



**INTERNATIONAL OPERATIONS & MAINTENANCE CONFERENCE  
IN THE ARAB COUNTRIES**

**UNDER THE THEME**

**"MANAGING MAINTENANCE WITHIN INDUSTRY 4.0"**

**CONICIDE WITH THE 16<sup>TH</sup> ARAB MAINTENANCE EXHIBITION**

**Preparation of Asset Register Documentation  
and Asset Maintenance Programmes**

**JCP CONSULTING ENGINEERS LTD**

**4.0**



## Background JCP Facilities Management



Simon Jackson (BEng)  
Director  
24 Years Experience in Building  
Services including PPM & the  
setting up and managing of  
PPM Contracts



Derek Hammond (IEng MIET)  
Director  
26 Years Experience in Building  
Services including PPM & the  
setting up and managing of  
PPM Contracts





## Effective M&E Maintenance Contracts

### Background

- Industrial and Processes
- M&E Systems in Buildings

### Benefit

- Reduces System Failure
- Reduces Capital Costs
- Reduces On-Going Annual Energy Costs
- Reduces Time Lost To Unplanned Outages And The Associated Loss Of Revenue.



Preparation of the Asset Register Documentation to  
enable an Asset Based PPM Contract to be  
Implemented

## Why Prepare An Asset Register?

Know what assets you are responsible for

Plan statutory inspections

Plan maintenance

Budget for Maintenance

Replace lost or missing O&M information

Plan renewals and refurbishment

Budget for renewals

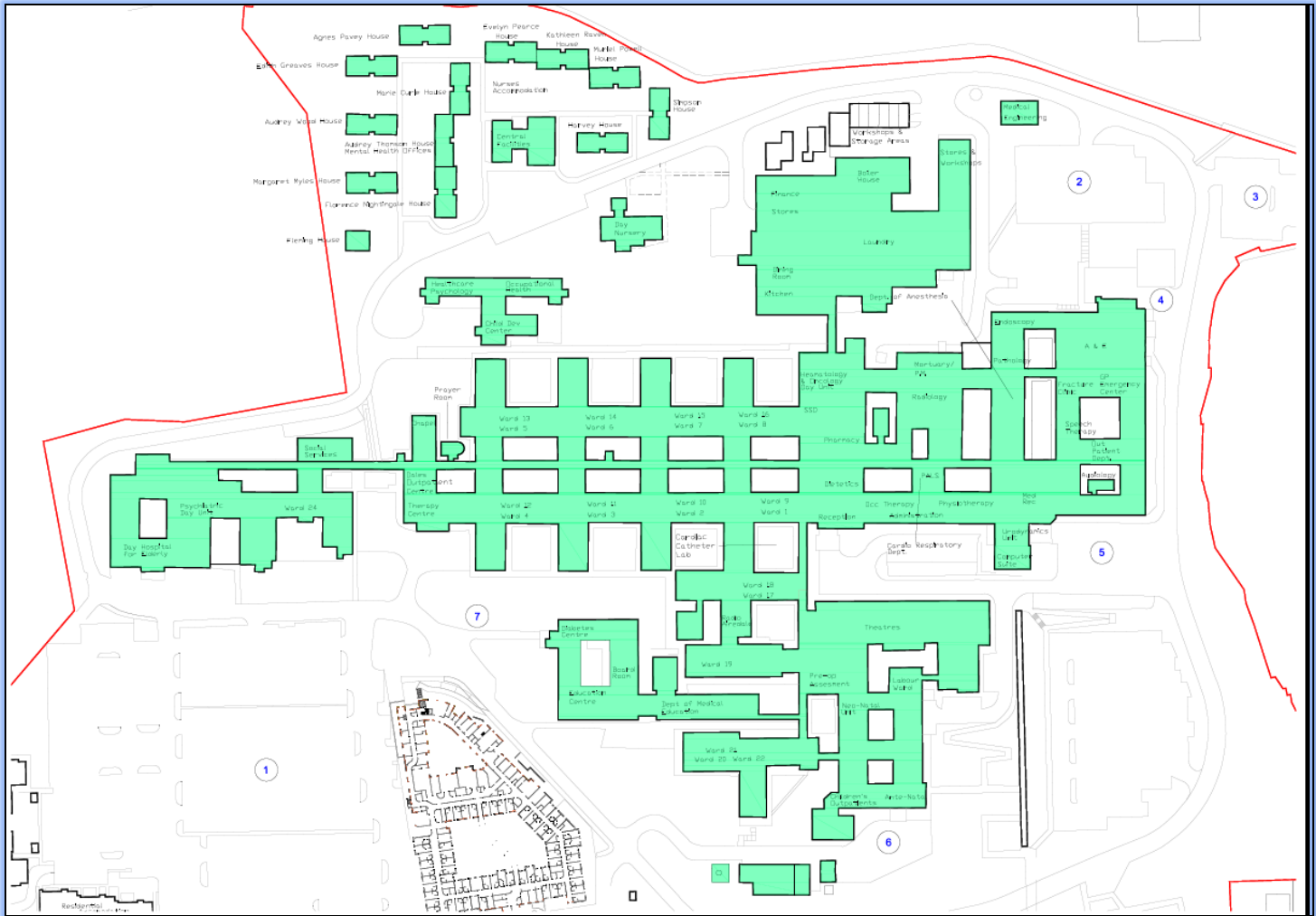




## How Detailed Does the Asset Register Need to Be



# Planned Preventative Maintenance (PPM) and Effective Asset Management



## Hospital x 1

### Pros

- Quick to prepare.

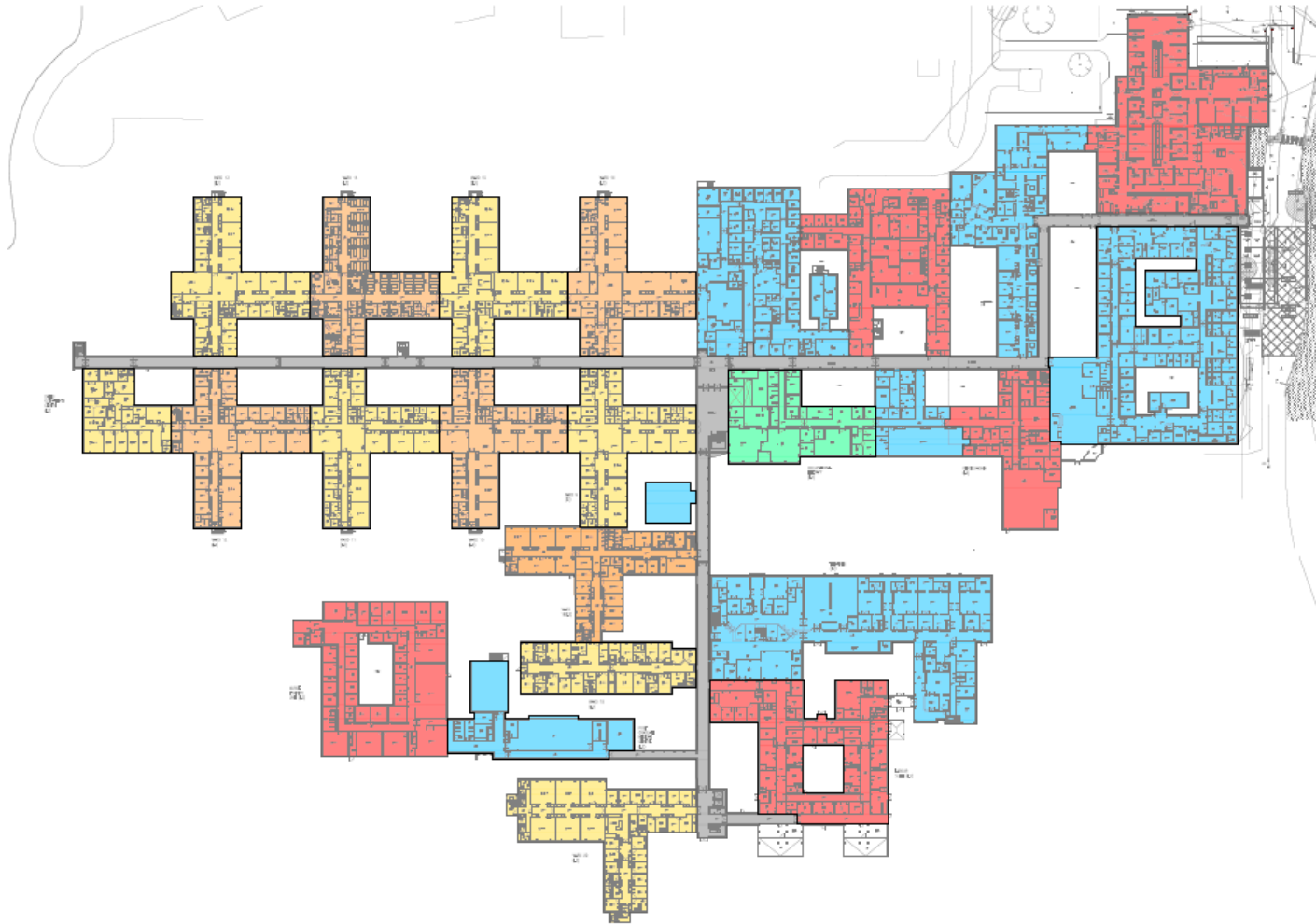
### Cons

- Does not provide sufficient information to set up, run and monitor maintenance.
- Unable to plan maintenance or renewals
- Unable to prepare budget forecasts





# Planned Preventative Maintenance (PPM) and Effective Asset Management



## Departmental

### Pros

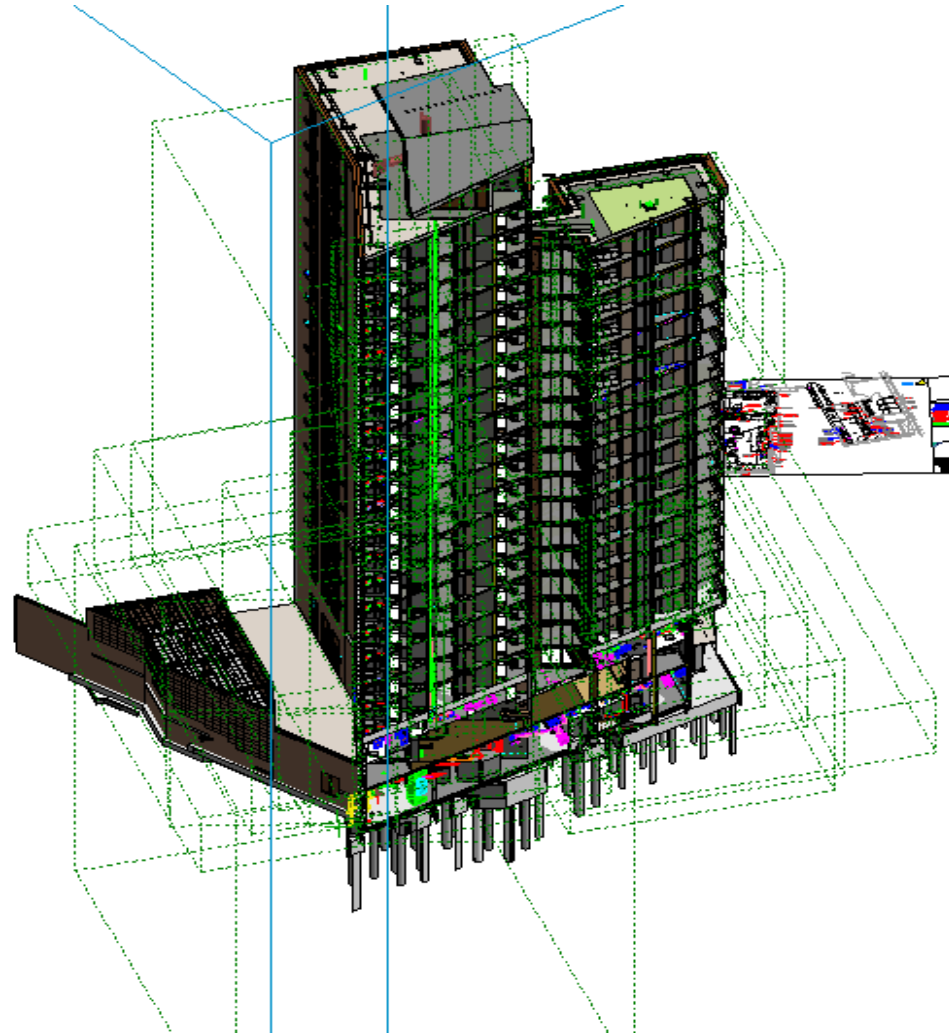
- Easier to prepare than a detailed asset register for each area.
- Provides sufficient information for high level budgeting.
- Does not require updating providing equipment is similar

### Cons

- Requires the departments to be similar for the information to be valid.
- Does not identify individual high cost items for tracking.



# Planned Preventative Maintenance (PPM) and Effective Asset Management



# Planned Preventative Maintenance (PPM) and Effective Asset Management





# Planned Preventative Maintenance (PPM) and Effective Asset Management



## Detailed Room by Room

### Pros

- Provides a comprehensive list of assets.
- Enables detailed maintenance plans to be implemented
- Enables detailed costing of assets for renewal planning.

### Cons

- Takes time to prepare
- Requires to be updated with changes to remain valid





## System Approach

- Boilers
- Chillers
- Calorifiers
- Air Handling Units
- Extract fans
- Lighting including emergency
- Water Storage tanks
- Water booster sets
- Medical gases
- Standby generator
- Electrical distribution
- Fire alarm
- Etc, etc



## Preparing Asset Registers

- Decide what the Asset Register is for.
- Decide the level of detail required.
- If using a CMMS prepare information so it can be uploaded into the CMMS package easily.
- Decide if individual equipment tags are to be used, if they are on what equipment.



# Planned Preventative Maintenance (PPM) and Effective Asset Management

## Information from O&M



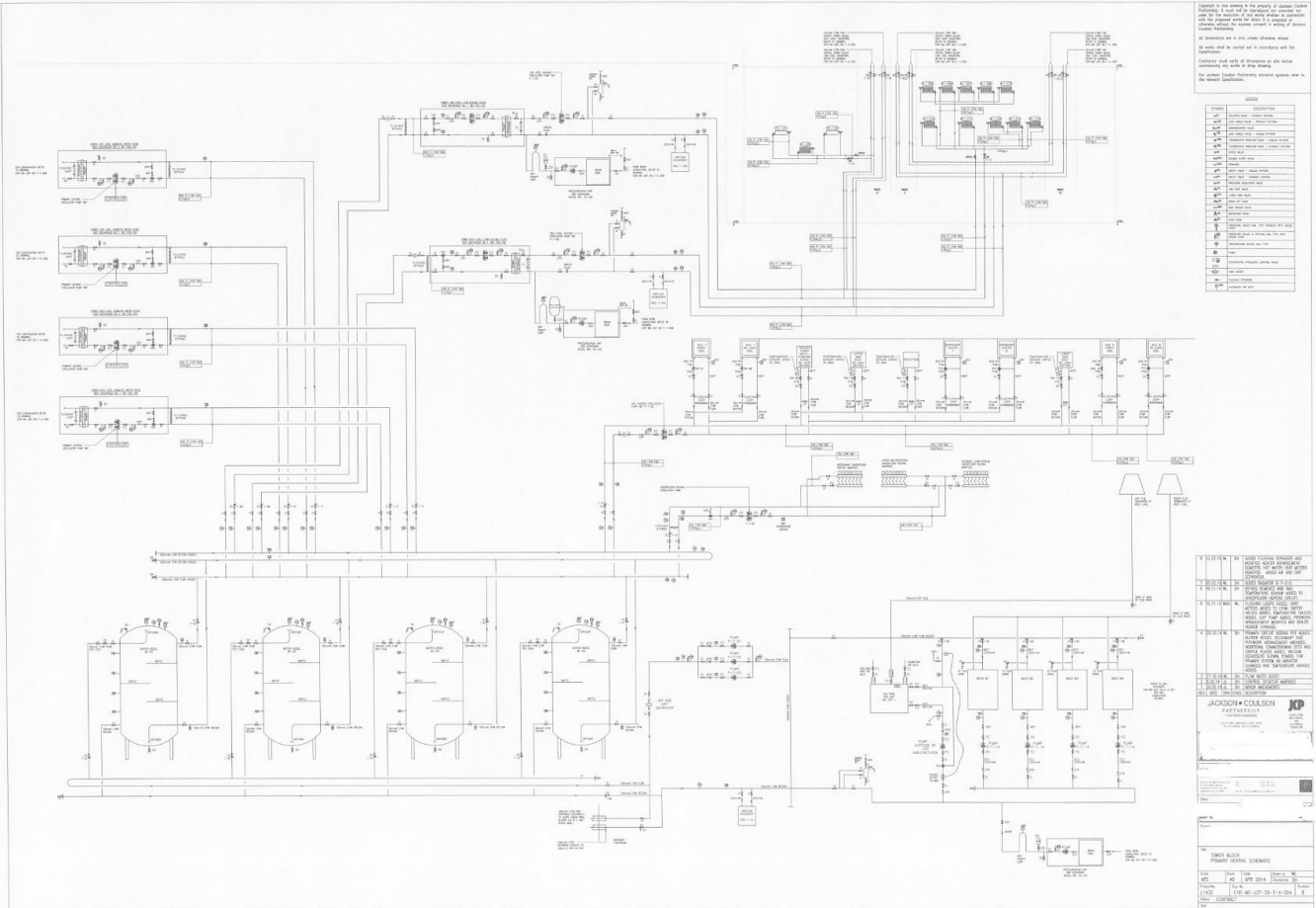
### Boilers

Ref	B01	B02	B03	B04	
<b>Location</b>	Tower Plant Room Level -1	Tower Plant Room Level -1	Tower Plant Room Level -1	Tower Plant Room Level -1	
<b>Type</b>	Gas-Fired Condensing	Gas-Fired Condensing	Gas-Fired Condensing	Gas-Fired Condensing	
<b>Fuel</b>	Natural Gas	Natural Gas	Natural Gas	Natural Gas	
<b>Output Duty (kW)</b>	912	912	912	912	
<b>Water Flow Temp (°C)</b>	85	85	85	85	
<b>Water Return Temp: (°C)</b>	55	55	55	55	
<b>Design Flow Rate (kg/s)</b>	7.26	7.26	7.26	7.26	
<b>Fuel Consumption (m3/hr)</b>	94	94	94	94	
<b>Gas Min Inlet Pressure (mbar)</b>	15	15	15	15	
<b>OA Dimensions WxDxH (mm)</b>	1550 x 2243 x 2139	1550 x 2243 x 2139	1550 x 2243 x 2139	1550 x 2243 x 2139	
<b>Dry Weight (kg)</b>	1893	1893	1893	1893	
<b>Water Content(litres)</b>	793	793	793	793	
<b>F&amp;R Connections (mm)</b>	125	125	125	125	
<b>Max. Operating Pressure (bar)</b>	6	6	6	6	
<b>Electrical (V/Ph/Hz)</b>	400/3/50	400/3/50	400/3/50	400/3/50	
<b>Electrical Loading (Amps)</b>	6.8	6.8	6.8	6.8	
<b>Nominal Flue Connection (mm)</b>	402	402	402	402	
<b>Thermal Eff. at 1/3 Output (%)</b>	97	97	97	97	
<b>Manufacturer</b>	Hoval	Hoval	Hoval	Hoval	
<b>Model Reference</b>	UltraGas 1000	UltraGas 1000	UltraGas 1000	UltraGas 1000	
<b>Comments</b>					
<b>Notes</b>					
<b>Contact</b>					



# Planned Preventative Maintenance (PPM) and Effective Asset Management

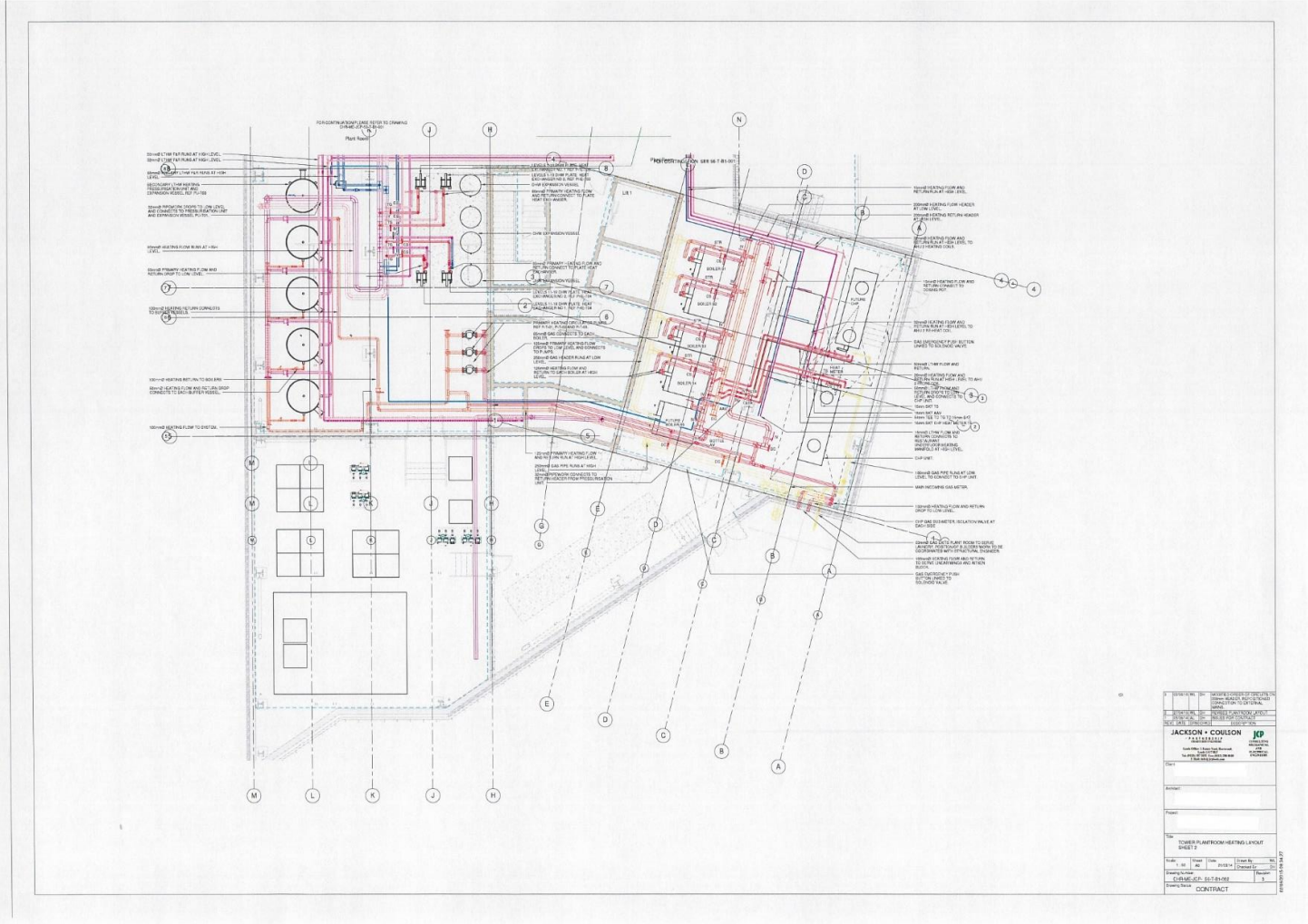
## Information from O&M





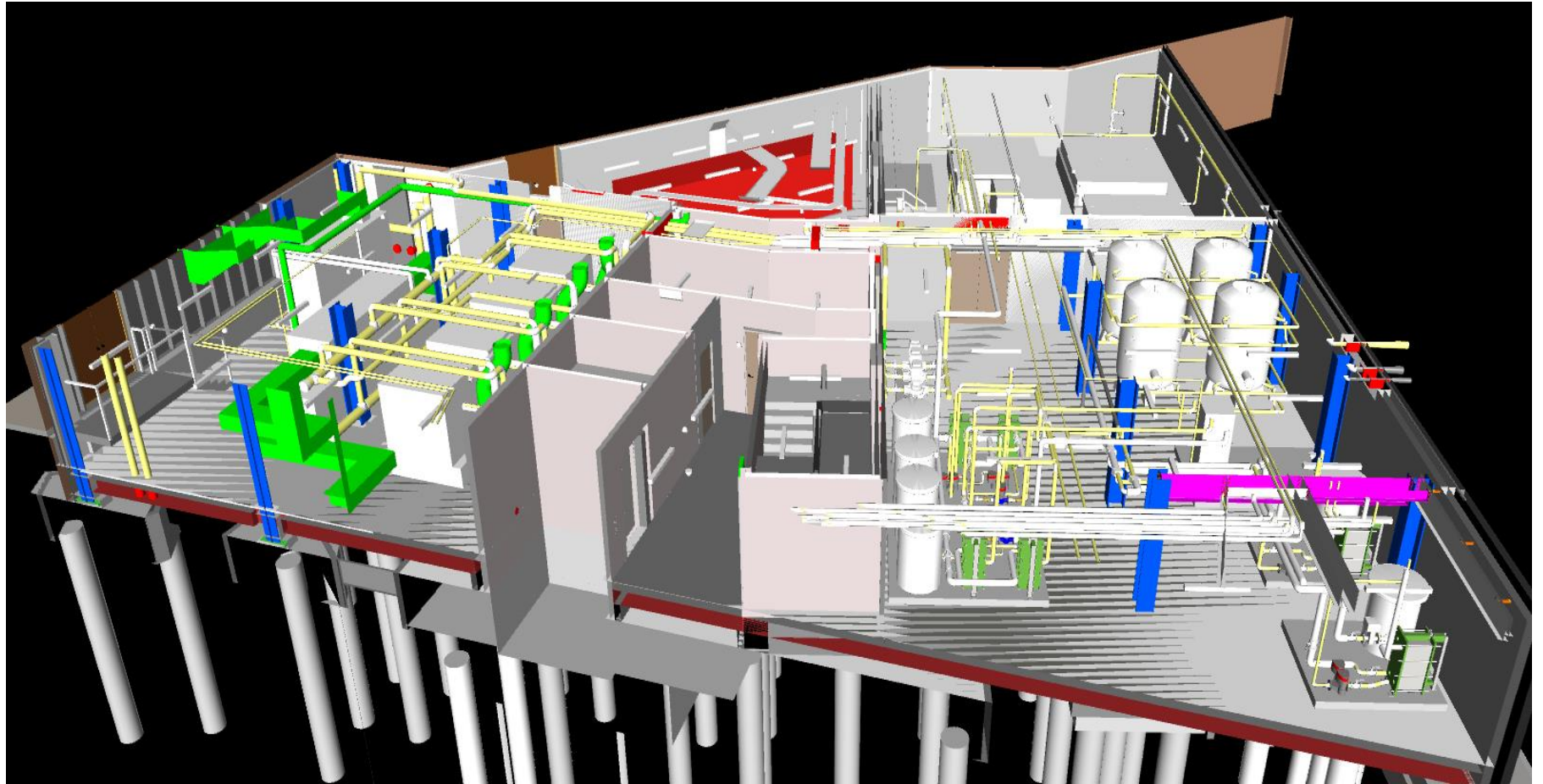
# Planned Preventative Maintenance (PPM) and Effective Asset Management

## Information from O&M



# Planned Preventative Maintenance (PPM) and Effective Asset Management

## Information from BIM Model





# Planned Preventative Maintenance (PPM) and Effective Asset Management

## Information from BIM Model

Type Properties

Family: Pipe-Commissioning\_Valve-Hattersley-5 Load...

Type: 100mm Duplicate... Rename...

Type Parameters

Parameter	Value
Weight (kg)	24.100000
UK End Connection	Fully-Lugged
Temperature °C	-10 to 130°C
Specification Notes	Conforms to BS EN 593:2009, Full
Pressure Rating (Cat)	PN16
Pressure (BAR)	<a href="http://www.hattersley.com/docu">http://www.hattersley.com/docu</a>
Operator	Lever
Approvals	
<b>Visibility</b>	
Tip Stem	Iron, Ductile Epoxy Paint
Red Tip	Iron, Ductile Epoxy Paint (Blue)(1)
Disc Material	Aluminum
Casing Material	Iron, Ductile Epoxy Paint (Blue)
Blue Tip	Iron, Ductile Epoxy Paint (Blue)(2)
<b>Other</b>	
_current revision	1
_author	Connor Laing
_BIMspec_GUID	0

<< Preview OK Cancel Apply

Type Properties

Family: Pipe-Commissioning\_Valve-Hattersley-5 Load...

Type: 100mm Duplicate... Rename...

Type Parameters

Parameter	Value
J mm	75.0
H mm	60.0
G mm	90.0
F mm	150.0
E mm	171.0
D mm	42.0
Connection Size	100.0
C mm	54.0
B mm	124.0
A mm	200.0
<b>Identity Data</b>	
_distributed by	<a href="http://www.bimstore.co.uk">www.bimstore.co.uk</a>
URL	<a href="http://www.hattersley.com/">http://www.hattersley.com/</a>
Type Comments	100mm
Product Page URL	<a href="http://www.hattersley.com/prod">http://www.hattersley.com/prod</a>
Product Documentation Link	<a href="http://www.hattersley.com/docu">http://www.hattersley.com/docu</a>
Model	5953
Manufacturer	Hattersley
Keynote	S

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## Asset Coding

- When preparing Asset Registers the same item needs to be called the same thing throughout.
- A luminaire could be: - Lamp, fluorescent lamp, light, lighting, LED, Metal halide light etc.
- Coding adds a code to capture all the naming options for an asset.
- Coding can be for individual assets or asset types.
- Tagging assets individually enable asset support information to be linked to the asset.



## Asset Coding Sources

- There are a number of different coding systems available.
- Generally they use alpha numeric or numeric codes to identify an item or item type.



## Asset Coding Sources

- UNSPSC (United Nations Standard Service Product Code)
- Unifomat
- Uniclass
- Omniclass
- If using a CMMS check what codes it can use



# Planned Preventative Maintenance (PPM) and Effective Asset Management

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## Asset Coding

- 5- Mainly Piped & Ducted Services
- 52 Waste Disposal, Drainage
- 53 Hot and Cold Water Supply
- 54 Gases Supply
- 55 Refrigeration
- 56 Space Heating
- 57 Air Conditioning, Ventilation
- 58 Other piped / Ducted Services
- 59 Parts, Accessories etc.
- 6- Services Mainly Electrical
- 61 Electrical Supply
- 62 Power
- 63 Lighting
- 64 Communications
- 66 Transport
- 68 Security
- 69 Minor Parts of Electrical Services.





## Typical Asset Registers



# Planned Preventative Maintenance (PPM) and Effective Asset Management



## Asset Register Mechanical & Electrical Installations

Date of Survey:

Building Address:

Area	Location	Element	No. Of	Description	Comments
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Stelrad 3000 x 800 SP radiator	Stelrad
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Room Cooling Unit	Marstair 7kW (norm)
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Controller for Cooling Unit	Marstair
Platform 3 Conference Room Area	Conference Room 1	Portable Appliances	1	Oasis Cold Water Drinks Dispenser	Aqua
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Up to 25 dia Range of pipework	Mildsteel
Platform 3 Conference Room Area	Conference Room 1	Hot and Cold water supply (where visible including tanks)	1	Boxi Brazillia Slimline 85 Gas Fired Heater	Boxi
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	2	Luminaire, 2 x 58w, 1500 Fluorescent	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	1	Luminaire, 1 x 58w, 1500 Fluorescent	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation substation, meter rooms & Main switchgear	2	Socket Outlet	MK
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	2	Dimplex WFE 3TI Wall Heater	Dimplex
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	1	Xpelair 9" Extract/Intake Fan	Xpelair

## Developing the Asset Register

- Condition of Asset
- Maintenance Condition of Asset
- Life cycle Expectancy of Asset
- Cost for Asset Replacement
- Forward Capital Planning for Life Cycle Replacement



# Planned Preventative Maintenance (PPM) and Effective Asset Management



## Asset Register Mechanical & Electrical Installations

Date of Survey:

Building Address:

Area	Location	Element	No Off	Description	PPM Schedule	Comments
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Stelrad 3000 x 800 SP radiator	01,05,06	Stelrad
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Room Cooling Unit	50,54,58	Marstair 7kW (norm)
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Controller for Cooling Unit	13	Marstair
Platform 3 Conference Room Area	Conference Room 1	Portable Appliances	1	Oasis Cold Water Drinks Dispenser	18,42	Aqua
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Up to 25 dia Range of pipework	29	Mildsteel
Platform 3 Conference Room Area	Conference Room 1	Hot and Cold water supply (where visible including tanks)	1	Boxi Brazillia Slimline 85 Gas Fired Heater	61	Boxi
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	2	Luminaire, 2 x 58w, 1500 Fluorescent	37	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	1	Luminaire, 1 x 58w, 1500 Fluorescent	37	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation substaintion, meter rooms & Main switchgear	2	Socket Outlet	44	MK
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	2	Dimplex WFE 3TI Wall Heater	42	Dimplex
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	1	Xpelair 9" Extract/Intake Fan	18	Xpelair

# Planned Preventative Maintenance (PPM) and Effective Asset Management



Asset Register Mechanical & Electrical Installations							
Date of Survey:							
Building Address:							
Area	Location	Element	No. Off	Description	PPM Schedule	Condition	Comments
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Stelrad 3000 x 800 SP radiator	01,05,06	B	Stelrad
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Room Cooling Unit	50,54,58	B	Marstair 7kW (norm)
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Controller for Cooling Unit	13	B	Marstair
Platform 3 Conference Room Area	Conference Room 1	Portable Appliances	1	Oasis Cold Water Drinks Dispenser	18,42	B	Aqua
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Up to 25 dia Range of pipework	29	B	Mildsteel
Platform 3 Conference Room Area	Conference Room 1	Hot and Cold water supply (where visible including tanks)	1	Boxi Brazillia Slimline 85 Gas Fired Heater	61	B	Boxi
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	2	Luminaire, 2 x 58w, 1500 Fluorescent	37	C	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	1	Luminaire, 1 x 58w, 1500 Fluorescent	37	C	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation substation, meter rooms & Main switchgear	2	Socket Outlet	44	A	MK
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	2	Dimplex WFE 3TI Wall Heater	42	B	Dimplex
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	1	Xpelair 9" Extract/Intake Fan	18	D	Xpelair
Condition Code A - Good E - Poor							



# Planned Preventative Maintenance (PPM) and Effective Asset Management



Asset Register Mechanical & Electrical Installations								
<b>Date of Survey:</b>								
<b>Building Address:</b>								
Area	Location	Element	No Off	Description	PPM Schedule	Condition	Maintenance Condition	Comments
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Stelrad 3000 x 800 SP radiator	01,05,06	B	3	Stelrad
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Room Cooling Unit	50,54,58	B	3	Marstair 7kW (norm)
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Controller for Cooling Unit	13	B	3	Marstair
Platform 3 Conference Room Area	Conference Room 1	Portable Appliances	1	Oasis Cold Water Drinks Dispenser	18,42	B	3	Aqua
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Up to 25 dia Range of pipework	29	B	3	Mildsteel
Platform 3 Conference Room Area	Conference Room 1	Hot and Cold water supply (where visible including tanks)	1	Boxi Brazillia Slimline 85 Gas Fired Heater	61	B	4	Boxi
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	2	Luminaire, 2 x 58w, 1500 Fluorescent	37	C	3	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	1	Luminaire, 1 x 58w, 1500 Fluorescent	37	C	3	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation substaintion, meter rooms & Main switchgear	2	Socket Outlet	44	A	3	MK
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	2	Dimplex WFE 3TI Wall Heater	42	B	3	Dimplex
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	1	Xpelair 9" Extract/Intake Fan	18	D	3	Xpelair
Condition Code A - Good E - Poor	Maintenance Condition 1 - Good 5 - Poor							

# Planned Preventative Maintenance (PPM) and Effective Asset Management



Asset Register Mechanical & Electrical Installations										
Date of Survey:										
Building Address:										
Area	Location	Element	No Off	Description	PPM Schedule	Condition	Maintenance Condition	Life Cycle Expectancy	Cost For Replacement	Comments
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Stelrad 3000 x 800 SP radiator	01,05,06	B	3	12 Years	£300.00	Stelrad
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Room Cooling Unit	50,54,58	B	3	3 Years	£150.00	Marstair 7kW (norm)
Platform 3 Conference Room Area	Conference Room 1	Air conditioning plant and equipment	1	Controller for Cooling Unit	13	B	3	10 Years	£200.00	Marstair
Platform 3 Conference Room Area	Conference Room 1	Portable Appliances	1	Oasis Cold Water Drinks Dispenser	18,42	B	3	5 Years	£300.00	Aqua
Platform 3 Conference Room Area	Conference Room 1	Heating	1	Up to 25 dia Range of pipework	29	B	3	2 Years	£350.00	Mildsteel
Platform 3 Conference Room Area	Conference Room 1	Hot and Cold water supply (where visible including tanks)	1	Boxi Brazillia Slimline 85 Gas Fired Heater	61	B	4	5 Years	£400.00	Boxi
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	2	Luminaire, 2 x 58w, 1500 Fluorescent	37	C	3	8 Years	£200.00	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical light fittings	1	Luminaire, 1 x 58w, 1500 Fluorescent	37	C	3	7 Years	£200.00	Thorn
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation substaintion, meter rooms & Main switchgear	2	Socket Outlet	44	A	3	20 Years	£50.00	MK
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	2	Dimplex WFE 3TI Wall Heater	42	B	3	5 Years	£150.00	Dimplex
Platform 3 Conference Room Area	Conference Room 2	Electrical Installation fixed appliances	1	Xpelair 9" Extract/Intake Fan	18	D	3	8 Years	£150.00	Xpelair
Condition Code A - Good E - Poor	Maintenance Condition 1 - Good 5 - Poor									

## PPM SCHEDULES

### Assessing the Maintenance Requirements

- Legal Requirements
- Manufacturers Recommendations
- Industry Standard Recommendations
- Health & Safety



## PPM SCHEDULES

### Frequencies

- Time based
- Hours Run
- Condition centred

### Criticality of Assets

Health & Safety

Cost of Failure

Text



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# Planned Preventative Maintenance (PPM) and Effective Asset Management

## Air Handling Units

ITEM	FREQ.	ACTION	NOTES
1. Filter.	1m	Check manometer reading and renew filter media as indicated.	Record manometer reading. It should be noted that checking the filter should be carried out weekly by maintenance staff.
2. Guide vane actuators and modulating dampers.	1m	Check operation.	
3. Condensate drains.	1m	Check for condensate carry-over and that drains are clear.	
4. Humidifier pumps, sprays and water supply to tank.	1m	Check operation.	
5. Frost protection, boost thermostat and controls.	6m	Check operation. For detailed maintenance refer relevant section.	This check should be carried out in September and February in Great Britain.
6. Vent air.	1m	Air should be vented from heating and cooling coils where fitted.	
7. Drive belts.	1m	Check tension, alignment, and condition.	Re-tension or replace as necessary. For detailed maintenance procedures, see <a href="#">BELT DRIVES</a> .
8. Drive pulleys.	12m	Check alignment, security.	
9. Drive couplings.	12m	Check alignment and for excessive clearance.	Wear is indicated by excessive clearance and couplings should be replaced.
10. Damper and guide vane pivots and linkages.	3m	Lubricate lightly.	
11. Motorised damper.	3m	Check to see that louvres are clear and not obstructed, couplings are secure and that motor runs without excessive noise or vibration.	For detailed maintenance see <a href="#">MOTORS</a> .
Cont/.			





# Planned Preventative Maintenance (PPM) and Effective Asset Management

## Cont.

ITEM	FREQ.	ACTION	NOTES
12. Heating and cooling coils.	12m	Check condition and clean. Check air and water pressure drops across coils.	Even when filters are fitted, dirt can build up causing loss of machine output.
13. Controls and electrical connections.	12m	Check operation and condition.	Calibration } Interrogation } Control adjustment } See relevant section
14. Valves.	12m	Fully open and close and then reset at the original setting.	
15. Air handling unit.	12m	Thoroughly clean interior and check for corrosion. On re-assembly check for air tightness.	Include heating and cooling coils, fan impeller and eliminator plates and other fittings.
16. Motors.	12m	Check:- a) condition of motor brushes and replace if necessary, b) clean and test windings, c) check tightness of terminals, d) check full load current, e) bearing wear, f) replace lubricant in motor bearings	This should not exceed data plate value. Measure shaft float and end play.
17. Anti-vibration mountings and ductwork flexible connections.	12m	Check condition.	



# Planned Preventative Maintenance (PPM) and Effective Asset Management



## **COLD WATER STORAGE and SUPPLY**

### **Introduction**

Whilst legionella bacteria are most active in the temperature range 20°C to 45°C, occasions can occur where growth is promoted even in cold water systems. This can arise where the local temperature is raised by:

- a) heat build up due to solar gain or the proximity to hot water services, or
- b) the storage capacity is far greater than is necessary. In general terms the storage capacity should not exceed one day's usage.

Cleanliness of the system is of primary importance to ensure that the legionella bacteria do not have any nutrients for growth and survival. Such nutrients can come from vegetable, animal and even mineral substances and it is for this reason that storage cisterns should be free from rust, dust, slime, mould, fungi and such items as dead birds, rats, mice, insects etc. and that non metallic materials satisfy the requirements of [BS6920](#). Lists of materials approved by the water industry are published in the Water Fittings and Materials Directory (see Standards List), All new and replacement water fittings should satisfy Byelaws requirements and be listed in the directory.

**Cleansing of tanks, cisterns and associated pipework should be followed by full disinfection in accordance with the procedures laid down in [ACOP L8.2001](#).**

Cisterns must have close fitting lids, which should not be of timber or other porous materials. Lids should have vent pipes of adequate cross section to prevent suction developing on water draw off. All vent pipes and overflows should be fitted with close mesh to prevent the ingress of foreign matter. These should be cleaned annually.

The pipework system should be free of any points where pockets of dirt, slime or sediment can build up. Where it is impossible to ensure this the system should be disinfected on a regular basis.

# Planned Preventative Maintenance (PPM) and Effective Asset Management

## Cold Water Storage Tanks and Cisterns

Note: Cisterns operate at atmospheric pressure whereas tanks are sealed vessels operating at pressures above atmospheric.

ITEM	FREQ.	ACTION	NOTES
1. Float operated ball valve	3m	Check operation, water level and shut off. Replace washer if necessary. Check float for leakage and security.	
2. Level control switches (if fitted).	6m	Check for scale deposits, clean as necessary and check operation.	For specialist maintenance of level control switches see LEVEL SWITCHES.
3. Cistern or tank body.	6m	Check for leaks and any structural weaknesses.	Ensure that any brackets, etc. supporting the tank are firmly fixed.
4. Valves	6m	Check valve stems are free to turn.	Ensure that any insulation or trace heating cable removed during inspection is replaced or frost damage could ensue.
5. Air vents and overflow screens.	6m	Check for blockage and condition.	Clean when necessary. Report if replacement needed.
6. Insulation.	6m	Check condition, replace if necessary.	Look for any damp patches, if necessary removing insulation to find cause.
7. Manlid and access covers.	12m	Check condition of seals.	If lid has been removed for inspection purposes ensure seals are effective.
<i>Continued on next page ..</i>			



# Planned Preventative Maintenance (PPM) and Effective Asset Management



## COLD WATER STORAGE TANKS and CISTERNS – continued

ITEM	FREQ.	ACTION	NOTES
8. Cistern or tanks.	12m	Inspect and report cleanliness and condition.	Check overflow and warning pipes are unobstructed and that the ends are conspicuous and well above the flood over level of a gully. If any remedial work needs to be carried out, advise client. If painting is required any paint should be non-toxic and WRC Water Byelaws Scheme/Water Regulations approved.
9. Tanking.	12m	Ensure drains are clear, check condition.	Check thoroughly for potential leakage. Report to client.
10. Associated pipework.	12m	Check condition and rectify any faults.	Examine for corrosion, leaks and security of fittings and attachments.
11. Generally.	12m	Check that all items of equipment comply with : Legislation. Bye-laws, and Codes of practice.	Report to client where remedial action is required.

## Setting Up an Asset Based PPM Contract

- Robust Asset Data/Register
  - Asset Type and location with Asset Code
  - Condition
  - Maintenance Requirements
  - Estimated Replacement Costs
- Record Information
  - O&M Manuals/Specialist Information
  - Building Layout Drawings
  - As Installed Drawings
  - Emergency Procedures
- Scope of the Maintenance PPM Contract
  - Statutory Testing
  - Water Treatment (eg Legionella)
  - Portable Appliance Testing (PAT)
  - Filter / Lamp Replacement

Cont/.





# Planned Preventative Maintenance (PPM) and Effective Asset Management

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## Setting Up A PPM Continued

- Conditions of Contract
  - Specialist Conditions (out of hours)
  - Service Level Agreement (response times, KPI)
  - Penalties (Linked to cost of failure)
  - Allowance for Asset Replacement
  - Schedule of Rates against Asset Register
  - Log Books and Ongoing Review
  - RAMS
  - Term of Contract
- Project Management
  - Verify/Monitor On-going PPM
  - Update Asset Registers
  - Future Projects
  - Update Budgets for Life Cycle Replacement

# Planned Preventative Maintenance (PPM) and Effective Asset Management

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## Energy Management

### Standards

- Statutory regulations – Building Regulations
- Voluntary schemes – BREEAM

### Design

- Remove the need (Passive design)
- Reduce the need
- Reuse

### How

- Building modelling software

# Planned Preventative Maintenance (PPM) and Effective Asset Management

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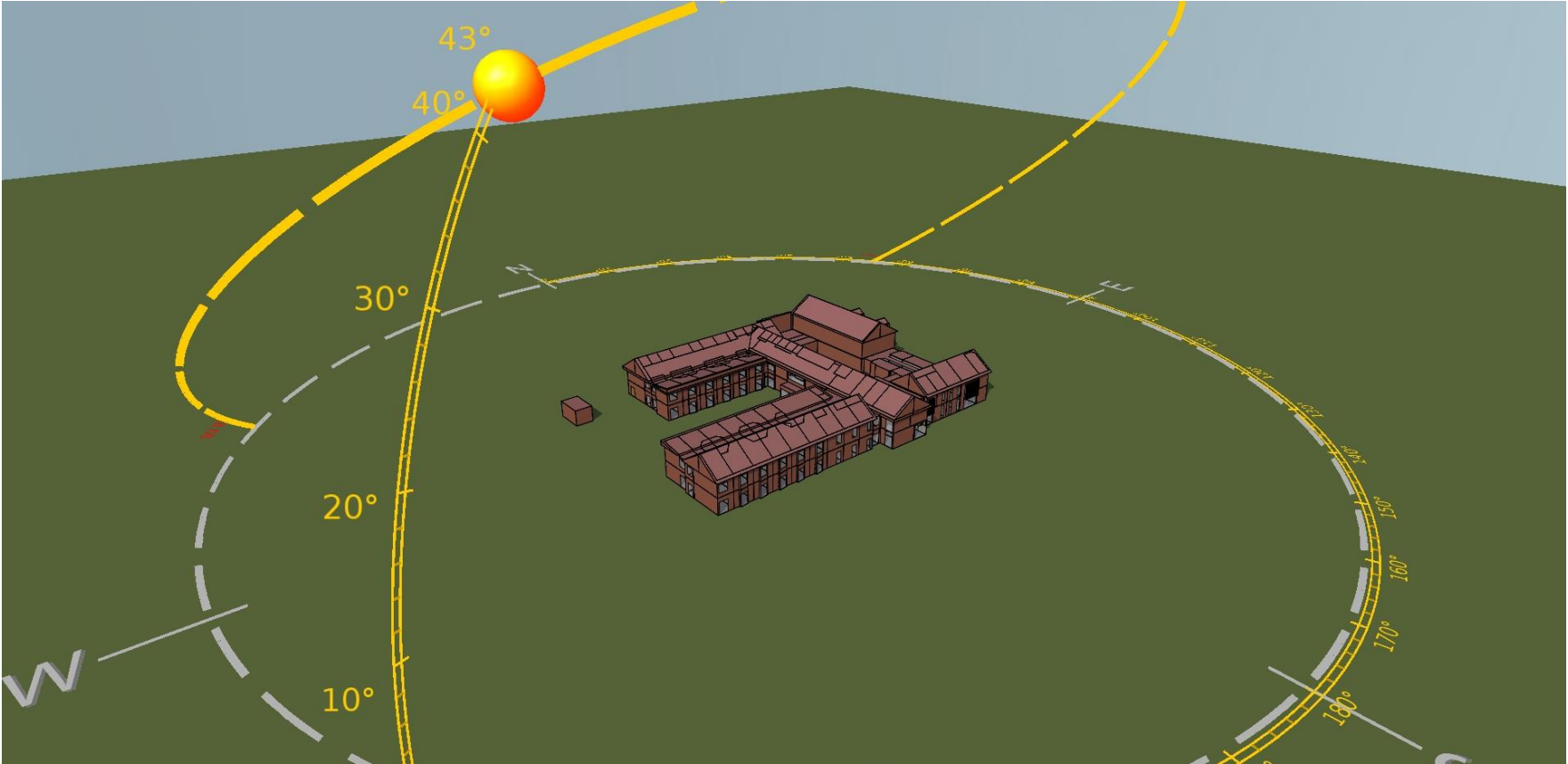
## Energy Management

### Building Modelling

- Optimise orientation.
- Control solar gain.
- Maximise natural daylighting.
- Maximise passive ventilation performance
- Exploit thermal mass (Night time purge).
- Building fabric.
- Carbon reduction.
- Minimise the effects of climate change.

# Planned Preventative Maintenance (PPM) and Effective Asset Management

## Energy Management

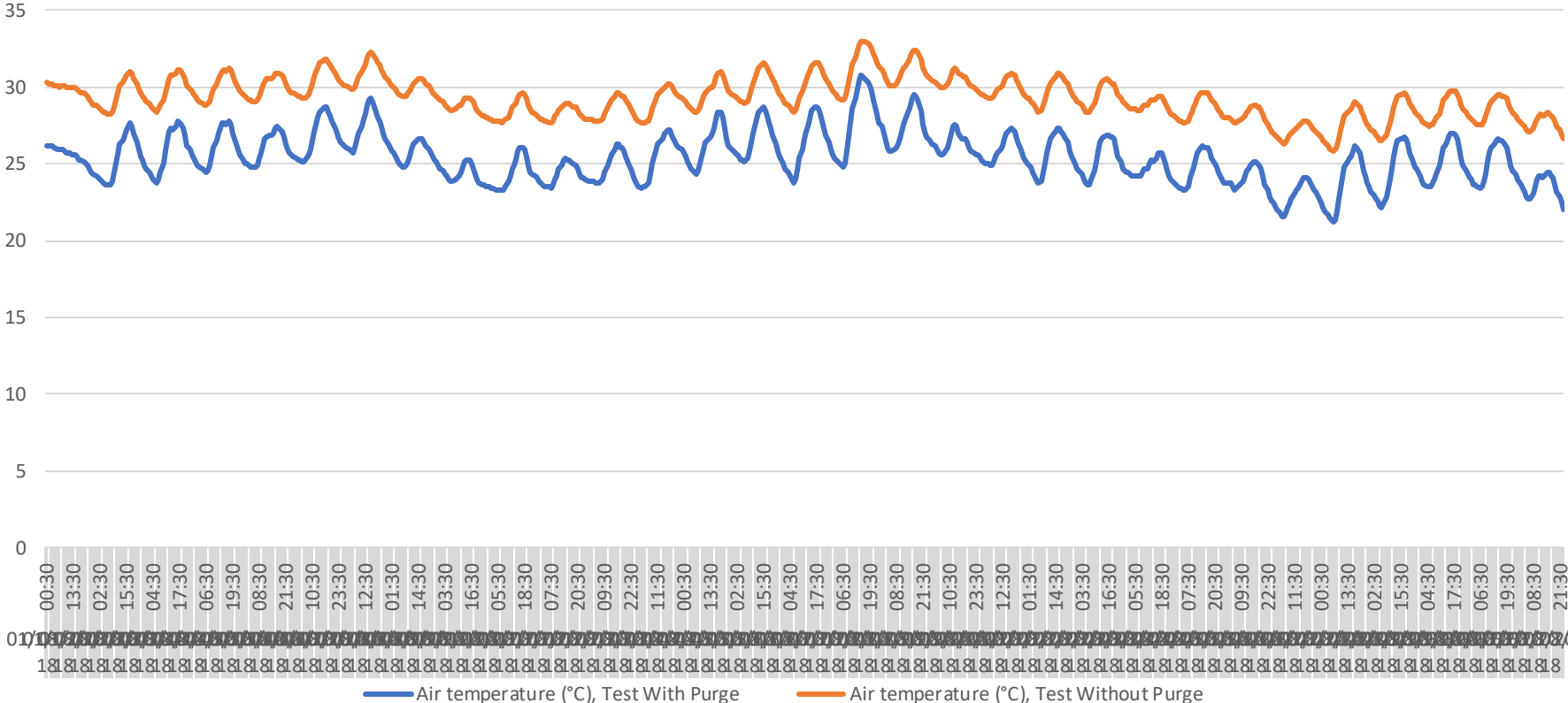


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## Energy Management

Temperature Comparison. With & Without Purge Ventilation





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## Energy Management

### Other design considerations

- Early user engagement
- Workflow layout
- Building layout
- Select plant and equipment to suit process and usage
- Dedicated or centralised plant

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## Energy Management

Having an asset register enables the building owner / manager to identify what energy using equipment is installed and review where energy savings could be made.

Review includes

- Type of equipment and number of items
- Capacity of equipment / plant
- Existing controls
- Hours of use
- Energy used

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## Energy Management

Reductions in energy usage can be achieved by

- Change equipment to one that uses less energy.  
i.e. LED lighting.
- Improve controls.
- Presence / absence detection.
- Daylight controls on lights.
- Optimised start on heating / cooling plant.
- Zone controls on heating / cooling.
- VSD on motors
- Control logic

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## Energy Management

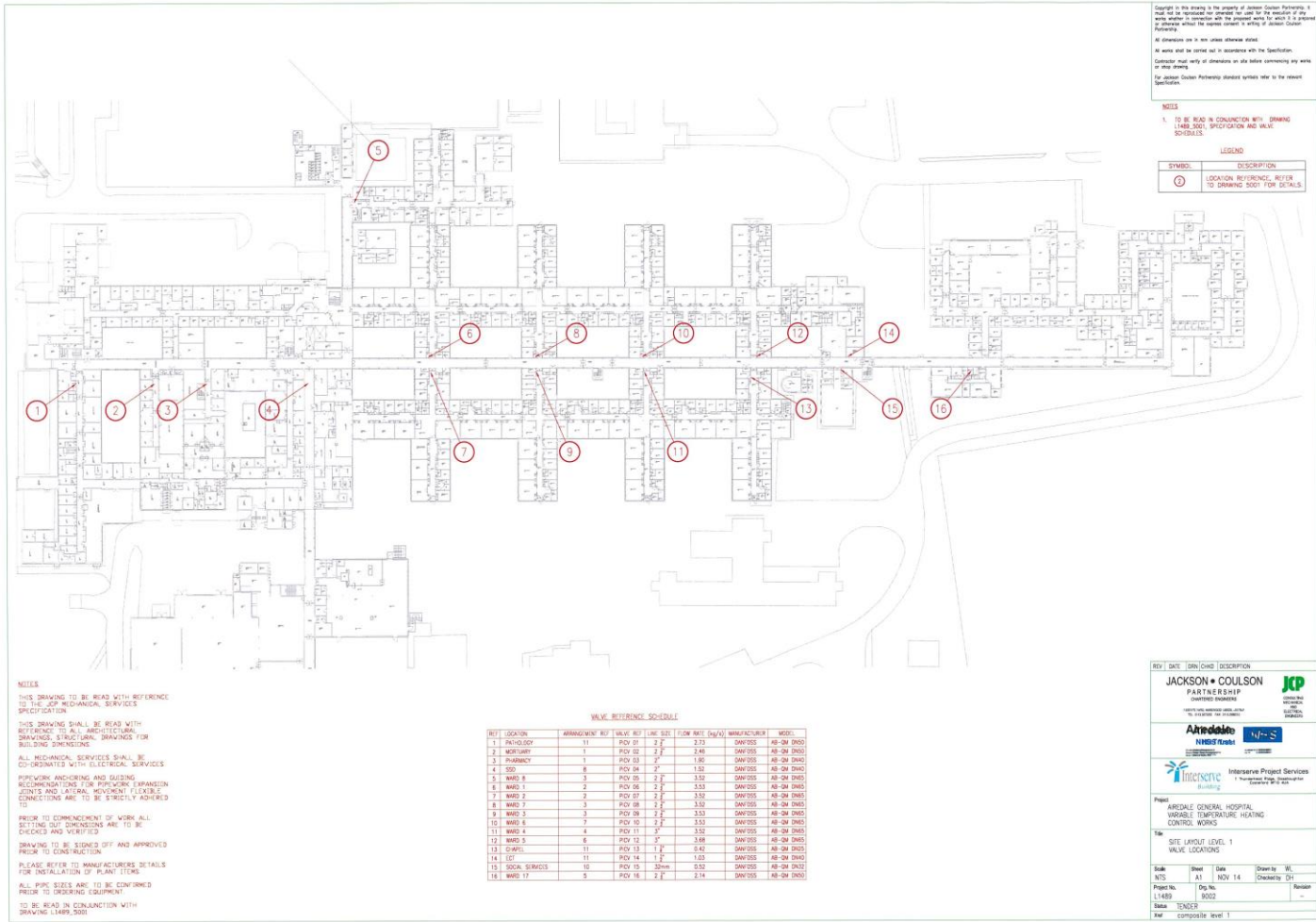
- Install sub meters for energy usage
- Compare similar areas
- Set targets
- Monitor usage
- Staff training and engagement
- Change plant





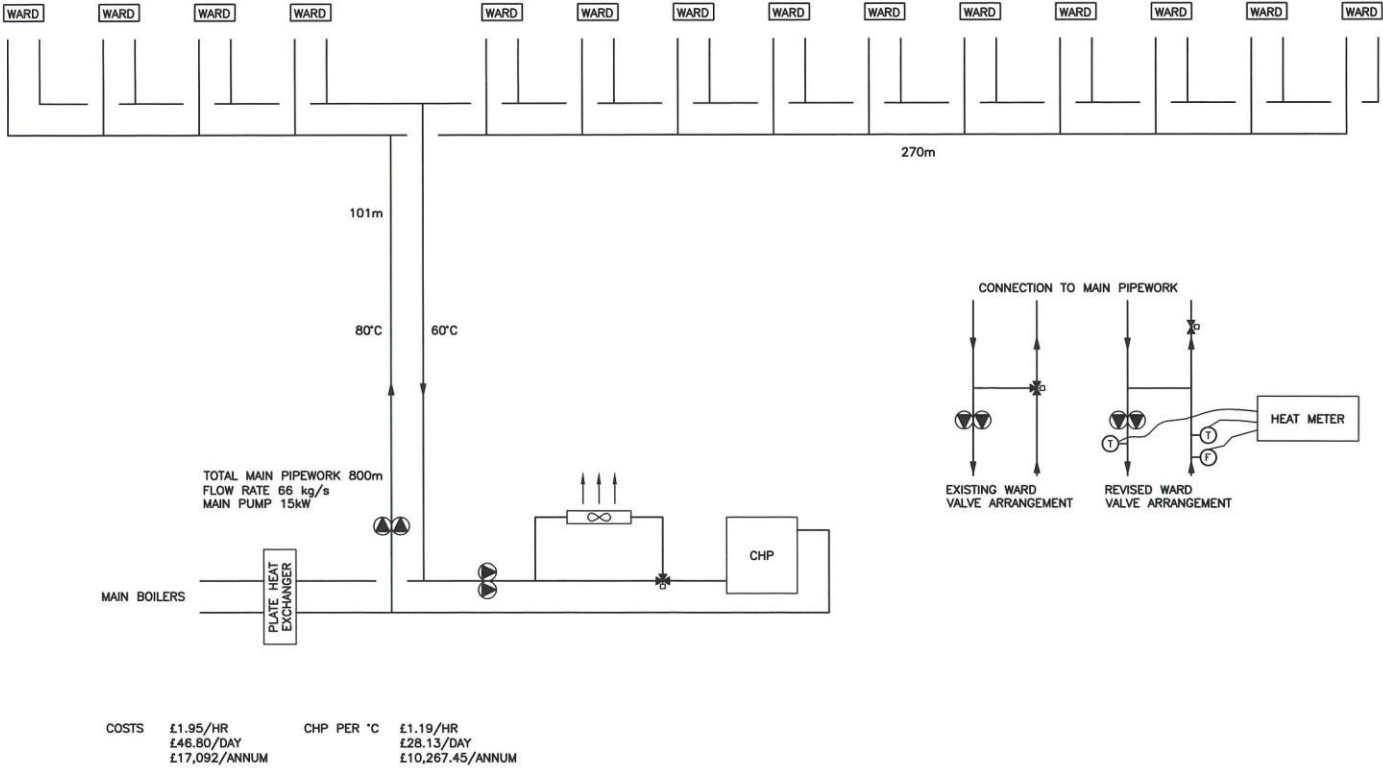
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## Energy Management



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## Energy Management



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THANK YOU

QUESTIONS?

