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MECHANICAL CONDITION SURVEY AND PROPOSED SCOPE OF WORKS REPORT

Client: [redacted]

Site: [redacted]

Surveyor: [redacted]

Purpose of Report: To present findings associated with:

A record documentation study, non-intrusive site investigation and scope of recommended works.

In relation to the site:

Boiler room plant and equipment.
Heating Distribution System
Domestic Hot and Cold-Water Systems

Distribution:

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[redacted]

1. INTRODUCTION

1.1 Requirements of the Survey and Reports

[redacted] comprises of a single storey building but is linked to a 2 storey
block that is owned and operated by a separate academy (previously the whole building was operated as a single school)

The main school, which dates back to the 1960's contains the boiler room which serves both the school and the academy building in terms of heating.

The schools tank cold water supply is from storage tanks located on the roof of the academy building.

The services are therefore interconnected and service charges contra charged, however the academy block have their own hot water plant and are completely on mains water supply i.e. no cold water down services

The standalone nursery block which is around 2 years old has its own individual services and is not included as part of this report

Approximately 250 students are educated on site.

[redacted] were commissioned via [redacted], to attend site and carry out a condition survey and scope of remedial works proposal relating to the school heating boiler plant, heating system and hot and cold-water systems.

Concerns raised by the school can be summarised as follows:

- The heating boilers are approaching the end of their serviceable life
- The existing heating distribution pipework and emitters in the main building
  are very old and approaching the end of their economic life.
- The legionella risk assessment raises concerns about the condition of the cold water storage tank and the school wish to look at converting the whole of the domestic water systems to mains supply.

The exercise shall observe and record the current condition of building services, take into account any relevant issues and provide a proposed scope of works to address
issues associated with these services that may occur within the next five years.

1.2 Observations and Recommendations Reporting

This has been provided in two formats:

1. Asset Condition Survey Schedule and Recommended Works.

2. Summary of Condition Report and Remedial Works Proposals Grouped Into Projects.

Please note any photographs provided with our reports are example photographs of observations and should be interpreted as such.

1.3 Asset Condition Survey Schedule and Recommended Works

Provided in a tabulated format where specific observations and recommendations relating to individual or groups of building services components. This information is used as a framework to produce the co-ordinated, summary of Condition and Remedial Works Proposals Grouped into Projects report described below.

See Appendix 1 (please note this Appendix is in A3 landscape format).

1.4 Summary of Condition Report and Remedial Works Proposals Grouped Into Projects

The many individual or groups of building services components found within any establishment are often interdependent and this must be considered when deciding the most beneficial way forward associated with any proposed works.

For example, one element may have economic life remaining but must be replaced because it is not compatible with a life expired component's replacement.

Taking this into account the second part of observations and recommendations will consider the 'big picture' and the best way to rationalise the various proposed works for the most expedient and economic solutions.

This inevitably entails grouping together remedial works described in section one, introducing new technology and changes in best practice and regulation to make one or more, larger project proposals for the funding body to consider.

Please note any economic savings and/or associated percentages noted within the report above are not necessarily cumulative.

[redacted]

1.5 Background Information

Information available:

Information	Available	Comments
Record drawings	Y	For Boiler Replacement 2003
Asbestos reports	Y	
Legionella water hygiene	Y	Identifies issues with domestic water services. Medium Risk Rating
Site representative verbal report	Y	Via Site Agent and SBM
Contractor's report	N	None

2. CRITERIA

The inspections were non-intrusive and those parts of engineering services, which were built-in, covered up, unexposed or inaccessible, were not inspected.

The inspections did not involve any testing using instrumentation or dismantling of plant and equipment items for internal viewing.

Where the surveyor has included estimates of remaining life or noted works required this assumes, testing, safety, remedial, repair or replacement works expected to be included, as part of a comprehensive maintenance regime will be programmed for the next five years.

Life estimates are against the economic life expectancies listed by the Chartered Institute of Building Services Engineers (CIBSE) but weighted, if the surveyor thinks necessary, to accommodate their actual site observations.

To aid the reader the following categories, as recommended by CIBSE, have been included to describe the existing plant condition and recommended proposed works priority:

Condition A = **Good**	Asset can be expected to perform adequately to its full normal life if maintained appropriately.
Condition B = **Fair**	Asset is sound, operationally safe and exhibits only minor deterioration.
Condition C = **Poor**	Element is operational but major repair or replacement will be needed.
Condition D = **Very Poor**	Element runs a serious risk of imminent breakdown or poses a health and safety risk.
Priority 1 = **Urgent**	(<1 yr) work required to address serious health and safety issues, correct breach of legislation or due to failure/imminent failure.
Priority 2 = **Necessary**	(<2 yrs) work required to prevent the deterioration of an asset.
Priority 3 = **Recommended**	(< 5 yrs) work required to prevent a deterioration of the service provided
Priority 4 = **Normal**	(> 5 yrs) no work required beyond normal maintenance.

3. CONDITION REPORT AND REMEDIAL WORKS PROPOSALS

Observations and recommendations relating to the building services under consideration are, as follows:

3.1 Main Boiler Room Plant and Equipment

Description:

In summary, these services consist of:

1. Natural gas services.
2. Natural combustion ventilation.
3. Two pressure jet cast iron sectional gas fired heating boiler.
4. Individual boiler flues fabricated from stainless steel.
5. Pressurisation Plant
6. Main School Heating Pumps
7. Pool Heating Pumps
8. Boiler Shunt Pumps
9. Valves, pipework and ancillary fittings.
10. Controls and Electrical services.

Condition:

The majority of the plant and equipment date from a boiler plant update project carried out around 19 years ago, with the exception of one of the man school heating pumps (which was retained).

The pool heating pumps have been subsequently replaced in recent years presumably due to failure of the original units.

The boilers are pressure jet gas fired cast iron sectional units rated at 278KW output and are now obsolete, although spares are still available.

The boilers are in reasonable condition for their age but approaching the end of their serviceable life and are not as energy efficient as modern equivalents.

The main heating pumps are single head centrifugal fixed speed units which again are reaching the end of their useful life, particularly the left hand pump which is around 30+ years old an in poor condition

The heating pressurisation plant is around 20 years old and in reasonable working condition as is the expansion vessel.

The valves in the boiler room are generally gate type and a vast proportion of them are seized open.

The majority of the pipework within the boiler room would have been renewed when the boiler was installed however it then connects to the older original steel pipework distribution to the building with no hydraulic break in the from of a plate heat exchanger.

The main panel is 20 years old and the controller is obsolete.

Taking into account the main components are around 20 years old, are of an old inefficient type, cross contamination from the old heating and general condition we must conclude the boiler plant is reaching the end of its economic life; replacement is recommended.

The new boiler plant would need to have hydraulic separation from the distribution pipework in the form of a plate heat exchanger (unless the internal pipework and heat emitters were also replaced at the same time)

In addition, the school would prefer that the heating to the two separate buildings be separated and that the Academy building has its own system installed,

Existing Overall Averaged Condition C.

Suitability for Purpose:

The existing plant is suitable for the schools requirements although it is probably oversized and is not energy efficient.

Options:

1. Do Nothing: The older components will decay further until leaks and costs force replacement anyway.

2. Repair: The main components in question (boilers) are not replaceable on a like for like basis. If, as is likely, sections within the boilers start to fail, repairs will be very expensive (around £2,000 - £3,000 for intermediate sections and £8,000 for a rear section) which could mean repair costs in excess of £20,000 in the event of total failure.

3. Replacement: Planning for replacement is the most cost-effective option.

Recommendation:

Our recommendation is to plan for a complete boiler room plant and equipment upgrade as soon as possible.

This arrangement would markedly improve the operational efficiency by perhaps 10-15%.

In summary, we recommend the main elements of replacement plant and equipment should consist of:

1. Automatic emergency gas shut off system linked to the site fire alarms.
2. Modular condensing boilers for economic operation, resilience and compliance, sized to serve the school building alone.
3. Plate heat exchanger to separate the new plant from any retained heating services in the school (if replacement of pipework and heat emitters is carried out the same time this item would not be necessary)
4. Pressurisation unit and expansion vessel.
5. Automatic speed-controlled pumps with duty/standby provision
6. Methane and carbon monoxide detection/shutdown systems.
7. General pipework, valve fittings and insulation work to accommodate the new plant arrangement.
8. Controls system upgrade.

Photographs:

Existing Gas Fired Boiler

Heating Pressurisation Unit

Boiler Flue

[redacted]

Existing main heating pump (left hand unit) Poor Condition

Replaced Pool Heating Pumps Burner

to Boiler 1 Poor Condition Boiler

Shunt Pump Poor Condition Existing

Panel with obsolete controller

3.2 Main Building Heating Distribution System

Description:

In summary, these services consist of:

1. Heating Distribution pipework throughout
2. Heat Emitters and Local Controls
3. Thermal Insulation
4. Local Heat Pump Systems.

Condition:

The majority of the heating distribution pipework is original and now around 58 years old so can be considered to be approaching the end of its useful life.

The pipework is generally a 2 pipe system with service runs at high level and within ceilings, however some pipework is installed in floor ducts that are generally inaccessible. This applies mainly to the heating circuit serving the academy building but also in some areas of the school.

In some areas, mainly classrooms, additional radiators have been installed and these are connected to the original pipework system via mechanical percussion tees.

The classrooms are generally heated by recessed fan convectors which are in poor condition and difficult to access to clean and maintain.

There are a mixture of steel panel and cast iron radiators that appear original and beyond their economic life.

In addition there are steel panel and low surface temperature radiators installed that whilst newer than the above are still approaching the end of their economic life.

The library area is served via wall mounted split heat pumps which are in good condition.

Existing Overall Averaged Condition Original Block D

Suitability for Purpose:

The existing pipework and heat emitters are approaching the end of their useful life and should be replaced.

Options:

1. Do Nothing: The older components will decay further until leaks and costs force replacement anyway.

2. Repair: The components in question are generally beyond repair and parts are not available so would need replacing on an ad hoc basis as they fail

3. Replacement: Planning for replacement pipework and emitters is the most cost-effective option.

Recommendation:

Our recommendation is to plan for replacement of the pipework and emitters in the throughout the school (excluding the academy block which would need to have its own dedicated heating plant installed)

Photographs:

External Heating Pipework to Pool Plant in poor condition

Typical High Level Pipework (original and approaching 60 years old)

Local electric heater in office adjacent to dining room

Original cast iron radiator in kitchen

Typical classroom fan convector outlet grille

Example of use of percussion tees where additional heat emitters have been installed to original pipework

Example of old pipework and valves with pipework run in floor

3.3 Hot and Cold Water Services

Description:

In summary, these services consist of:

A main cold water storge tank
A Gas Fired Water Heater serving the kitchen
A bronze HWS Circulation Pump for the above.
Local electric vented hot water cylinders and associated storage tanks
Local electric unvented water heater
Electric Shower
Valves, pipework and ancillary fittings.

Condition:

The 1,800 cold water storage tank located in the academy building is in poor condition as identified in the legionella risk assessment

The 280 litre vented gas fired water serving the kitchen is around 20 years old and is served from the main cold water tank. The heater is operational but approaching the end of its useful life.

The 5No 110 litre classroom direct copper cylinders and associated 90 litre plastic storage tanks are all in poor condition, difficult to access for maintenance and provide poor operating pressure.

The cold water pipework is generally original galvanised steel which is approaching the end of its useful life. Where modifications/additions to the systems have been carried out the pipework is installed in copper which will accelerate the deterioration of the galvanised pipework due to galvanic action.

The hot water pipework is generally copper.

It appears that over the years the cold mains distribution pipework has been adapted so as to provide drinking water to the classroom sinks and some other outlets. This has resulted in large quantities of dead legs with the water distribution system and also unequal pressure to thermostatic valves due to the hot water being gravity fed.

The above also means the existing main cold water tank is vastly over sized.

Overall Averaged Condition D.

Suitability for Purpose:

The system installed are not considered suitable for purpose

Options:

1. Do Nothing: The existing galvanised steel pipework system is fast approaching the end of its useful life and will require replacement in the very near future. Ongoing leaks and failure of fittings can be expected (as currently being experienced. The gas fired water heater and the local cylinders are approaching the end of their serviceable life

2. Replacement: Planning for the complete replacement of the of the hot and cold water services is the best option.

Recommendation:

Our recommendation is to plan for complete replacement of the domestic water services including conversion to mains water supply only.

This will allow the existing tank in the academy building to be abandoned along with the associated underground pipework.

A new gas fired unvented heater should be installed to serve the kitchen

In the classrooms areas, new unvented electric waters should be installed which will enable removal of the local storage tanks.

A new cold main pipework distribution system should be installed from the incoming main in the boiler room. This will also enable the removal of all existing dead legs on the old cold water down service.

Photographs:

Gas Fired Water Heater serving kitchen

[redacted]

Hot water Circulation Pump to kitchen water heater

Typical classroom water heater

Typical storage tank serving classroom water heater. Very restricted access

Example of dead legs in cold water down system

Example of dead legs in cold water down system on old galvanised pipework

[redacted]

Leak from cold water cistern in staff room

Incoming water main in boiler room connected to old galvanised pipework

4. SUMMARY TABLES

Summary of Condition Report and Remedial Works Proposals Grouped into Projects are detailed in the following tables.

Budgets Noted Include:

Consultant's fees,
CDM/health & safety Issues,
Preliminaries,
Testing existing services,
Removal and disposal of redundant services,
Recommended works,
Commissioning and setting to work,
Manuals,
Staff instruction,
Builder's work,
Modest contingency,
Modest allowance for asbestos removal.

Budgets Noted Exclude:

VAT

Temporary plant should any works be carried out during occupancy. This would be at additional cost.

Budget General Notes:

Budget costs are an approximate guide at this stage, due to the limited information available at present relating to the detailed content of the work, unknown occupancy during the works and how much continuous or staged working will be involved.

Budget costs include an allowance for asbestos removal, although this is impossible to fully quantify at this stage.

The budgets noted also include an allowance to move, reposition and protect all general unfixed furniture and stored equipment, as required, but this does not include archive material, library material, IT equipment or specialist equipment.

Proposed Works	**Complete Main Plant Room Refurbishment to Serve School Only**
Existing Overall Averaged Condition A - D	C
Current Efficiency L/M/H	M
Current Maint' Cost L/M/H	M
Recommendation Review in 5yrs, Repair, Replace	Replacement
Risk Description	Life expired failure, spare part availability, Resilience, health and safety issues.
Risk Likelihood 1=low, 5=high	4
Unmitigated Consequence 1=low, 5=high	5
Risk Score	20
Priority 1 - 4	1
Proposed Programme	2022/23
Budget £K	£110K

[redacted]

Proposed Works	**Heating Distribution System Replacement to School Only**
Existing Overall Averaged Condition A - D	D
Current Efficiency L/M/H	L
Current Maint' Cost L/M/H	H
Recommendation Review in 5yrs, Repair, Replace	Replacement
Risk Description	Life expired failure, spare part availability, Resilience, health and safety issues.
Risk Likelihood 1=low, 5=high	5
Unmitigated Consequence 1=low, 5=high	5
Risk Score	25
Priority 1 - 4	1
Proposed Programme	2022/23
Budget £K	£130K

Proposed Works	**Replacement Hot and Cold Water Services to School Only**
Existing Overall Averaged Condition A - D	D
Current Efficiency L/M/H	L
Current Maint' Cost L/M/H	H
Recommendation Review in 5yrs, Repair, Replace	Replacement
Risk Description	Life expired failure, spare part availability, Resilience, health and safety issues.
Risk Likelihood 1=low, 5=high	5
Unmitigated Consequence 1=low, 5=high	4
Risk Score	20
Priority 1 - 4	1
Proposed Programme	2022/23
Budget £K	£100K

5. APPENDIX 1 – ASSET REGISTER

Item No	Sub Element	Function	Manufacturer	Description	Location	Floor	Installation date Estimated	Residual Life Years	Condition	Description of Work Required within next 5 years	Priority	Comments/Additional Notes
1	Fuel Distribution and Safety Equipment	Emergency Gas Shut Off System	Honeywell	Knock off isolation button at entry to plant room together with gas shut off solenoid valve and ETL	Main Plant Room	0	2003	1	C	Replace	1	Upgrade to include self proving valve, gas and CO detection and fire alarm interface
	Fuel Distribution and Safety Equipment	Gas Distribution Pipework	-	Steel Pipework	Main Plant Room	0	2003	40	B	None	1	Modify to suit new boiler installation
	Heating Sources and Equipment	Heating Boilers 2 No	Remeha	Cast Iron Sectional Boiler	Main Plant Room	0	2003	1	C	Replace	1	Replace with gas fired modular condensing boilers and plate heat exchanger
	Heating Sources and Equipment	Boiler plant pressurisation and expansion	Aquatech Pressmain	Pumped pressurisation unit and 2No 300 litre diaphragm type expansion vessel	Main Plant Room	0	2003	1	B	Replace	1	Replace with digital pressurisation unit in conjunction with boiler replacement
	Heating Sources and Equipment	School heating water circulation pump (Right Hand)	Grundfos	Single Head Fixed Speed	Main Plant Room	0	2003	1	C	Replace	1	Replace with twin variable speed pumps
	Heating Sources and Equipment	School heating water circulation pump (Left Hand)	Grundfos	Single Head Fixed Speed	Main Plant Room	0	1980	1	D	Replace	1	Replace with twin variable speed pumps
	Heating Sources and Equipment	Pool heating water circulation pumps	Grundfos	Twin Head Variable Speed	Main Plant Room	0	2015	1	B	None	4	Re use as part of plant room upgrade
	Heating Sources and Equipment	Plant Room Heating Pipework	NA	Steel Pipe and Fittings	Main Plant Room	0	2003	40	B	Replace	1	Modify to suit new boiler installation
	Heating Sources and Equipment	Plant Room Heating Valves	NA	Gate Valves	Main Plant Room	0	2003	1	D	Replace	1	Install new as part of plant replacement
	Controls	Main Plant Programmer	Drayton	Panel and DC1100 controller	Main Plant Room	0	2003	1	C	Replace	1	Existing controller obsolete. Upgrade to suit modular boilers

Item No	Sub Element	Function	Manufacturer	Description	Location	Floor	Installation date Estimated	Residual Life Years	Condition	Description of Work Required within next 5 years	Priority	Comments/Additional Notes
	Heating	Heating Distribution Pipework	NA	Steel Pipework and Fittings	Main Building	0	1964	2	D	Replace	1	Replace with new 2 pipe system
	Heating	Heat Emitters	Unknown	Cast Iron and Steel Panel Radiators	Main Building	0	1964	1	D	Replace	1	Plan for replacement in conjunction with pipework
	Heating	Heat Emitters	Unknown	Fan convectors	Main Building	0	1964	1	D	Replace	1	Plan for replacement in conjunction with pipework
	Heating	Heat Emitters	Unknown	Steel Panel and LST Radiators	Main Building	0	1990	5	B	Replace	2	Plan for replacement in conjunction with pipework
	Air Conditioning	Heat Pumps	Fujitsu	Split AC Heat Pumps	Library	0	2010	10	A	None	4	
	Hot and Cold Water Services	Main Cold Water Tank	Unknown	1800 litre steel tank	Academy Block	2	1964	0	D	Remove	1	Convert System to Mains Water
	Hot and Cold Water Services	Gas Fired water Heater	Andrews	23KW 276 litre gas fired	Store	0	2003	1	C	Replace	1	Replace with mains fed unvented water heater
	Hot and Cold Water Services	Local Direct Electric Cylinders	Varies	Copper 110 litre	Varies	0	1980	0	D	Replace	1	Replace with mains fed unvented water heaters
	Hot and Cold Water Services	Pipework	NA	Galvanised Steel	Main Building	0	1964	1	D	Replace	1	Replace with new copper mains water supply throughout