Marlborough Town Council

19 September 2023

To: Councillors serving on the Property Committee – Councillors Kym-Marie Cleasby (Vice Chair), Mark Cooper, Mervyn Hall (Chair), Kelvyn Shantry, Caroline Thomas, plus the Town Mayor Councillor Nicholas Fogg

Dear Councillor

Property Committee

You are **summoned** to attend an extra-ordinary meeting of the **Property Committee**, which will be held on **Monday, 25 September 2023 following the Planning Committee meeting** in the **Court Room, Marlborough Town Hall**, starting no earlier than **8pm**.

Yours sincerely

Richard Spencer-Williams

Richard Spencer-Williams, PSLCC

Town Clerk

If members of the public wish to attend and ask a question they should also notify the Town Clerk of this prior to the meeting and provide their question in writing at the same time.

If members of the public wish to ask a question, but not attend, they can provide the question in writing to the Town Clerk by noon on the day of the meeting, and a written response will be provided.

PUBLIC QUESTION TIME

In accordance with Standing Order 3(f), members of the public may ask questions of the Property Committee. The time allocated for this should not exceed 10 minutes and be limited to 1 question per person unless directed otherwise by the Chair. A full response may not be possible without further research, and the Chair may direct that a written or oral response be given.

AGENDA

1. **Apologies for absence**

2. **Declarations of Interest**
   To receive any declarations of interest or requests for dispensation

3. **Town Hall Heating**
   To consider the replacement of heating for the Town Hall

ITEM 3 TOWN HALL HEATING

To consider replacement heating for the Town Hall

Purpose

The purpose of this report is to ask the Committee to consider the findings of feasibility report provided by Jones King and the options for replacement heating system in the Town Hall. This report should be read along with the feasibility report (see Appendix).

Background & Status

The current heating system is a twin gas boiler arrangement and was installed well over 25 years ago. Overall, the heating is difficult to regulate throughout the Town Hall, as the boilers feed the radiators in each chamber with hot water via a connected system of large metal pipes, which in themselves act as conductors and convectors of heat. Consequently, the thermostat in each chamber becomes inconsequential and temperature control is quite limited in the range that can be achieved. The only real means to moderate the heat output (and usage) is achieved by switching heating on and off. New thermostats have been added around 5 years ago but these did not make any real difference.

Parts are difficult to source and since their servicing in August, one boiler has now been decommissioned due to lack of replacement parts.

In July the Committee agreed to commission Jones King Heating Consultants to do a feasibility study of the Town Hall heating. We have now received their report back with recommendations for replacement heating and indicative costs for each option.

Considerations

There are some key factors highlighted in the feasibility report that should be considered when deciding how the current boilers should be replaced, namely;

- The status of the Town Hall, and that it is located in a conversation area
- Environmental impact, and carbon footprint
- Cost of energy , both gas and electricity
- Cost of installation, and associated works
- Health and safety

Proposal

It is proposed to:

A. Follow the recommendation and specification outlined in the Jones King report, to proceed in tendering a specialist commercial heating provider to replace the gas boilers in the Town Hall.

And

B. Delegate the tendering decision to the Chair of the Property Committee and the Town Clerk

The Committee asked to consider the matter and instruct the Town Clerk accordingly.

Financial Implications

- There is a Town Hall maintenance EMR £135,584 which can be used for this purpose. (NB The use of this EMR has been agreed under Scheme of Delegation 3.1 as an urgent matter by the Mayor, Cllr Hall - Chair of Property Committee), Cllr Thomas - Chair of Finance and Policy, and the Town Clerk).
- The indicative cost replacement gas boilers (x2) is circa £45,000.
- There will be additional expenditure related to the modernisation of internal building works, and fire and access upgrades.
- The advised annual energy cost is projected to be £7512.
- The advised annual energy cost saving with new boilers is projected to be £1502.

Recommendation

It is recommended that the Committee proceeds with new gas boilers.

Town Clerk 18 9 23

Jones King
CONSULTING ENGINEERS

Marlborough Town Hall, Wiltshire

Boiler Replacement Feasibility

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CIBSE LOW CARBON ENERGY ASSESSORS

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CONSULTING ENGINEERS

Marlborough Town Hall, Wiltshire

Project Number: 2095

Current Revision: 1

Date of Issue: 04/09/2023

Prepared by: MS/JM

Rev	Date	Amendments	Author	Checked
1	04/09/2023	Report Issue	MS/JM	PA

Table of Contents

1.0 Introduction

1.1 Report Purpose

The purpose of this report is to provide an options appraisal for the replacement of the gas fired boilers at Marlborough Town Hall

1.2 Report Basis

This report is based on a visual, non–intrusive inspection of the heating system by Jones King Partnership on 3rd August 2023.

Conditions were warm with occasional rain showers at the time of survey.

Limited record information for the building services has been viewed.

The building was unoccupied during the visit and the building services systems were not operational as the heating was not required.

1.3 Property Description

Marlborough town hall is located in the centre of the town. The building was constructed in approximately 1902.

The building is generally brick built, with a tiled pitched roof and single glazed windows.

The roof void was insulated in 2022.

Externally the building is built into a slope such that the ground floor is accessed via steps at the front but is level at the side.

Internally the building consists of several floors and a basement and includes a court room (now used as a meeting hall), an assembly room, a council meeting chamber, and ancillary facilities.

There is a basement boiler room located centrally within the building. Access to the plantroom is through the floor of the Court Room via a large floor hatch.

1.4 Information Received

The following information was received in relation to the building:

- Generic Manufacturers Boiler Manual
- Heating Controls Manual
- Building Floor Plans
- Utility Bills (Dec 2021 – Nov 2022)

2.0 Mechanical Heating System

2.1 General

The following section is compiled from a visual survey of the building and includes some assumptions on the system. The survey did not include any testing.

The review does not include any system design analysis and it is assumed that the current installations meet the original design criteria and parameters.

2.2 Heating System Overview

A low temperature hot water system (LTHW) provides the space heating of the building.

The heating system consists of 2no. natural gas fired boilers which provides LTHW to a primary plantroom circuit and onto secondary circulation space heating circuits.

The heating system includes a low loss header which hydraulically splits the primary and secondary circuits, with each circuit served by pumps.

The primary side has a flow and return through the boilers and is served by a single pump (Labelled Pump number 1).

The secondary side has 3no. circuits and each circuit is served by a single pump (Pumps 2, 3 & 4). The areas served by these circuits are identified in the Heating Controls Manual as follows;

- Zone 1 - Courtroom
- Zone 2 - Dance Hall (Assembly Room)
- Zone 3 - East Wing

The systems are all single pipe circulation; and are controlled by an on/off control valve per circuit, linked to room thermostats. The circuits are controlled by timeclocks, with frost protection outside of the operation hours.

There does not appear to be any form of weather compensation or optimisation of the system.

The emitters are generally column type radiators, although some spaces have floor grilles with bare pipes below. There generally does not appear to be any manual or automated way to isolate individual radiators in a circuit, with room thermostats providing an on / off function.

Generally, the system is not insulated with the exception of the plantroom which is mainly insulated.

Most of the primary elements of the heating system in the plant room and the boilers appear to have been installed circa 1991/1992, although maintenance has been undertaken in the period to the current date, including the replacement of heating pumps.

It is feasible that the remainder of the system outside of the plantroom could be older.

The operational parameters of the LTHW systems are not known, however, given the age of the buildings and the systems it is expected the boiler operates on a nominal 80°C flow temperature and a return temperature of 70°C. This equates to a nominal 10°C return differential.

The emitters would have been sized to operate in that temperature band in terms of meeting the space heat losses. The system flow rates, and pipe sizing would also have been selected to match the same.

The controls system was installed circa 1991 and from site discussion it is understood that control of the heating system can be poor. Each of the room thermostat positions has two stats, one for the frost protection and one for the room. More details were included in the control manual found on site.

2.3 Boiler Overview

The plantroom boiler installation circa was 1992.

The boiler arrangement consists of 2no gas fired Stelrad Concord floor mounted boilers.

Plantroom Boilers	

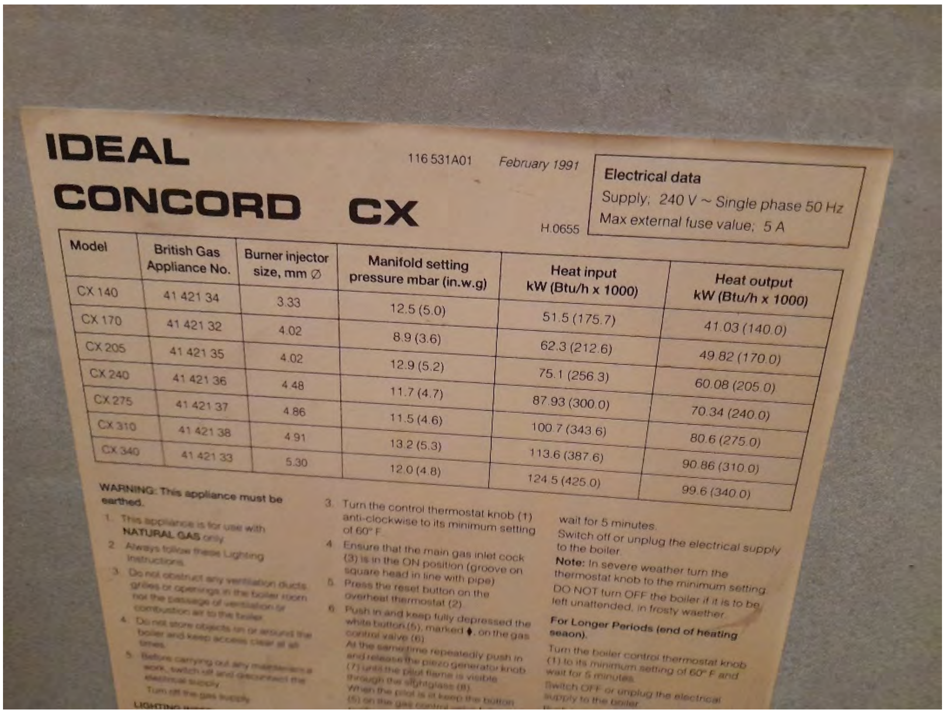
From the manufacturers literature it can be seen that the boilers were manufactured circa 1991. Due to the age of the boilers these are now obsolete. In addition, the efficiency of the boilers is considerably lower than a more modern equivalent.

The identification label on the door cover is generic for the boiler series, as is the manufacturer's manual which was located on site. However, the CX 240 data was circled in the manual, therefore it can be assumed that the boilers of that size.

This would give each boiler a capacity of 70kW with an input of 88kW. An approximate efficiency of 80% (when new).

There are a pair of boilers in the system thus this increases the potential operating capacity to140kW, although most boilers are arranged to allow reducing on a nominal 2/3 of capacity each. This would make the estimated building load at around 100kw.

Stelrad Boiler Identification



The boiler system is connected to a flue which runs up inside a chimney within the room and the spaces above, discharging at roof level.

The gas supply for the boilers enters the room from an external point which is metered in a small external courtyard.

Plantroom ventilation is provided for the boilers, through the use of a redundant coal chute at high level and a ducted vent at low level from outside.

Jones King CONSULTING ENGINEERS

3.0 Notes and Observations

The following a list of notes and observation made during the survey.

Safety & Access Items

- The plantroom does not appear to be fire protected from the rest of the building.
- Access to the plantroom is via an underfloor staircase that does not have a handrail for the upper treads.
- The fire escape path from the basement should be reviewed for travel distance and safety.
- There does not appear to be a means of isolating the gas through an emergency control valve upon entry to the building and additionally, although not mandatory, there isn't an automatic means of gas shutdown in the event of a fire or gas leak.
- Access to the heating pumps, isolation switches etc in the plantroom is very limited and would not be in compliance with current CDM regulations.

Building Items

- The building construction dates from the 1902 and there are significant amounts of old single glazed windows. The building will perform poorly in terms of U-Values and heat retention.

Heating System Items

- It is assumed that all systems are regularly serviced and maintained, with the gas appliances certified in compliance with statutory requirements.
- The heating circuit is a single pipe type which is an inefficient method of heating the building as the water used on each emitter goes back into the main circuit and reduces the temperature.
- The emitters do not have thermostatic control devices or in some cases an individual isolation valve. Therefore, the heat flow to these emitters will only cease if the entire circuit is closed or the boilers are switched off.
- The plantroom does not include a valve chart or a plant schematic.
- There do not appear to be any record drawings for the system.
- The water quality of the heating system is unknown and may be poor due to age.
- It is likely that the flue will need to be replaced. This may require additional access.

- The system has an open vent and cold feed linked to a roof system expansion tank. The replacement system will require a closed pressurised expansion.
- The heating control panel is located remotely from the plant on the level above.
- The functionality and accuracy of the heating controls should be inspected and tested to ensure these are calibrated and operate to the correct parameters.
- The control thermostats have frost and normal settings, which are set up in pairs as either left and right, or right and left depending on which room they are in. These are not labelled.
- The space heating system serving the building would benefit from being upgraded to a two pipe, flow and return system, with thermostatic controls on each of the emitters, however, this would be a major upgrade in terms of cost and disruption.

Electrical Services Items

- The incoming connection appears to be paper insulated lead covered cable. The cable and service head are both at end of life. We would suggest the regional electrical company is contacted to appraise the existing connection in terms of suitability for continued usage and service life.
- The main distribution board is missing a front cover and there are no surge protection devices present.
- The main containment is missing a cover and appears to be plastic and generally does not offer sufficient mechanical strength to house the cables between the cut out, meter and main distribution board.
- The installation at this location is generally to a poor standard.

4.0 Boiler Replacement Options

4.1 Option 1

Replacement of the boilers with current more efficient models.

This option would involve the removal of the current boilers and the replacement with new boilers of a similar capacity to the existing.

The replacement boilers could be floor mounted as currently installed, or preferably wall / cascade mounted which would free up floor space.

New boilers will have a greater efficiency than the currently installed models and would therefore require less gas input for a similar heating output. A cascade arrangement could utilise several smaller boilers.

Due to the age of the system the boilers would need to be segregated from the existing heating system by a heat exchanger, this would ensure that any contaminated water from the existing system does not foul the new boilers.

It is likely that the flue will need to be replaced and options for that would need to be advised by the specialist flue manufacturer, including any additional access needs.

The system will require the addition of pressurisation sets and expansion vessels for the primary and secondary sides. These need to be connected to a cold-water supply.

The works would involve;

- Test and measure the existing circuits and flow rates.
- Isolate and remove existing boiler and associated pipework, flue, electrical supply and controls.
- Provide new gas fired boilers to replace the existing.
- Provide new controls for the heating system to include weather compensation.
- Provide new power supplies for the heating system.
- Reconfigure and upgrade plantroom heating pipework arrangements to suit the new plant and to provide more adequate access to the same.
- Provide new flue and ancillary heating equipment to provide a complete working primary system.
- Flushing, testing, commissioning and setting to run of the new system.

Other Notes:

- Fire safety would need to be reviewed by a specialist as noted in the observations in section 3.

- Access in general may need to be reviewed in terms of safe working.

- There appears to a potential option to relocate the plantroom to an area currently used for storage. This space is also in the basement but is accessed from Oxford Street with a flat walkway all the way through from street to room. The room would need to be ventilated from an external point; however, the current boiler room vent runs through it already and could be adapted. The room would need to be looked at in further detail by a building surveyor for fire and structural suitability.

Budget Costs

Main Items	
New gas boiler installation with heat exchanger	£20,000
Plantroom reconfiguration works	£10,000 (using existing plantroom)
New heating controls	£5,000
Power supplies for system	£5,000
Other non-specific items	£5,000
Risk Items	
Fire and access upgrades	Cost subject to building surveyor advice
Internal building works in association and making good / decoration	Cost subject to building surveyor advice
Budget Total	£45,000 (Excluding building works)

4.2 Option 2

Replacement of the boilers with an alternative heat source

Electric powered air source heat pumps are currently being promoted as an alternative to gas boilers. These work on a principal of converting electricity to heat energy via an internal refrigeration circuit. Air source heat pumps are located externally to the building.

Due to the refrigeration process the heat pump units are more efficient than a standard electric heater and, in some instances, than gas fired equipment due to the co-efficient of performance of the equipment.

These can be a useful alternative for new build properties or those having a large-scale overhaul and refurbishment. Generally, they do not provide a suitable heat source in older buildings or with older systems. This is due to many reasons.

- The air source heat pumps are external and must be located in a compound somewhere easily accessible. They may be subject to planning, and there may also be issues with noise.
- The heat pumps generally operate at a lower circulation temperature and temperature differential that the older gas fired systems. For example, this could be 50°C-45°C rather than an existing 80°C-70°C. This means that the present pumps, emitters, and pipework in the system will be undersized to provide sufficient heat output for the building, requiring wholesale replacement of the internal space heating system,
- The removal of the existing, and installation of a new space heating system would cause significant disruption to the building.
- The heat pumps require a three-phase electrical supply and the requirements for the heat pumps energy demand is likely to exceed the current capacity of the incoming electrical supplies to the building. This may require a significant upgrade in electrical capacity.

Budget Costs

Main Items	
Air source heat pumps installation	£75,000
Plantroom primary and secondary system works	£30,000
New space heating emitters and pipework (including removal of existing)	£65,000
New heat pump and heating controls	£10,000
Provide power supplies for ASHP	£10,000
Main distribution rationalisation	£10,000
New incoming 3 phase main	Cost subject to electric authority advice
Other non-specific items	£5,000
Risk Items	
Electric Authority network upgrade	Cost subject to electric authority advice
Ground works	Cost subject to building surveyor advice
Planning	Cost subject to building surveyor advice
External compound	Cost subject to building surveyor advice
Fire and access upgrades	Cost subject to building surveyor advice
Internal building works in association and making good / decoration	Cost subject to building surveyor advice
Budget Total	£205,000 (Excluding building works)

4.3 Option 3

Replacement of the LTHW heating system with direct electric heaters.

A further alternative for the space heating would be to install direct electric heaters (convection or fan heaters) throughout the building and to make the LTHW system redundant.

Whilst these may be a useful proposal for well insulated buildings or for small spaces which are remote from an existing LTHW network within a building, we do not recommend this as a viable option for a boiler replacement. Reasons for this include;

- Direct electric heaters are inefficient compared to all other methods and would attract high energy usage costs.
- The high heat losses in the building would require a very large volume of heaters.
- Each heater would need to be wired individually requiring extensive electrical works.
- Low level convector heaters can present a higher fire risk in areas where they may be accidently covered (for example by coats or clothing).
- The load required to power the heater would likely exceed the current building electrical capacity and necessitate an electrical infrastructure upgrade.
- The existing LTHW may have to be removed to allow the installation of the system.
- The removal of the existing LTHW space heating system and the installation of the new electrical system would cause significant disruption to the building.

Budget Costs

Main Items	
Electric Heaters	£10,000
Removal of LTHW system	£7,500
Provide power supplies & network for heaters	£35,000
Main distribution rationalisation	£10,000
New incoming 3 phase main	Cost subject to electric authority advice
Other non-specific items	£5,000
Risk Items	
Electric Authority network upgrade	Cost subject to electric authority advice
Ground works	Cost subject to building surveyor advice
Fire and access upgrades	Cost subject to building surveyor advice

Internal building works in association and making good / decoration	Cost subject to building surveyor advice
Budget Total	£65,000 (Excluding building works)

Important Notes:

All budget costs are estimates and are subject to the following;

- Design
- Site logistics
- Works programmes
- Planning
- Building Regulations
- Review by the Specialist Installers
- Building Regulation Approval

Budget Costs do not include;

- Building works
- Preliminaries
- Fees
- Planning and Building Regulation Approvals
- Cranage & Delivery
- VAT

5.0 Energy Appraisal

5.1 Energy Benchmarks

CIBSE TM46 - Energy Benchmarks (2008) states that Town Halls are considered to be Category 1 for the production of Display Energy Certificates (DECs).

From Table 1 of CIBSE TM46 the typical benchmarks are as follows:

- Electricity 95 kWh/m^2
- Fossil-thermal 120 kWh/m^2

We have been provided with floor plans for the building, from which floor areas can be determined. These areas are as follows:

- Basement 184 m^2
- Ground Floor Area 333 m^2
- First Floor Area 347 m^2

Total floor area 864 m^2

This provides a benchmark figure for gas consumption of 103,680 kWh/annum for a typical building. Due to the age and construction of the building it is anticipated that the energy consumption is likely to be higher than this.

We have been provided with gas bills for a year's consumption, starting December 2021 to end of November 2022.

This provides an annual gas consumption of **166,951 kWh/annum.**

This would equate to an annual cost of **£7,512.80**

5.2 Option 1 Energy Appraisal

Replacement of the boilers with current more efficient models.

Using the annual gas consumption from the utility bills, a simple assessment of the energy savings from upgrading the boilers to a more energy efficient version can be made.

Assuming the efficiency of the existing boilers is now around 75%, a new boiler system could be installed that could have an efficiency of 95%. This would provide an annual energy consumption of 133,561 kWh/annum. Should a gas cost of 4.5p/kWh be assumed (determined from the utility bills) then an annual saving of **£1,502.55** could be apparent.

5.3 Option 2 Energy Appraisal

Replacement of the boilers with an alternative heat source.

Using the annual gas consumption from the utility bills, a simple assessment of the energy costs from replacing the boilers with an air source heat pump system can be made.

A new air source heat pump system could be installed that could have an efficiency of 350%. This would provide an annual energy consumption of **60,709 kWh/annum**. Should an electricity cost of 23.5p/kWh be assumed (determined from Department for Energy Security & Net Zero Quarterly Energy Prices) then an annual cost of **£14,266.62** could be apparent.

This would provide a greater annual running cost, due to high electricity prices, compared to the relatively low gas price that is currently apparent.

It should be noted that this option would provide significant carbon dioxide savings for the building.

5.4 Option 3 Energy Appraisal

Replacement of the LTHW heating system with direct electric heaters.

Using the annual gas consumption from the utility bills, a simple assessment of the energy costs from replacing the boilers with direct electric heaters can be made.

New direct electric heaters could be installed that could have an assumed efficiency of 100%. This would provide an annual energy consumption of **125,213 kWh/annum**. Should an electricity cost of 23.5p/kWh be assumed (determined from Department for Energy Security & Net Zero Quarterly Energy Prices) then an annual cost of **£28,720.06** could be apparent.

This would provide a greater annual running cost, due to high electricity prices, compared to the relatively low gas price that is currently apparent.

6.0 Conclusion

Having undertaken a site assessment to determine the most feasible option for replacing the existing boilers, we would recommend that Option 1 be chosen. This option would provide a more energy efficient system as well as savings in annual gas consumption costs. Consideration must be made of the current location and suitability of the plantroom with regards to the fire protection and safe access of the same.

An air source heat pump system has also been considered, however due to site restrictions, electrical infrastructure upgrades and high budget and running costs, we do not consider this option to be suitable for this building.

A further option of direct electric heaters has been considered. Again, we do not consider this option to be feasible due to the higher capital and running costs.