SECTION 1: SINGLE-POINT EQUIVALENTS SHORT-LIST SHEET

Most hospitals operate a small list of critical assets sharing the pressurisation unit profile: small capital footprint, no installed standby, and an outage that collapses major clinical services. Complete this audit sheet to isolate single-point assets from redundant plant.

A. MASTER SINGLE-POINT ASSET INVENTORY & CONSEQUENCE PROFILE

PLANT AUDIT

ASSET CLASSIFICATION	SPECIFIC PLANT ID / LOCATION	REDUNDANCY STATUS	SERVICE DEPENDENCY & CONSEQUENCE	STRATEGY DETERMINATION
Pressurisation Unit	Plant Room ID: [ ]	[ ] Zero Standby Vessel [ ] Shared Single Controls [ ] N+1 Vessel Available	Sealed LTHW heating & hot water to all wards, theatres, taps. Pressure sag collapses top floors first.	[ ] **Calendar Replace** [ ] Run-to-Failure (Denied)
Cold Water Booster Sets	Location / Header: [ ]	[ ] Single Common Header [ ] Single VFD Controller [ ] True Independent Backup	Upper floor ward drinking water, sanitary flushing, clinical sluice rooms, CSSD sterilisation feed.	[ ] **Calendar Replace** [ ] Run-to-Failure (Denied)
Medical Vacuum Plant	Plant Room: [ ]	[ ] Common Receiver Line [ ] Single Exhaust Stack [ ] Full Triplex N+1	Operating theatres, ICU, resuscitation bays, surgical suction. Outage triggers immediate case halt.	[ ] **Calendar Replace** [ ] Run-to-Failure (Denied)
Controls Batteries / BMS UPS	DDC Enclosure: [ ]	[ ] Unbuffered Transformer [ ] Single 24V DC Battery [ ] Dual Redundant UPS	Boiler burner interlocks, primary heating valves, sensor telemetry. Outage blinds plant automation.	[ ] **Calendar Replace** [ ] Run-to-Failure (Denied)
The One Pump with No Standby	Circuit / Tag: [ ]	[ ] Zero Standby Pump [ ] Spares on Shelf [ ] Duty/Assist Installed	Critical ventilation run-around coil, isolation ward HVAC loop, or specialized process heat loop.	[ ] **Calendar Replace** [ ] Run-to-Failure (Denied)

B. PLANT ROOM SINGLE-POINT ASSET VERIFICATION SIGN-OFF

ESTATES LEAD AUTHORIZATION

Estates Lead Assessment:
Site / Building: _____
Lead Facilities Engineer: _____
Total Single-Point Assets Identified: _____ • Target Budget Year: _____

Core Strategy Standard:
"The craft is not 'replace everything early.' It is knowing which short list of assets gets replaced on the calendar, and defending that list with numbers."

SECTION 2: REMAINING-LIFE REGISTER TEMPLATE

"Knowing you own it is bookkeeping. Knowing its assessed end of life — and reviewing the list against failure consequence, not just age — is planning." (Gloucestershire Managed Services / GMS Model).

A. REMAINING-LIFE & CONSEQUENCE REVIEW LEDGER

PLANNING VS BOOKKEEPING

ASSET TAG & NAME	INSTALLED DATE	ASSESSED EOL DATE	REMAINING LIFE	FAILURE CONSEQUENCE REVIEW (CLINICAL / SERVICE REACH)	CONSEQUENCE RANK	CAPITAL ACTION WINDOW
PU-01 LTHW Pressurisation	[/]	[/]	___ Months	Total heating/DHW loss; top-floors-first radiator freeze; boiler low-pressure lockout.	**CRITICAL** (High propagation)	[ ] Current FY [ ] Next FY [ ] Monitor
PU-02 Secondary Press. Unit	[/]	[/]	___ Months	Dedicated clinic or outpatient wing heating circuit; patient comfort impact.	**HIGH** (Moderate scope)	[ ] Current FY [ ] Next FY [ ] Monitor
CW-BST-01 Cold Booster Set	[/]	[/]	___ Months	Top-floor ward sanitary flushing, hand hygiene, CSSD wash supply collapse.	**CRITICAL** (Infection control)	[ ] Current FY [ ] Next FY [ ] Monitor
VAC-01 Medical Vacuum Plant	[/]	[/]	___ Months	Surgical suction failure across operating suites; immediate theatre stop.	**CRITICAL** (Life safety)	[ ] Current FY [ ] Next FY [ ] Monitor
CTRL-BAT-01 BMS UPS Battery	[/]	[/]	___ Months	Control signal drop; heating valves fail; primary heating lockout.	**HIGH** (Blinds plant room)	[ ] Current FY [ ] Next FY [ ] Monitor
PMP-CRIT-01 Single-Line Pump	[/]	[/]	___ Months	Theatre HVAC run-around coil / critical department heat loop.	**HIGH** (Compliance breach)	[ ] Current FY [ ] Next FY [ ] Monitor

B. AGE REVIEW VS. FAILURE CONSEQUENCE EVALUATION MATRIX

PRIORITY DETERMINATION

Chronological Age Trap (Bookkeeping Alone):
Replacing an old asset merely because it hit 15 years wastes capital if the unit has installed N+1 redundancy and zero clinical consequence upon failure.

Consequence-Driven Replacement (Planning Discipline):
Replacing an 8-year-old single-point vessel before winter because failure propagates across live wards is disciplined asset stewardship.

SECTION 3: TOP-FLOORS-FIRST FAILURE-ORDER CHECKLIST

"When it weakens, the failures arrive in the order facilities people dread." Use this physical diagnostic checklist during plant room inspections and seasonal shift rounds to catch pressure decay before wards go cold.

PHYSICAL DIAGNOSTIC WALKTHROUGH: THE 6-STAGE DECAY CHAIN

SHIFT INSPECTION FORM

STAGE	FIELD INSPECTION & PHYSICAL TESTS	OBSERVABLE SYMPTOMS & TOLERANCES	STATUS
1. Pressure Sag	☐ Inspect cold fill static pressure gauge on expansion set. ☐ Test expansion vessel nitrogen pre-charge valve with gauge. ☐ Check pressurisation top-up pump runtime counter.	• Cold static pressure < design minimum (e.g. <1.5 bar). • Vessel waterlogged or zero cushion pre-charge. • Frequent micro-fill top-up cycles logged.	[ ] NORMAL [ ] SAGGING [ ] FAILED
2. Air Ingress	☐ Inspect high-point automatic air vents (AAVs) on upper floors. ☐ Listen for air bubbles at high-level boiler headers and manifolds. ☐ Verify system pressure at highest radiator elevation > 0.5 bar.	• AAV weeping or hissing as negative pressure draws air in. • Sloshing/gurgling noises in top-floor distribution mains. • Highest terminal units at or near atmospheric pressure.	[ ] CLEAR [ ] AIR BOUND [ ] LEAKING
3. Corrosion & Circulation	☐ Inspect in-line magnetic dirt separator & strainers. ☐ Measure supply/return temperature differential (ΔT) across headers. ☐ Acoustic check on distribution pipework bends.	• Heavy black magnetite sludge in strainer blowdowns. • Circuit ΔT widens abnormally (>25°C) due to restricted flow. • Gritty acoustic rattle inside distribution loops.	[ ] CLEAN [ ] SLUDGE [ ] RESTRICTED
4. Pump Cavitation	☐ Acoustic audit of primary and secondary heating pumps. ☐ Inspect mechanical pump seals for weeping or steam spitting. ☐ Check motor vibration levels and casing surface temperature.	• Pumps sound like pumping gravel or marbles. • Suction pressure below Net Positive Suction Head required. • Mechanical seal carbon faces scorched or weeping fluid.	[ ] SMOOTH [ ] CAVITATING [ ] SEAL LEAK
5. Boiler Lockout	☐ Inspect boiler low-pressure safety interlock switch setting. ☐ Review BMS boiler fault logs for low-pressure trip codes. ☐ Test safety valve relief pressure vs expansion set high-cut.	• Circuit drops below interlock setpoint; burner trips off. • Primary flow temperature rapidly collapses. • Emergency BMS plant alarm activated.	[ ] ARMED [ ] TRIPPED [ ] LOCKOUT
6. Top-Floors-First Outage	☐ Hand/IR thermometer check of top-floor ward radiators. ☐ Verify domestic hot water (DHW) secondary flow/return at top taps. ☐ Audit clinical complaint logs for cold water / cold ward tickets.	• Top-floor radiators cold across upper one-third or full body. • DHW taps take >60 seconds to reach compliance temperature. • Clinical complaints arriving from top floors first.	[ ] WARM [ ] COLD RADS [ ] CLINICAL FAIL

SECTION 4: PRE-FAILURE CAPITAL BID WORKSHEET

"The case writes itself in the language finance understands: probability of failure inside the budget window, cost of the emergency version (hire plant, out-of-hours labour, service disruption), against the planned version."

A. COMPARATIVE FINANCIAL BUSINESS CASE: PLANNED VS. EMERGENCY SWAP

FINANCIAL JUSTIFICATION

COST COMPONENT	PLANNED PRE-FAILURE REPLACEMENT (OFF-PEAK / CONTROLLED)	EMERGENCY FAILURE REPLACEMENT (MID-WINTER BREAKDOWN)
Primary Plant & Equipment	Competitively procured high-efficiency unit specified for site. **Est. Cost: $ / £** _____	Distressed purchase; whatever package is on distributor shelf. **Est. Cost: $ / £** _____ (est. +25-40% freight)
Temporary Hire Plant & Hosing	$0.00 / £0.00 (Zero temporary plant required; controlled swap). **Est. Cost: $ / £** 0.00	Emergency mobile boiler / pressurisation hire + temporary pipework. **Est. Cost: $ / £** _____ ($1,500-$4,000/wk)
Mechanical & Electrical Labour	Standard day rates; planned weekend or shoulder-season outage. **Est. Cost: $ / £** _____	Emergency 24/7 out-of-hours overtime callout rates (double time). **Est. Cost: $ / £** _____
Clinical Service Disruption	Zero patient impact; notification scheduled in advance. **Disruption Impact:** ZERO	Ward space heaters deployed, theatre delays, clinical bed moves. **Disruption Impact:** SEVERE CLINICAL INCIDENT
Upgrades & Telemetry Captured	Energy efficiency gains, variable speed, full BMS telemetry. **Upgrade Value:** CAPTURED	Zero upgrades; obsolete like-for-like emergency install. **Upgrade Value:** LOST OPPORTUNITY
TOTAL ESTIMATED EXPOSURE	**Planned Total: $ / £** _____	**Emergency Total: $ / £** _____

B. RISK ARGUMENT FORMULATION FOR FINANCE COMMITTEE

COMMITTEE SUBMISSION

Executive Summary for Capital Allocation Board:
The existing [_____] at [_____] has reached the end of its assessed operational life. Failure inside the upcoming budget window exposes the Trust to an unbudgeted emergency outlay of [$ / £ _____], temporary hire plant logistics, and catastrophic heating loss across [____] clinical wards. Securing planned capital of [$ / £ _____] today delivers a verified pre-failure swap, eliminates emergency premium costs, and captures energy efficiency improvements supporting Trust sustainability targets.

SECTION 5: LIKE-FOR-LIKE VS UPGRADE-MOMENT SPEC SHEET

"If the vessel has to come out anyway, efficiency, controls integration, and monitoring come at marginal cost. A like-for-like emergency swap spends the same disruption and buys none of it."

A. SPECIFICATION COMPARISON: BASELINE LIKE-FOR-LIKE VS. UPGRADE MOMENT

ENGINEERING SPEC MATRIX

ENGINEERING DISCIPLINE	DISTRESSED LIKE-FOR-LIKE SWAP (EMERGENCY)	PLANNED UPGRADE-MOMENT SPECIFICATION (GMS MODEL)
Pumping Technology & Motor Efficiency	Fixed-speed direct-on-line fractional pumps; high inrush current; continuous cyclic wear.	**Variable-speed inverter-driven pumps (IE4/IE5):** Soft start, matched flow, reduced parasitic electrical load.
Controls & Digital BMS Integration	Isolated dry-contact volt-free alarm (general fault only); zero remote telemetry or predictive metrics.	**Full BACnet / Modbus protocol interface:** Real-time pressure logging, fill-rate trending, leak detection alerts to BMS.
Vessel Membrane & Pre-Charge Health	Standard fixed-bladder vessel; requires manual physical depressurisation to verify nitrogen pre-charge.	**Replaceable butyl membrane with continuous monitoring:** Pressure sensor tap on nitrogen cushion; automated sag alarm.
Degassing & Air Separation	Separate passive air bottle; manual bleeding on top floors.	**Integrated micro-bubble vacuum degasser module:** Eliminates dissolved gases continuously, halting circuit corrosion.
Trust Sustainability Goals Tie-In	Zero energy reduction; zero contribution to NHS Net Zero Carbon or hospital decarbonisation goals.	**Quantified electrical reduction + heat transfer efficiency:** Backed by GMS Energy Team tracking and year-end reporting.

B. UPGRADE SPECIFIER CHECKLIST (SIGN-OFF FOR PROCUREMENT TENDER)

TENDER REQUIREMENTS

- ☐ Premium efficiency pump motors (IE4 minimum / EC inverter).
- ☐ Modbus RTU / BACnet IP native communications card included.
- ☐ Microprocessor controls with high/low pressure digital transducers.
- ☐ Water meter pulse output for automated water top-up tracking.
- ☐ Acoustic vibration isolation mounts on pump skid.
- ☐ Documented tie-in to Trust Energy & Decarbonisation targets.

SECTION 6: WINTER PERFORMANCE TRACKING LOG

"The GMS Energy Team will track the new installation's performance through the winter and report the benefits, including energy-efficiency improvements, at year end." Log these weekly metrics across the heating season.

A. WEEKLY HEATING SEASON OPERATIONAL LOG SHEET

WEEKLY WINTER AUDIT

WK #	DATE / TIME	COLD STATIC PRESS. (BAR)	HOT FLOW PRESS. (BAR)	TOP-UP RUN HOURS	WATER TOP-UP (LITRES)	TOP-FLOOR RAD TEMP (°C)	DUTY ENGINEER INITIAL
W01							
W02							
W03							
W04							
W05							
W06							
W07							
W08							
W09							
W10							
W11							
W12							

B. BASELINE VS. IN-SERVICE PREDICTED TOLERANCES

VARIANCE THRESHOLDS

Static Head Tolerance:
Nominal: _____ bar (±0.2 bar). Variance >0.3 bar indicates nitrogen cushion leakage or safety discharge.

Water Make-Up Limit:
Max: <10 litres/month. Make-up >25 litres indicates active circuit pinhole leakage or automatic air vent discharge.

Top-Floor Radiator Balance:
Target: 21°C ±1.5°C across all clinical spaces. Radiator drop <18°C triggers immediate plant room check.

SECTION 7: YEAR-END BENEFITS REPORT TEMPLATE

"Proactive replacement creates the one thing emergency replacement never can: a baseline, a prediction, and a report that proves or refutes it... A winter of tracked performance converts one good decision into the evidence base for the next capital bid."

A. ANNUAL ESTATES PERFORMANCE & BENEFITS SYNTHESIS

EXECUTIVE SUMMARY

Annual Asset Performance Summary:
Asset Installed: _____ • Commissioning Date: _____
Reporting Period: Winter 2026/2027 (November 1 through March 31) • Energy Team Lead: _____
Executive Finding: The proactive pre-failure replacement maintained uninterrupted heating and domestic hot water resilience across [_____] hospital beds with [ZERO] unplanned boiler lockouts and [ZERO] top-floor clinical temperature complaints.

B. PREDICTED VS. MEASURED BENEFITS SCORECARD

EMPIRICAL VERIFICATION

EVALUATION METRIC	PRE-PROJECT BASELINE (OLD UNIT)	PROJECTED BENEFIT (PRE-SWAP BID)	MEASURED PERFORMANCE (WINTER ACTUAL)
Unplanned Plant Outages	Frequent alarms / pressure sags	Zero unplanned heating outages	[ ] Outages Logged
Pumping Power / Electricity	Constant fixed-speed draw	Estimated 15-25% electrical reduction	[ ] % Verified Reduction
Top-Floor Radiator Stability	Intermittent air binding / complaints	100% continuous circulation	[ ] % Stable Head
Emergency Premium Avoided	Exposure: $ / £ _____	Avoided hire plant & overtime	[$ / £] Net Avoided Cost

C. GOVERNANCE & NEXT CAPITAL CYCLE BRIDGE

STRATEGIC SIGN-OFF

Estates & Facilities Sign-Off:
Portfolio Director of Estates: _____
Strategic Asset Director: _____
Date Signed: _____

Next Capital Bid Pipeline:
Identified Single-Point Assets for Next Cycle:
1. _____
2. _____