipework are inevitably disruptive and costly both in common parts, and **within** individual flats.

The boiler house is very inefficient.

Although originally considered separately, it is clear that pipework and boiler issues are inter-connected - although it will help to consider the detail separately.

We must start now, but although the expense is considerable but we can phase it over time

To achieve a single 'big-bang' renewal of the total infrastructure over a short period of time would be

- Very expensive
- Very disruptive
- Unnecessary

We therefore recommend a **long transition period of 15 years** from the date of agreement and decision to proceed

In summary we would propose:

- to provide the basic 'new' infrastructure as **soon as possible**

- so that residents have the option to switch their own flat from the 'old' to the 'new' at any time of their choosing during the 15 year transition period.

Certainty about, and availability of, the new infrastructure will allow renovations and updates to proceed.

Clearly many flats will be renovated or change ownership during the transition period.

A few small caveats:

- On major renovation (to be defined), flats will be required to adopt the 'new' system.

- Rivermead Court must reserve the right to give two years' notice of the intention to discontinue the 'old' system and curtail the transition in the event that:
    - Deterioration of the old system makes it necessary, or
    - A significant proportion of flats have migrated (to be confirmed but say 75%), making it uneconomic to continue the 'old' system. (Subject to a minimum period including notice of ten years.)

A long transition period means the current boilers will remain in use for a significant further period

Some investment in the boiler house is therefore necessary and will be justified.

Put another way, careful upgrading of the boiler house is a reasonable price to pay for the advantages of a long transition period… but it will then need maintaining carefully.

Looking at the pipework first:

We cannot replace like with like:

- The flats are designed as vertical stacks – all the bathrooms, kitchens and indeed wash basins, together with heating are vertically above one another. And all are served by vertical pipes – the risers (normally a flow and return pipe).
- There are estimated to be in excess of 500 vertical pipes across all blocks.
- Simple to install when first built –in practice impossible to replace.

As the professional reports make clear, there are three basic options for the 'new' infrastructure

- **Direct** connection to new risers in the light wells – the closest to replicating the current system
- **Indirect** connection to new risers in the light wells – using Heat Interface Units (HIU) also called 'Hot Boxes'
- **Individual** combi/condensing gas **boilers** in each flat providing both heat and hot water

In evaluating these three options, some factors are common:

- All require a **new mains cold water** supply – not particularly difficult
- All require that **each flat be re-plumbed** 'horizontally' from a single entry point in the kitchen . It is this re-plumbing of flats that in turn allows
    - **full central heating** within each flat (if wanted)
    - individual **metering** of usage, and isolation in case of works
- **Costs of these elements are the same for all three options** - we will look at the detail costs later

None of these factors therefore affects the choice of which option to adopt

The 'horizontal' re-plumbing, which is confirmed to be perfectly possible by the Greenwood Report, and is required in all cases, will cost about £6000 to £11,000 per flat – in aggregate amounting to nearly half the total.

It is the ability to defer this re-plumbing to a moment of leaseholders' choosing that is the major benefit of the long transition period.

In summary, for the common factors the costs are the same

		Direct	**Indirect**	**Individual boilers**
The Common Factors				
Permits extended transition		Yes	Yes	Yes
Metering of individual usage and isolation		Possible	Yes	Yes
Full central heating		Possible	Yes	Yes
New Cold Water Risers		£465,000	£465,000	£465,000
Re-plumb 212 flats at £8,000		£1,696,000	£1,696,000	£1,696,000

Note, all figures are unrounded estimates, and are not based on final designs or quotations. A margin for error of 10% should be assumed.

There are benefits to a new cold water system

Our current arrangement provides two separate supplies:

- Mains (drinking) water to kitchens.
- Non-potable cold water for bathrooms etc from storage tanks in the roof

In addition to failing pipework:

- Cold water from the roof can be warm
- Drinking water is often warm because of proximity of hot pipes
- Pressure imbalances affect showers etc

The new system will provide a single mains supply

- Pump-boosted insulated mains to all flats, via new pressure buffer tanks in the basement

The old roof tanks will be removed.

The implications of re-plumbing the flats

Pipework within flats (with the exception of the risers) is the property and responsibility of the Flat Owner.

The consultants reports make clear that the mild steel pipework within flats is subject to the same concern as the risers, and specifically "shows no sign of internal corrosion but is reported to be heavily scaled especially in the small bore pipework in the flats. This has resulted in poor flow and pressure being available at some taps."

Horizontal re-plumbing of each flat, at a moment of the leaseholder's choosing, will be the responsibility of the leaseholder and at their expense.

A range of scenarios can be considered, for example:

- Minimal replacement required to connect to single entry point in the kitchen, making maximum use of existing pipework pending later renovation
- Full replacement of internal pipework, but with no extension
- Full replacement to include pipework for full central heating
- Connection to an existing system that has already been upgraded

Clearly, these costs will vary considerably between flats. We assume a range of £6–11,000, (not including the costs of any kitchen remodelling) and use an illustrative figure of £8,000 in the analyses in this document.

The report from T G Greenwood confirms that re-plumbing is perfectly possible, with pipework under floors, or in casings, at the choice of the leaseholder.

Clearly such work would best be done in conjunction with the renovation of the flat, and many flats will come to be renovated during the 15-year transition period.

Several suppliers for flat re-plumbing will be nominated – in order to achieve competitive pricing, and to benefit from learning and experience, and guidance will be made available.

But some factors *differ* between the options:

- **Direct** connection requires: new heating risers, plus new hot water risers. (Note: heating and hot risers consists of two pipes – a flow and return.)

- **Indirect** connection requires: a single high-temperature hot water riser, plus an indirect connection interface – called a Heating Interface Unit – HIU or Hot Box

- **Individual** combi gas boilers: require no hot water but do require a new greater-capacity gas supply, plus a shared flue system (more on this shortly)

In summary each requires **two (but different)** additional services, and **the costs are not very different**.
Adding in the costs, we can summarise the **differing** factors as follows:

The Differing factors		**Direct**	**Indirect**	**Individual boilers**
New heat supply risers		√	√	
New domestic hot water risers		√		
Heat Interface Unit per flat			√	
New gas supply				√
Common flue system				√
Boiler per flat				√
Total costs		£1,577,000	£1,714,000	£1,564,000

We must now look at other factors to help in our choice of option.

Let us consider independent control, full central heating and metering

Our current system (a direct connection system) falls short of modern standards in two related respects:

1. Lack of independent control

- The heating system for all flats must be turned on (in the Autumn) and off (in the Spring) at the same time. On occasions, there are requests to turn it on again – as happened this year.

- Temperature control within a flat is rudimentary – there are no thermostats, all you can do is turn radiators on or off (or use thermostatic valves)

- When a flat is unoccupied for a period (and many are), it is difficult to lower the heating, and there is little incentive to do so.

2. Lack of full central heating.

- All options could allow full central heating, and the introduction of full central heating will naturally provide independent temperature control, but . . .

- Clearly those consuming more heat via a full central heating system must pay an appropriate charge – which is straightforward enough – provided metering of heating is introduced.

- Most purchasers today would expect to find central heating with full control – to provide the facility would protect or enhance the value of our properties

Individual heating control, with (or without) the extension to full central heating, will we believe, result in:

- Greater personal comfort
- Significantly less wasted heat
- Enhanced property values

Independent heating control, metering, plus full central heating if required, would inherently be provided by:

- **Individual** boilers, or
- **Indirect** connection – indeed a primary purpose of indirect connection is to provide individual control

It **would not be** provided inherently by simple **Direct** connection, although it could be added at considerable expense

So we could have either:

a) Simple direct connection

This would be the closest to replicating today's system (except the risers would be in the light wells) with the acknowledged shortcomings of:

- No independent control
- Inability to support metering, rendering impractical the administration of full central heating

b) **Controlled** direct connection –

Which would be achieved by the introduction of a control and metering unit to every flat (not unlike the Hot Box but without the heat exchange), but with the shortcoming of additional cost.

A note on metering

One advantage of an indirect system based on Hot Boxes, would be the ability to measure the consumption of heating and hot water.

If flats are to be permitted to fit full central heating connected to the central system, some form of differential allocation of heating costs would seem to be logical – and metering of consumption is the obvious answer

Also, if all heat consumption (i.e. including hot water) were measured and charged, there would be an incentive to avoid waste – and a probable significant saving.

During the transition period:

- Any flat connecting to the new system, but not taking increased heating, together with all flats remaining on the old system, would continue to be charged on the current basis

At the end of the transition period, when all flats will be connected via meters:

- the charging basis for all flats could be according to metered consumption
- not "all "consumption need be metered: an initial "allowance" would attract a fixed charge as at present, and only additional consumption would be charged as consumed

The Consultation Questionnaire therefore asks a number of specific questions on views about the introduction of metering.

But our recommendation is clear – the introduction of metering would enable a fair and equitable allocation of heating and hot water costs based on consumption.

The alternative would be to offer independent heating control and the facility to connect to the central system for full central heating, but on the basis of the current charging system – hardly equitable.

The choice between Direct with added metering, and Indirect with Heat Interface Units (which provide metering)

We are advised that indirect connection via Hot Box is now regarded as the current best practice for an up to date building because of:

- Inherently better energy consumption
    - One rather than two circulations losing heat
    - One rather than two pumping systems consuming energy
    - Variable pump speed gives further energy saving
    - Hot Boxes allow a much lower return flow temperature – which would be essential if in due course we progressively migrate the main boiler to condensing boilers – which are more efficient

- Separation of water flows between circulating system and within each flat – avoids "dead legs" – important for hygiene

And Direct with metering is more expensive.

We must now consider Individual boilers - and flues become the issue!

- Approximately 30 flats today have individual boilers (the majority heating only), with flues discharging into the light wells or discharging to outside facades.
- We are advised that all flats discharging into the light wells would lead to significant air quality issues and could not be shown to conform to building regulations.
- The issue can be overcome by the provision of shared flues
- We have studied the positioning and have established that vertical flues can be provided for all flats in the light wells, (or the rear façade in the case of the centre block) adjacent to kitchens.

But modern high efficiency condensing boilers:

- Require short connections to the main flue system,
- Which means all boilers must be positioned in a vertical stack,
- Which means in the identical location in all kitchens in a stack, with no flexibility.
- The inflexibility can be mitigated by the provision of two flues per stack – either side of kitchen windows

The consequent disruption to current kitchen arrangements, including the need to find space for the boiler, is a significant downside to individual boilers

In contrast, we have studied the positioning of Hot Boxes and have established that they can be installed in flexible positions on the external walls of the light wells, or if preferred inside the flat, and of course do not require flues.

In addition, individual boilers have a theoretical design life of 10 years, implying the need for renewal within the planning period.

Individual boilers (cont.)

The small number of flats which are currently equipped with individual boilers (used for heating only and not for domestic hot water), will need new boilers to provide **both hot water and heating** – which would be required to be connected to any shared flue system, requiring in many cases a position change.

Turning now to the boiler house - we have concluded that careful upgrading is a reasonable price for a long transition period.

It should also be noted that a central boiler house would be regarded as the 'best practice' method for a quality contemporary building

Partly due to the flood some years ago which required some expedient repairs:

- The boiler room today is in a poor state
- Significant systems are not working
- And there are new technologies available that will improve efficiency and thus reduce operating costs

The boilers themselves are in reasonable condition

The principal systems simply not working (they have been abandoned) and which are inter-related, are:

- Electrical control system
- Boiler isolation valves

The abandonment of these two systems means we have lost the ability to control automatically

- The number of boilers in circuit at any time – as a function of demand. Today, non-firing boilers are left in circuit with resultant heat loss
- The rotation cycle of boilers in use, so spreading the wear

Cost to restore these systems is £50,000.

Savings are not easy to quantify, but 5% of the gas bill would amount to £6,000 per annum. Wear is difficult to quantify.

There are new technologies to improve fuel efficiency substantially – modulating burners

Each boiler is fitted with a burner unit – not unlike a flame-thrower!

Our current burners have simple three-position control HIGH, LOW and OFF

This makes it impossible to match the rate of burn to the demand for heat – and the boilers are constantly switching between high and low, and low and off – resulting in wasted fuel and heat

Modern modulating burners deliver control on a scale of 1 to 10, making close matching possible
The addition of variable speed fans further improves combustion efficiency by delivering precisely the required amount of air.

Cost of modulating burners plus fans (to all four boilers) is £90,000.

Fuel saving estimates vary between 10 – 15%, or £14,000 to £20,000 per annum

Boiler house works in summary

	Cost including VAT and fees	Estimated annual fuel saving
Essential maintenance including replacement of pumps and heat exchangers, plus clean-up and paint	£80,000	Required in any case
Restore non-functioning systems	£52,000	£6,000
Modulating burners to improve efficiency	£90,000	£14 – 20,000
Prelims and contingency	£30,000	
Total	**£252,000**	

In addition, revised arrangements for the regular upkeep of the boiler house are being planned

But there is a further complication

The most attractive options are likely to necessitate an amendment to the provisions of leases (probably by the amendment of provisions, which is much simpler than the issue of new leases to everyone)

Indirect or **Controlled Direct** connection – to permit the charging for heat and hot water to be based on metering, or

Individual boilers – to remove the requirement that RCL provides heat and hot water

And such changes will require the agreement of 75% of leaseholders.

The essential points at this stage are:

- **We do need to make decisions about the future of heat and hot water very soon, so that the steps required to provide for the future can begin**

- **We shall all need to build a consensus on what to do!**

In Summary

Pulling together all the threads, our full range of options looks like this:

Options			**Costs**		
Option	**Requires lease change**	**Comment**	**Total £000**	**Of which:**	
				RCL £000	**Flat owner £000 each**
Direct	No	Lack of control and metering.	3,738	2042	8
Direct with control and metering	Yes	Additional cost for control and meters	4167	2471	8
Indirect Hot Box (meters not implemented)	No	Avoids need for lease change, delivers individual control and central heating, but charging remains on current basis	3874	2178	8
Indirect Hot Box with metering	Yes	Meets objectives	3874	2178	8
Individual boilers	Yes	Meets objectives subject to downside of inflexible boiler positions in kitchens and 10 year life	3421	1098	11

And from the viewpoint of an individual Flat Owner, the range of costs looks like this:

Service charge basis			**Small flat (0.45%)**		**Larger flat (0.55%)**	
Indirect		*Cost basis*	*From*	*To*	*From*	*To*
	Shared systems*	£2,178,000	£9,800	£9,800	£12,000	£12,000
	Re-plumb flat	£6 - 11,000	£6,000	£11,000	£6,000	£11,000
	Total		£15,800	£20,800	£18,000	£23,000
Individual		*Cost basis*	*From*	*To*	*From*	*To*
	Shared systems*	£1,098,000	£5,000	£5,000	£6,000	£6,000
	Re-plumb flat	£6 - 11,000	£6,000	£11,000	£6,000	£11,000
	Boiler	£3,000	£3,000	£3,000	£3,000	£3,000
	Total		£14,000	£19,000	£15,000	£20,000

* To be recovered over say 15 years in the Service Charge

Next steps – the Consultation Questionnaire, and conclusions so far.

A full Consultation Questionnaire will be issued to all Flat Owners within a few days, together with a copy of this document.

The Consultation will seek to gather views on all the issues and options, and will be an essential input to future recommendations and decision-making.

The questionnaire will be confidential, with a closing date of 30th November.

An overall analysis of the responses will be published by end December.

At this stage, our tentative conclusions are that the two front-runners are:

- The **Indirect** system, with heat interface units, and including a change to a metered basis for charging for heat and hot water, which will meet all objectives
- **Individual** boilers also meet all objectives, subject to Flat Owners views on the requirement for inflexible positioning of boilers in kitchens, and a 10-year design life.

Further work

This is a complex subject with both technical and lease issues. We are now planning to appoint specialist professional advisors to guide us through the process.

On the detail of the options:

- Further validation of all budget figures and estimates
- Due diligence on Hot Boxes and individual boilers – visits to a number of modern installations to confirm residents' views and experience
- Outline programme timetable
- Identify potential suppliers and obtain initial estimates for flat re-plumbing
- Decision on how much heating to provide to common areas, and how to do so
- Legal advice on lease changes

As part of our decision making process:

- Issue the Consultation Questionnaire
- Publish Results of Consultation
- Consider options further in the light of Consultation feedback
- In due course, with professional guidance, arrive at a recommendation
- There will be communications and updates as appropriate throughout
- In due course seek formal approval of lease changes, if required