

KING CONSULTING LTD

M&E DESIGN SPECIFICATION REPORT

HT 641 – NEW BUILD DOMESTIC DWELLING (WALES)

Building Services 2 – Integration (ACBA5017)

CW1 – M&E Specification

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1.0 Introduction and Project Overview

This report presents an outline Mechanical and Electrical (M&E) design specification for a new-build domestic dwelling in Wales (typology HT 641). The dwelling is a four-bedroom, six-person house with a measured gross internal area (GIA) of 110.4m², aligned with WDQR 2021 minimum area requirements (Y Grŵp Addysg a Gwasanaethau Cyhoeddus and Education and Public Services Group, 2021). The report outlines the proposed building services strategy, focusing on system selection, coordination, regulatory compliance and whole-life performance.

2.0 Design Assumptions and Compliance Basis

2.1 KEY ASSUMPTIONS

Where full design information is not provided, the following assumptions have been made:

- The dwelling is supplied by single-phase mains electricity; mains water and mains sewer connection.
- The building is assumed to target improved fabric performance consistent with the Net Zero Carbon Buildings feasibility documentation (Vale of Glamorgan Council, 2024).

Final equipment selection, commissioning values and specialist system designs will be verified by specialist contractors and manufacturer requirements.

2.2 BUILDING REGULATIONS

This M&E specification is developed to align with the Welsh Building Regulations and relevant Approved Documents (Wales), including:

- Part L (Conservation of fuel and power)
- Part F (Ventilation)
- Part H (Drainage and waste disposal)
- Part P (Electrical safety)
- Part G (Sanitation, hot water safety and water efficiency)
- Part B (Fire safety)
- Part M (Access and usability).

(Approved Documents– Welsh Government, 2022).

Best practice guidance and manufacturer requirements will be followed to ensure the systems are correctly coordinated, installed and commissioned to achieve the intended performance.

3.0 Mechanical Services Design

3.1 HEATING SYSTEM

Consideration has been given to the Space heating as seen in appendix A, Space heating shall be provided by an air source heat pump (ASHP) serving as a wet, low temperature heating system. This has been selected as it supports decarbonisation and is well suited to low temperature emitters and smart zoning control. Air source heat pumps are encouraged within Part L as it reduces carbon with electricity, compared with fossil fuels and can improve energy performance substantially (Part L heat pump guidance, 2021).

A heat pump with a capacity of approximately 5kW is considered appropriate for this dwelling type, subject to confirmation by detailed room-by-room heat loss calculations at design stage. The feasibility drawings indicate a Vaillant aroTHERM plus 5kW unit, and this selection is retained as it aligns with best practice low carbon domestic design and coordinated plant allowances. Time and temperature control, zoning, and commissioning provisions shall be incorporated to support efficient operation and compliance with Building Regulations energy performance expectations.

The ASHP shall be installed externally in accordance with the manufacturer's requirements, maintaining the minimum service and airflow clearances shown on the coordinated elevations to ensure safe maintenance access, performance and longevity (Vaillant Group UK Ltd., 2020).

3.2 HEAT EMITTERS

To maximise heat pump efficiency, low temperature heat emitters are proposed:

- **Ground Floor:** Underfloor heating (UFH)
- **First Floor:** Radiators sized for low flow temperature operation

UFH is well suited to new-build dwellings as it provides even heat distribution and supports low flow temperatures, while first floor radiators shall be selected with sufficient surface area to deliver the required heat output at reduced temperatures. The system will be supported by smart zoning controls to improve comfort and reduce overheating risk, in line with domestic building services efficiency guidance. Part L 2021 updates encourage low-flow temperature systems such as underfloor heating to improve overall energy performance and support heat pump efficiency (Part L compliance guidance, 2023).

3.3 ZONING AND CONTROLS

A smart home control strategy is proposed to support energy efficiency, occupant comfort and effective user control. The heating system shall be zoned to reflect different occupancy patterns and heat demands, with separate control of the ground floor UFH zone and first floor radiator zone, in line with domestic building services guidance on time and temperature control. Controls shall be configured to support stable heat pump operation and minimise short cycling through appropriate interlocks and the use of weather/load compensation where available (Controls Guide for Air-Water Heat Pump Systems, BEAMA, 2024).

Control element	Proposed solution	Purpose / justification
Time & temperature control	Manufacturer-approved smart controller (e.g., Vaillant sensoHOME)	Stable operation + scheduling
Ground floor room control (UFH)	Room stats + manifold actuators	Prevent overheating, comfort
First floor room control (radiators)	TRVs / smart TRVs where appropriate	Room-by-room control

Domestic Hot Water (DHW) control	Integrated DHW time/temp control	Limits unnecessary reheating
Heat pump efficiency features	Weather/load compensation + interlocks	Reduces cycling, improves SCOP
User interface / usability	App-based control + local wall controller	Improves user understanding and enables effective day-to-day operation.

3.4 SYSTEM COMMISSIONING AND MAINTENANCE

Commissioning is key for performance. The system shall be filled, flushed, pressure tested, and balanced as per the manufacturers specifications. User controls shall be configured with appropriate setpoints and time schedules for the specific property user. Clear access to plant and isolating valves shall be provided for maintenance and emergencies. External ASHP positioning must also consider noise, airflow and safe working space (Vaillant Group UK Ltd., 2020).

3.5 DOMESTIC HOT WATER (DHW)

DHW shall be provided via an unvented hot water cylinder integrated with the ASHP system (Mixergy cylinder as indicated on drawings), sized to meet the expected demand of a six-person household (Mixergy X Datasheet, n.d.).

3.6 DHW HYGIENE

DHW systems shall be capable of achieving 60–65°C, or include a supplementary heating regime to periodically raise stored water to $\geq 60^{\circ}\text{C}$, to reduce the risk of bacterial growth and support compliance with Part G (Mixergy X Datasheet, n.d.).

The hot water cylinder installation shall allow safe access for servicing and provide a compliant discharge route for temperature and pressure relief valves. Cylinder pipe runs shall be insulated to minimise heat loss and reduce overheating in the airing cupboard.

3.7 HOT WATER DISTRIBUTION AND INSULATION

To reduce heat loss and support Part L performance, hot water pipework shall be insulated, particularly where routed through unheated voids, and pipe runs shall be kept as short as practicable to improve hot water delivery times. Thermostatic mixing valves shall be provided where required to reduce scald risk at outlets, particularly baths and showers, in line with Part G safety expectations (Welsh Government, Part G 2022).

3.8 VENTILATION STRATEGY

The proposed ventilation strategy is Mechanical Ventilation with Heat Recovery (MVHR), using the unit indicated on the design drawings: EnviroVent energiSava 200. Manufacturer performance data indicates a volume flow range of 40–245 m³/h with 89% heat recovery efficiency, supporting an energy efficient whole-dwelling ventilation solution (EnviroVent Ltd., 2025, p.1). MVHR is defined under Part F as a system that continuously supplies outdoor air while continuously extracting indoor air and includes heat recovery to improve efficiency (Welsh Government, 2022).

The MVHR system shall be designed, installed and commissioned to meet the minimum whole-dwelling ventilation requirements of Approved Document F (Wales), including continuous background ventilation and boost extract provision to wet rooms. The design intent aligns with Passivhaus-type principles where good airtightness supports controlled ventilation and reduced heat loss (Passive House Institute n.d.).

Distribution intent:

Supply: lounge and all bedrooms

Extract: kitchen, utility, WC/shower and bathroom

Boost function shall be provided to wet rooms during high moisture periods. The system shall be balanced at commissioning to achieve the required airflow rates, and the unit shall be located to allow safe access for filter replacement and maintenance, with user guidance provided to support long-term performance and indoor air quality.

4.0 Electrical Services Design

4.1 LIGHTING

Lighting shall be high efficiency LED throughout with practical switching arrangements, including two-way switching to stairs/landing, dedicated task lighting to kitchen worktops, and IP-rated fittings suitable for bathroom zones and external use. This approach supports reduced lighting energy demand and improved controllability in line with Part L domestic services guidance.

Area	Lighting type	Control strategy	Notes
Lounge	LED downlights	Optional dimming control	Comfortable ambient lighting

Kitchen / dining	LED downlights + under-cabinet/task strip	Separate switching for task lighting	User comfort
Hall / stairs / landing	LED downlights with integrated motion sensor lights on stairs	Two-way switching and motion activated stair lighting.	Safe night-time movement
WC / shower / bathroom	LED downlights	Switching arrangements and fitting selection shall comply with bathroom electrical zones and IP rating requirements (BS 7671).	IP-rated fittings to zones
Bedrooms	LED pendant or downlights	Optional dimming control	User comfort
External	LED bulkhead / wall light	PIR Sensor + override switch	IP rated & security option

4.2 SMALL POWER

As this is predicted to be social housing, small power distribution shall be designed to meet modern domestic needs and Welsh Housing Quality Standards. Adequate located socket outlets shall be provided to all habitable rooms, kitchen, and circulation spaces, with additional provision in the lounge and bedrooms for home working and device charging. Dedicated circuits shall be provided for fixed loads including the cooker/hob, kitchen and utility appliances, MVHR, ASHP and controls, and the hot water cylinder/immersion. All circuits shall be protected by appropriate RCD/RCBO protection and designed to comply with Part P (Welsh Government, Part P 2022).

Proposed minimum socket provision

(This schedule is a proposed best practice intended to meet WHQS expectations and modern usage patterns.)

Room / area	Proposed minimum socket outlets
Kitchen	7
Utility	4
Lounge	8
Dining area	4
Bedrooms (double)	6
Bedroom (single)	4
Hall / landing	2

Bathroom (shaver outlet)	1
External (weatherproof)	1–2

4.3 PHOTOVOLTAICS (PV)

Roof-mounted PV shall be provided to support reduced operational carbon and improved Part L performance (Vale of Glamorgan Council, 2024). The design shall include suitable cable routing allowances and an accessible inverter/metering location. PV may be paired with battery storage to increase on-site self-consumption and reduce peak grid import. Battery installation (if provided) shall comply with PAS 63100:2024 and manufacturer fire-safety guidance, with location confirmed by risk assessment and design coordination.

4.4 TELECOMS AND DATA

Telecoms infrastructure shall be provided to support modern household connectivity, in line with WHQS 2023 which recognises digital access as essential. The design shall include a fibre-ready incoming service route and termination point, a centrally located Wi-Fi router position to maximise coverage, and optional Cat6 data points to key areas (e.g., lounge and principal bedroom/home working space). Provision may also be made for a smart home security system to support occupant safety and future flexibility.

4.5 EV CHARGING PROVISION

EV charging provision shall be incorporated in accordance with Welsh Government proposals requiring EV charging facilities for associated parking spaces in new-build dwellings, subject to the £3,600 connection cost cap mechanism (Adroit Economics, PRP, and Welsh Government, 2023). A dedicated supply route from the consumer unit to an external charger location shall be provided.

5.0 Drainage Design

5.1 ABOVE & BELOW GROUND DRAINAGE

Above ground foul drainage shall be arranged to minimise pipe runs and coordinate with internal layouts, discharging via a soil vent pipe arrangement with traps to all appliances. Below ground foul drainage is assumed to connect to the mains sewer, with access points (rodding eyes/inspection chambers) provided at changes in direction and at key junctions to allow maintenance and blockage clearance (Welsh Government, Part H).

Rainwater drainage shall be collected via gutters and downpipes and discharged to a suitable outfall (surface water sewer or soakaway), subject to site drainage strategy and ground conditions. Provision may be made for a rainwater butt connected to a rear downpipe to support garden use and reduce potable water demand, subject to client requirement.

6.0 Fire Protection – Sprinklers

6.1 DESIGN

Sprinkler systems are specially designed and installed; therefore, this report provides a performance-based specification rather than a full hydraulic design (Welsh Government, Part B 2022). Final sprinkler requirements and layout shall be confirmed against Approved Document B (Wales) and coordinated with the agreed fire strategy. The system shall be designed and installed by a competent specialist contractor in accordance with BS 9251 (domestic and residential sprinkler systems), with water supply test (flow and pressure) undertaken to confirm whether a mains-fed system is feasible or whether a tank and pump arrangement is required.

6.2 FIRE DETECTION AND ALARM SYSTEM

A domestic fire detection and alarm system shall be installed in accordance with Approved Document B (Wales) and relevant domestic guidance. The system shall include mains-powered, interlinked smoke alarms with battery backup to circulation spaces (e.g., hall and landing) and a heat alarm to the kitchen area to reduce false alarms. Alarm positioning shall ensure effective coverage to protect escape routes (Welsh Government, Part B 2022).

7.0 Maintenance Access and Whole-Life Performance

Maintainability provisions include manufacturer clearances to the external ASHP, safe access to MVHR filters, isolation valves to key plant, and access to cylinder controls and UFH manifolds. Systems shall be commissioned to achieve intended performance, and a user handover provided covering heating controls, MVHR boost operation and DHW settings.

8.0 Conclusion and Recommendations

This report sets out an integrated M&E strategy for the HT 641 dwelling. An ASHP with UFH (ground floor) and low-temperature radiators (first floor) is

proposed with smart zoning controls. DHW is provided via a heat pump cylinder with a suitable hygiene regime. MVHR is selected to support indoor air quality and energy efficiency. Electrical services include LED lighting, suitable small power provision, telecoms, EV charging allowance and PV provision, with compliant drainage and fire protection measures.

9.0 References

- Adroit Economics, PRP and Welsh Government (2023) *Electric Vehicle Charging Points Policy Proposals – Cost Benefit Analysis – Assumptions Report (WG50056)*. Welsh Government.
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- British Standards Institution (BSI) (2024) *PAS 63100:2024 – Electrical installations: Protection against fire of battery energy storage systems for use in dwellings. Specification*. London: BSI.
- Myson (n.d.) *Calculators*. Available at: <https://www.myson.co.uk/calculators> (Accessed: 20 January 2026).

10.0 Appendices

Appendix A – Heating System Options.

Heating option	Capital cost	Running cost	Carbon impact	Practicality for typical new-build plot	Compatibility with low-temp emitters (UFH/rads)	Key advantages	Key limitations / risks	Overall suitability
Gas boiler + wet heating	Low–Medium	Medium	High	Good (if gas available)	Moderate (works, but less benefit at low temps)	Familiar technology, lower initial cost, wide installer base	Usually higher operational carbon	Medium / Not preferred
Direct electric heating (panel heaters / electric UFH)	Low	High	Medium–High (grid dependent)	Good	Poor–Moderate	Simple installation, minimal maintenance	High running costs & less efficient than heat pumps	Low
Ground Source Heat Pump (GSHP)	High	Low	Low	Poor–Moderate	Excellent	High efficiency and stable seasonal performance	Requires groundworks/boreholes/land availability, higher design and installation complexity, higher upfront cost and more complications on a brown field site.	Medium (site dependent)
Air Source Heat Pump (ASHP) + wet heating	Medium	Low–Medium	Low	Good	Excellent	Supports decarbonisation, efficient at low flow temps, integrates well with UFH and smart controls, suitable for new-build dwellings	Requires good system design (sizing, emitter selection), commissioning quality critical, external unit siting/noise considerations	High (selected)

Heating option appraisal informed by the Net Zero Carbon Buildings feasibility specification and domestic services compliance guidance.

Conclusion:

Following review of the above options, ASHP + wet heating is selected as it

provides the best balance of energy efficiency, reduced operational carbon, and compatibility with low temperature heating emitters.

Appendix B – Heat Emitter Schedule–

Room	Heat loss (W)	Emitter	Required Q50 (W)	Selection intent
Bed 1	1034	RAD	3195	Low temp radiator sized to meet load
Bed 2	1113	RAD	3439	Low temp radiator sized to meet load
Bed 3	886	RAD	2738	Low temp radiator sized to meet load
Bed 4	700	RAD	2163	Low temp radiator sized to meet load
Bathroom	705	TR (+supplement if needed)	2178	TR required; add small panel rad if TR output at ΔT_{25} is insufficient
Airing Cupboard	(allowance)	Small RAD	~620 (allowance)	Low-output background heat, final size by detailed calc

Radiator outputs were obtained using an online radiator sizing calculator, with outputs adjusted for low temperature heat pump operation (Myson, n.d.).

Room	Emitter type	Provisional size (H × L, mm)	Panel type	location note
Bed 1	Radiator	600 × 2000	Type 22 (K2)	Under/adjacent external wall / window
Bed 2	Radiator	600 × 2000	Type 22 (K2)	Under/adjacent external wall / window
Bed 3	Radiator	600 × 1800	Type 22 (K2)	Under/adjacent external wall / window
Bed 4	Radiator	600 × 1400	Type 22 (K2)	Under/adjacent external wall / window
Bathroom	Towel radiator	~500 × 1200 (<i>high output</i>)	TR	Sized to maximise low-temp output
Airing cupboard	Small radiator	600 × 400	Type 11 (K1)	Low-output background heat

Appendix C – Product Specification

M&E Product Specification Schedule (HT641)				
System	Element	Spec / Performance requirement	Proposed product / example	Notes / compliance
Heating	Primary heat source	Air Source Heat Pump (approx. 5kW), low temp wet system	Vaillant aroTHERM plus 5kW	Locate externally with service clearances; Part L compliant low carbon heat source
Heating	Heat distribution	Wet heating system to UFH + radiators	Emitter Schedule in Appendix B	Sized by heat loss calcs and emitter schedule
Heating	Ground floor emitters	Underfloor heating pipework to all GF habitable areas	Grant- Uflex Underfloor Heating	Manifold located in store/service zone
Heating	UFH manifold	Multi-port manifold with flow meters + actuators	Grant- UFH manifold	Zone controlled; allow isolation + balancing

Heating	First floor emitters	Low temperature radiators (panel rads)	Type 22 steel panel radiators, Stelrad	Outputs confirmed via radiator schedule
Heating	Bathroom emitter	Towel radiator (TR)	Chrome/white TR (high output) Stelrad	TR may require supplement at low ΔT
Heating	Airing cupboard	Background heat emitter	Small panel radiator (or equal) Stelrad	Final output by detailed calc
Heating controls	Smart controller	Time + temp control with zoning	Vaillant sensoHOME	Supports stable heat pump control / scheduling
Heating controls	Room control	UFH stats + actuators / TRVs to rads	Vaillant sensoHOME + actuators / Stelrad TRVs	Room-by-room control where required
Heating controls	Efficiency functions	Weather/load compensation, anti-cycling	Vaillant sensoHOME	Improves seasonal efficiency (SCOP)
DHW	Hot water storage	Indirect cylinder suitable for ASHP	Indirect HW cylinder (size TBC) Mixergy X Standard	Include immersion heater for backup
DHW	Scald protection	TMV to limit outlet temperature	TMV2/TMV3 thermostatic mixing valve- Milton 15mm	Part G compliance / occupant safety
DHW	Pipework insulation	Insulate hot water distribution pipework	Pre-formed insulation- Armaflex Pipe Insulation	Reduce heat losses (Part L)
Ventilation	Whole dwelling ventilation	Balanced MVHR system with heat recovery	EnviroVent energiSava 200	Whole-dwelling ventilation to Part F
Ventilation	MVHR ductwork	Rigid/semi-rigid ducting with sealed joints	EnviroVent Duct work	Coordinate routes to avoid clashes
Ventilation	Supply terminals	Supply to habitable rooms	Zehnder ComfoValve Luna S125 Supply Valve	Bedrooms + lounge
Ventilation	Extract terminals	Extract from wet rooms	Zehnder ComfoValve Luna S125 Supply Valve	Kitchen/utility/WC/bath
Ventilation	Acoustic control	Attenuators to reduce noise transfer	Techvent Circular Attenuator 8"	Fit near MVHR unit/branches as required
Ventilation	Commissioning	Airflow balancing + handover	Specialist commissioning	Part F commissioning requirements
Electrical	Consumer unit	Domestic CU with RCD/RCBO protection	Hager 12 Way 100A Isolator Incomer Metal Clad Consumer Unit	Part P compliance
Electrical	Small power outlets	Sockets to WHQS / modern domestic provision	British General 900 Series 13A 2-Gang SP Switched Socket + 2.4A 12W 2-Outlet Type A & C USB Charger	E.g. MK / Schneider / BG (or equal)
Electrical	Switches	Switching to suit layout	British General 800 Series 1G / 2G / 2-way switches	Two-way switching to stairs/landing
Electrical	Cooker circuit	Dedicated circuit for cooker/hob	British General 45A cooker control unit (or equal)	Final load subject to appliance selection
Electrical	Kitchen appliance supplies	Dedicated circuits/spurs	British General Fused connection units / dedicated outlets	Dishwasher / fridge freezer etc.
Electrical	MVHR supply	Dedicated electrical supply	British General Local isolator adjacent to unit	Maintainable + safe isolation

Electrical	ASHP supply	Dedicated electrical supply	British General Local isolator adjacent to unit	Coordinate with manufacturer
Electrical	Smoke/heat alarms	LD2 coverage typical for dwelling	Aico Ei3000RF Series	To Part B / BS 5839-6 (typical)
Electrical	External lighting	IP rated external fittings	Luceco IP54 700 Lumens LED bulkhead/wall light (or equal)	PIR option for security
Lighting	Internal lighting	High efficiency LED throughout	Luceco LED Downlight/pendants (or equal)	Part L energy efficient lighting
Lighting	Bathroom lighting	IP rated fittings to bathroom zones	Luceco FType Mk 2 Flat Fixed Fire Rated LED Downlight	To BS 7671 zones
Telecoms	Broadband provision	Suitable for fibre broadband termination	Fibre ONT point (provider dependent)	WHQS supports digital connectivity
Telecoms	Data cabling (optional)	Cat6 to key locations	Cat6 outlets (or equal)	Lounge + home working bedroom
EV charging	EVCP	Domestic EV charge point provision	EVCP Humax MX7 Smart EV Charger 7kW	Locate driveway/parking; comply with current Welsh requirements
Drainage	Foul drainage	100mm soil / wastes to mains sewer	uPVC drainage system	Part H compliance; rodding points + ICs
Drainage	Wastes	32/40/50mm wastes to traps	uPVC waste pipe	Include ventilation/anti-siphon where required
Fire suppression	Sprinklers (provisional)	Indicative only – specialist design	Specialist sprinkler contractor	Final design to BS 9251 + ADB

Appendix D – Ventilation floor plan, Duct Sizing & Ventilation Rates.

For MVHR, Approved Document F (Wales) says the whole-dwelling ventilation rate must meet both:

- 0.3 l/s per m² internal floor area, and
- the bedroom-based minimum in Table 1.3.

For a 4-bed dwelling, Table 1.3 minimum = 37 l/s.

(= 133.2 m³/h, using 1 l/s = 3.6 m³/h)

Design target (balanced MVHR): Supply = Extract = 37 l/s (133.2 m³/h) (minimum) (Approved Document F, Welsh Gov 2022).

Room	Terminal	Continuous rate (l/s)	Continuous rate (m ³ /h)
Lounge	Supply	10	36
Bed 1	Supply	8	28.8
Bed 2	Supply	7	25.2
Bed 3	Supply	6	21.6

Bed 4	Supply	6	21.6
Kitchen	Extract	15	54
Utility	Extract	8	28.8
Bathroom	Extract	8	28.8
WC/SH	Extract	6	21.6
TOTALS		37 l/s	133.2 m³/h

This satisfies the bedroom-based whole dwelling minimum (37 l/s) and provides balanced supply/extract.

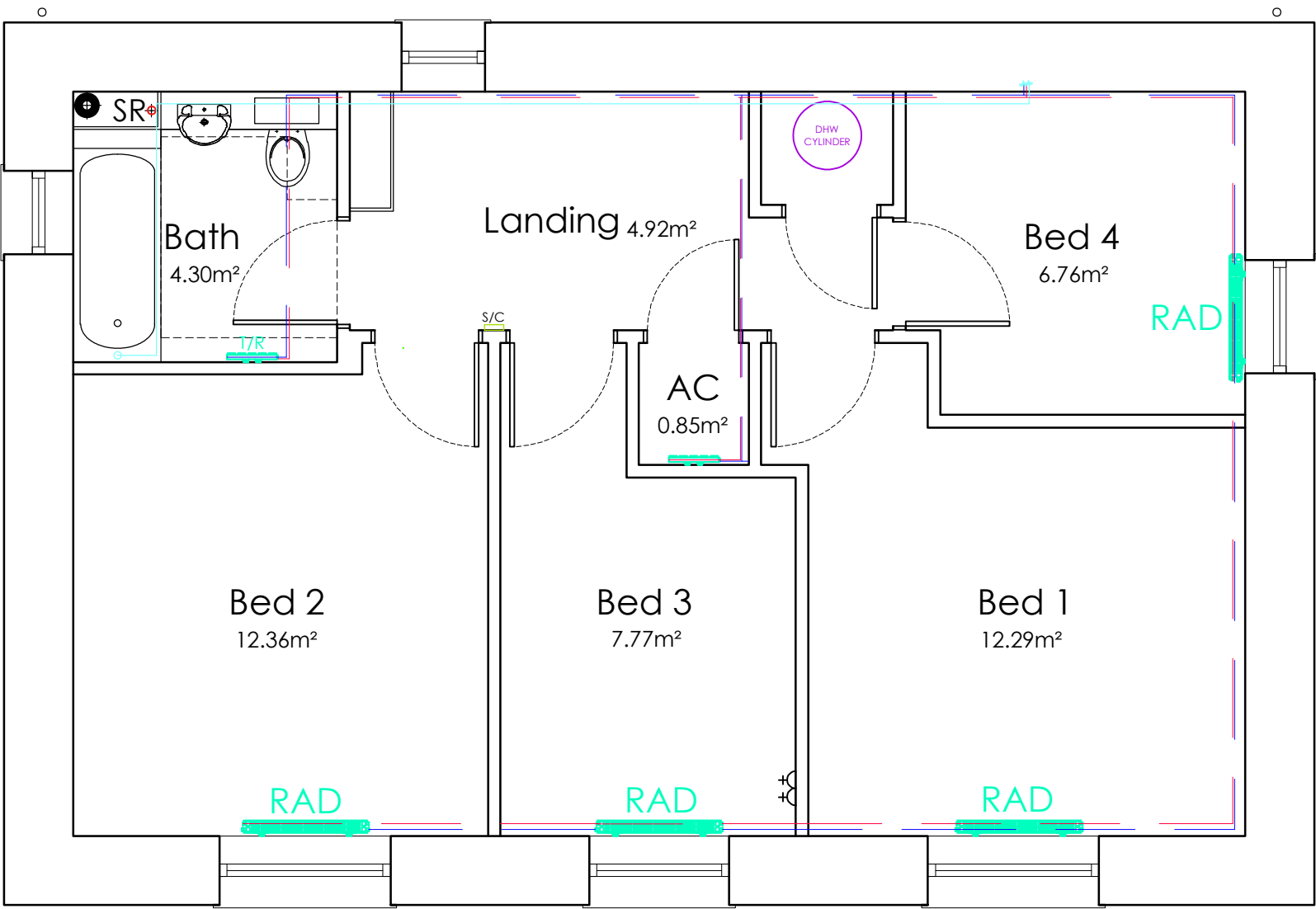
Ducting-

The energiSava 200 technical data states Ø125 supply and extract spigots. Proposed duct sizes (based on the rates above). (EnviroVent Ltd., 2025, p.1).

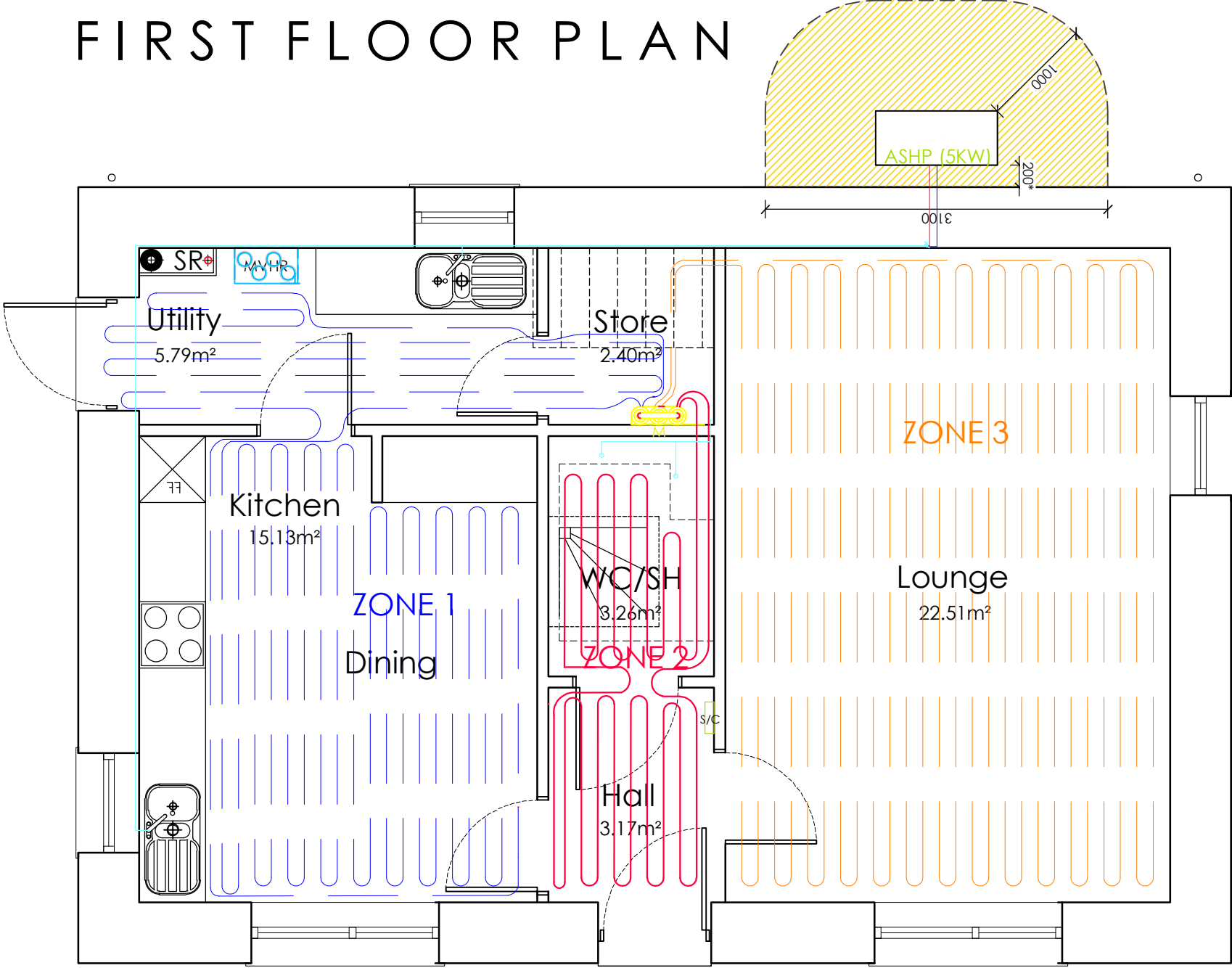
Duct / branch	Airflow (l/s)	Airflow (m³/h)	Proposed duct size
Main supply from MVHR unit	37	133	Ø125
Main extract to MVHR unit	37	133	Ø125
Kitchen extract branch	15	54	Ø125
Utility extract branch	8	28.8	Ø125
Bathroom extract branch	8	28.8	Ø125
WC extract branch	6	21.6	Ø125
Lounge supply branch	10	36	Ø125
Bedroom supplies	6–8	21.6–28.8	Ø125

Final duct sizing to be confirmed by pressure-loss calculations and manufacturer guidance; duct runs to be minimised and sealed to maintain design performance.

Appendix E – Ventilation System, Heating system, Power and Lighting Floor, Sprinkler Head, Drainage Plan.



FIRST FLOOR PLAN



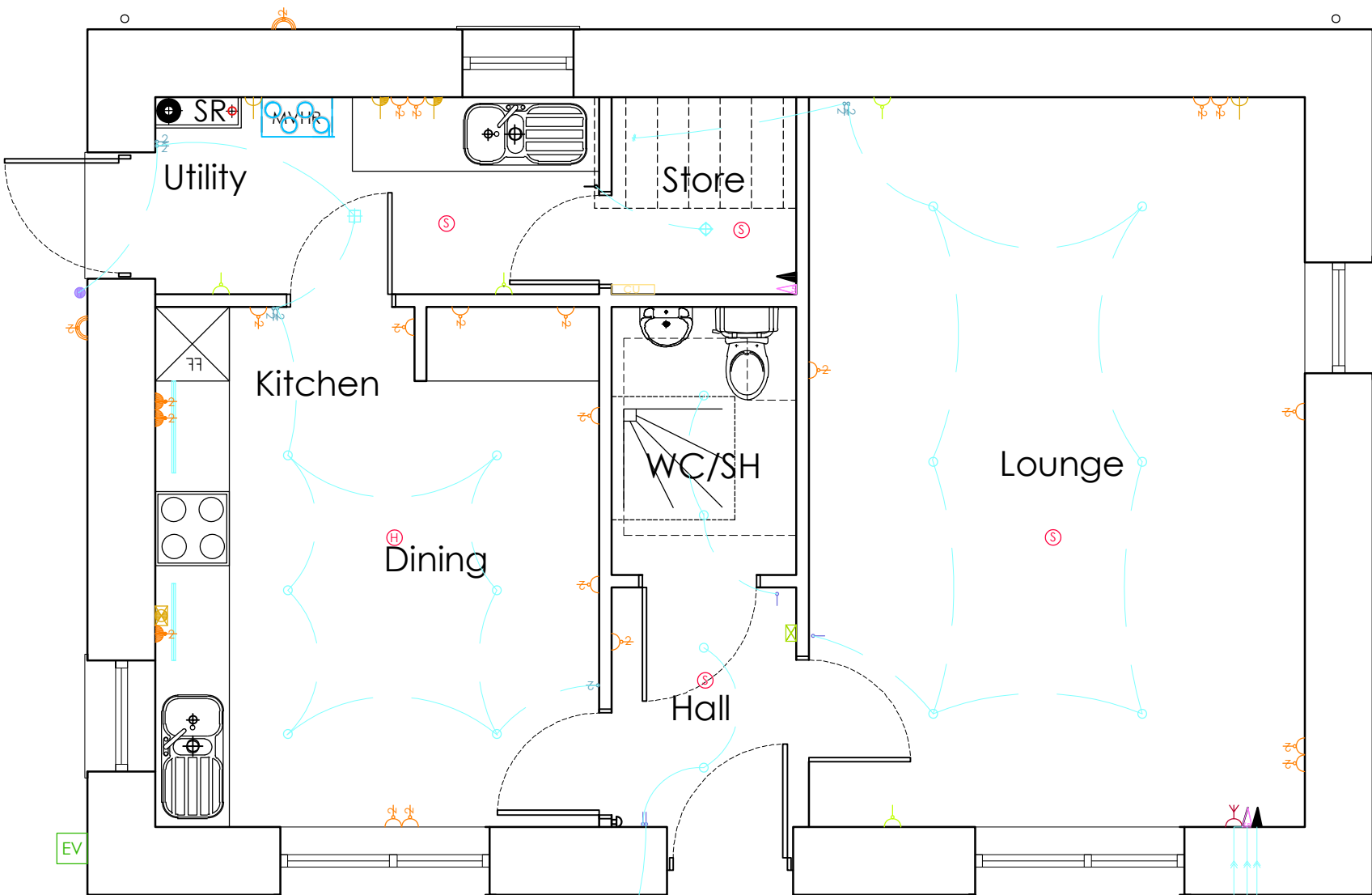
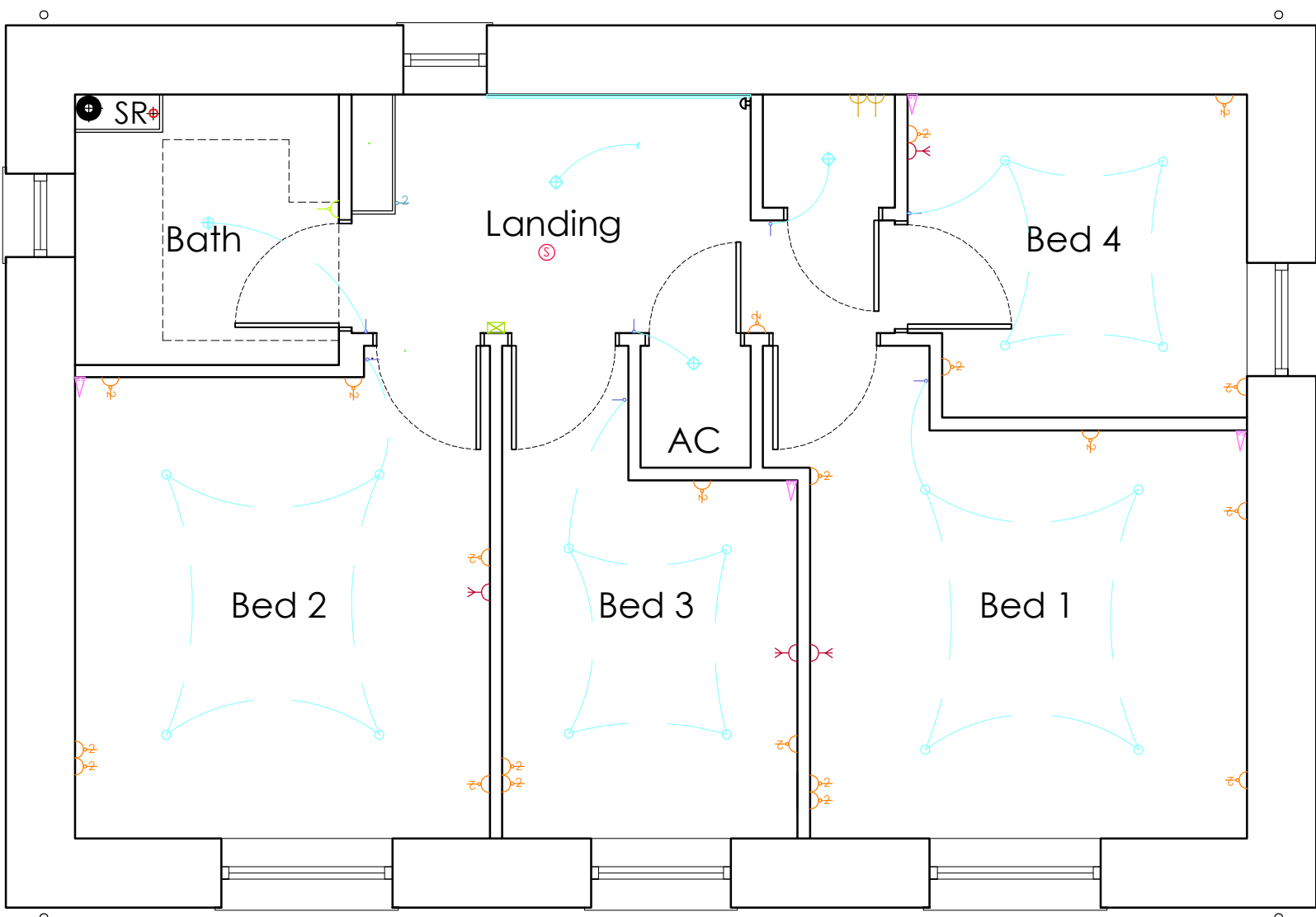
GROUND FLOOR PLAN

Symbol	Meaning
ASHP	Air Source Heat Pump (5kW)
UFH	Underfloor heating zone 1(Ground Floor)
M	UFH manifold location
RAD	Radiator (First Floor)
T/R	Towel radiator (Bathroom)
S/C	Smart Thermostat / zone control
DHW CYL	Domestic Hot Water cylinder
BLUE DASH	Heating flow
RED DASH	Heating return
CYAN	Hot & Cold Feeds

Note-

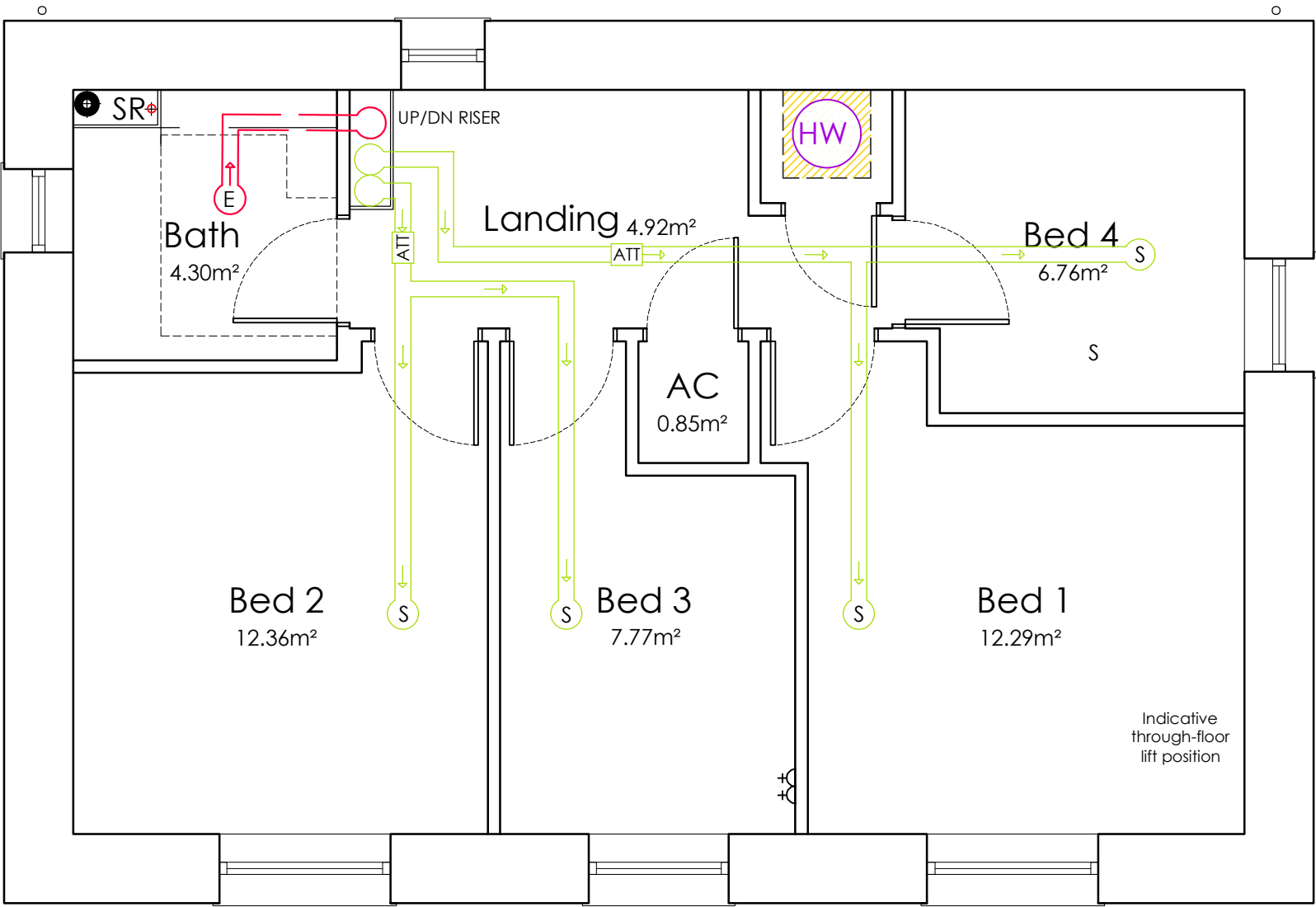
1. UFH served from manifold located in store/service zone.
2. Radiators sized for low flow temperature operation seen in appendix B.
3. Heating controls via smart zoning controller (e.g., Vaillant sensioHOME) with weather compensation
4. ASHP has been placed in line with manufacturers requirements for access, and safety and maintenance.
5. Radiators shown are not to scale but to represent location preference, Radiator schedule can be seen in appendix B.

Project HT 641 – Heating Layout – ASHP, UFH & Radiators (GF & FF)	Designed by L King	Checked by N/A	Module Title Building Services 2 - Integration (ACBA5017)	Date 17/01/2026	Scale 1/50	Tutor Ian Brown
	Drawing Title HT 641 – Heating Layout – ASHP, UFH & Radiators (GF & FF)					Drawing No. HT641-M-02

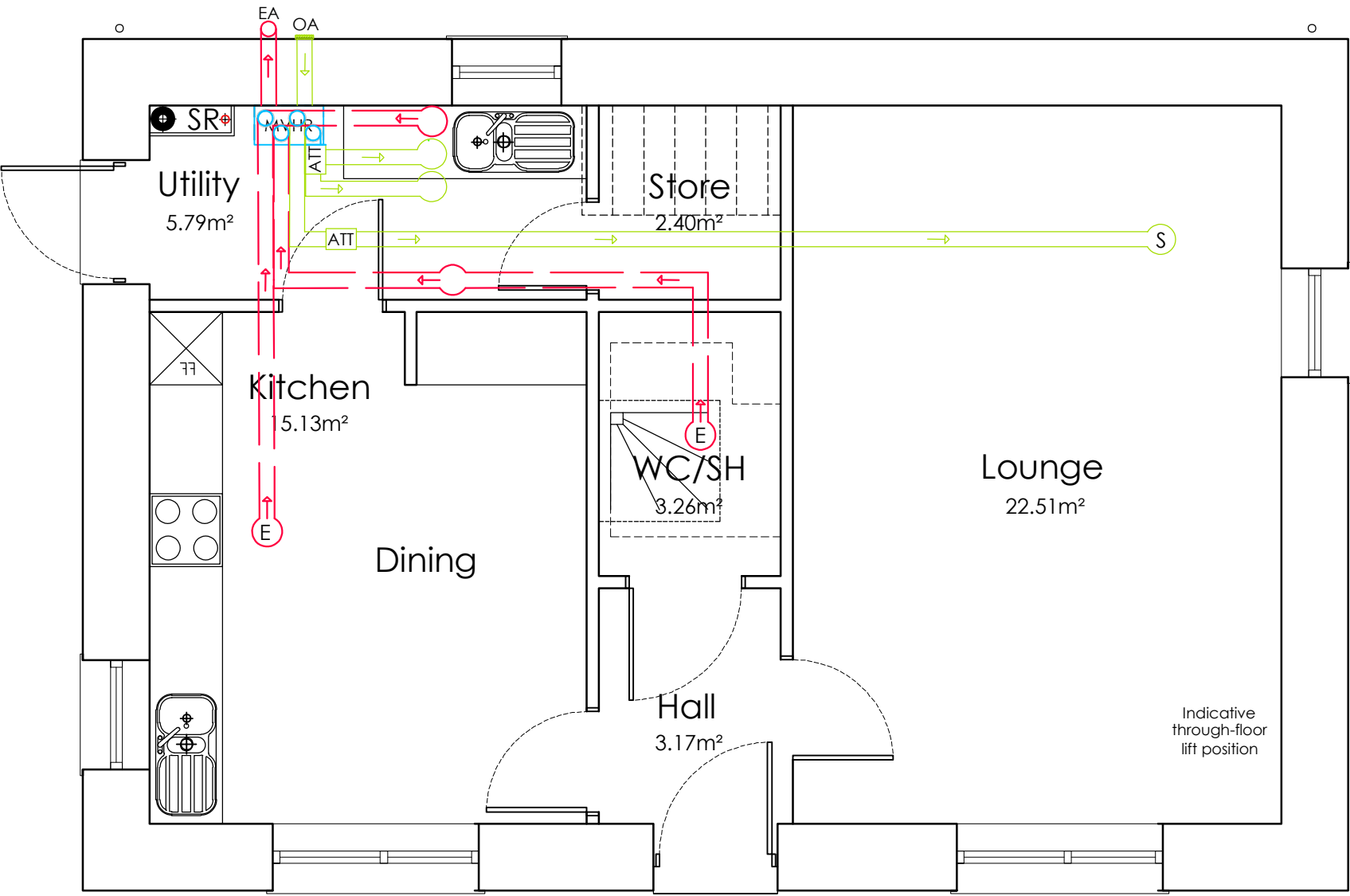


	SINGLE SWITCHED WALL SOCKET
	DOUBLE SWITCHED WALL SOCKET
	SINGLE SWITCHED WALL SOCKET 1200MM ABOVE FLOOR LEVEL
	SINGLE SWITCHED FUSE SPUR BELOW WORKTOP LEVEL
	SINGLE SWITCHED FUSE SPUR
	1 GANG LIGHT SWITCH
	2 GANG LIGHT SWITCH
	1GANG 2 WAY LIGHT SWITCH
	2 GANG 2 WAY LIGHT SWITCH
	EXTERNAL LIGHT
	RECESSED DOWNLIGHTER
	LIGHT POINT - PENDANT HOLDER (4 INCH)
	LIGHT POINT - PENDANT HOLDER (6 INCH)
	LIGHT POINT - BATTEN HOLDER
	TV AERIAL POINT
	DOOR BELL PUSH
	DOOR BELL CHIME
	THERMOSTAT
	CONSUMER UNIT
	TELEPHONE POINT
	CAT 5 or 6 DATA SOCKET
	COOKER SWITCH
	COMBINED HEAT DETECTOR AND FIRE ALARM SOUNDER
	SMOKE DETECTOR AND FIRE ALARM SOUNDER
	ELECTRIC VEHICLE CHARGING POINT
	RECESSED LED TASK LIGHTING
	EXTERNAL DOUBLE SWITCHED WALL SOCKET

Project HT 641 – Electrical Layout – Small Power & Lighting (GF & FF)	Designed by L King	Checked by N/A	Module Title Building Services 2 - Integration (ACBA5017)	Date 17/01/2026	Scale 1/50	Tutor Ian Brown
	Drawing Title HT 641 – Electrical Layout – Small Power & Lighting (GF & FF)					Drawing No. HT641-M-03



FIRST FLOOR PLAN

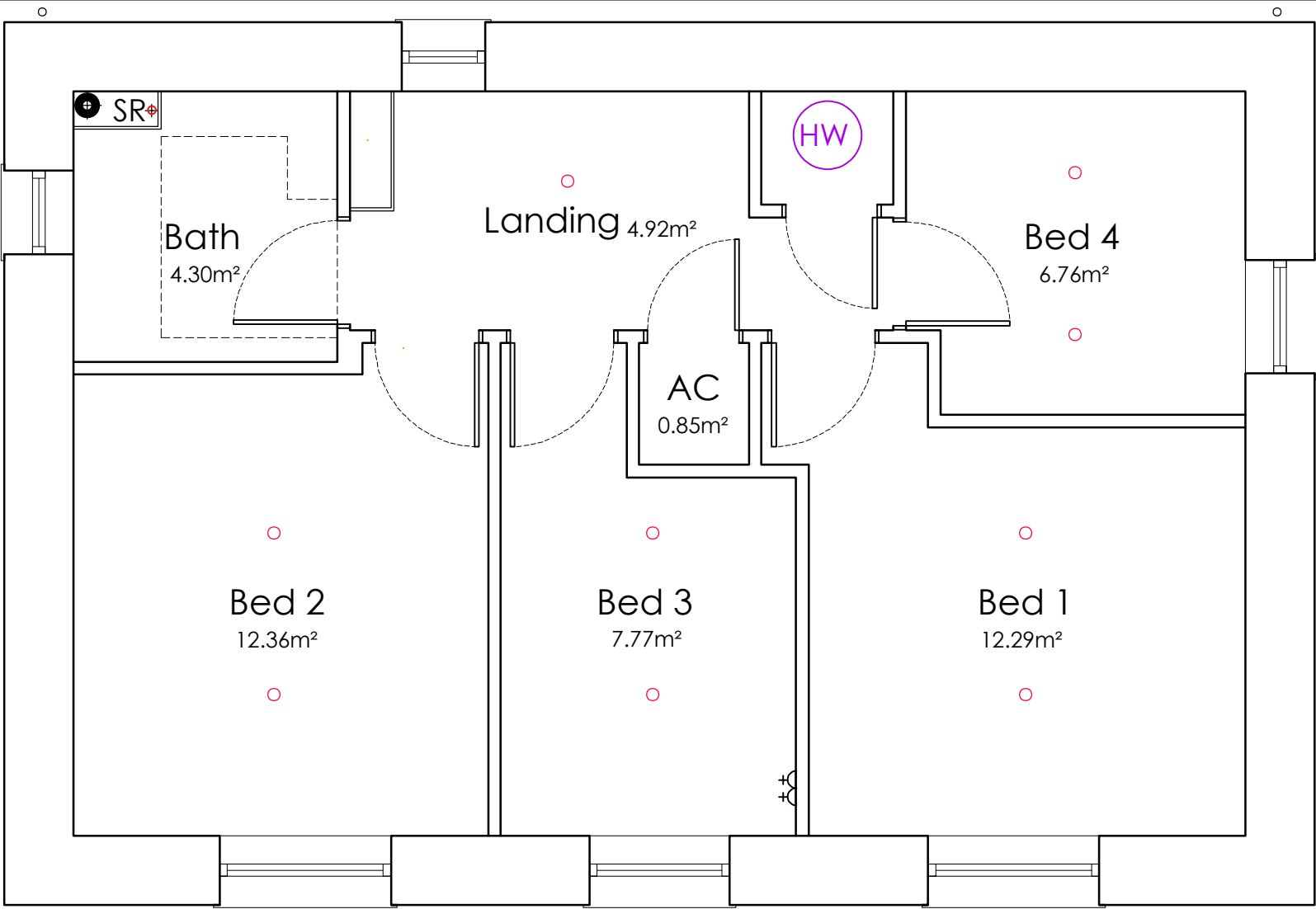


GROUND FLOOR PLAN

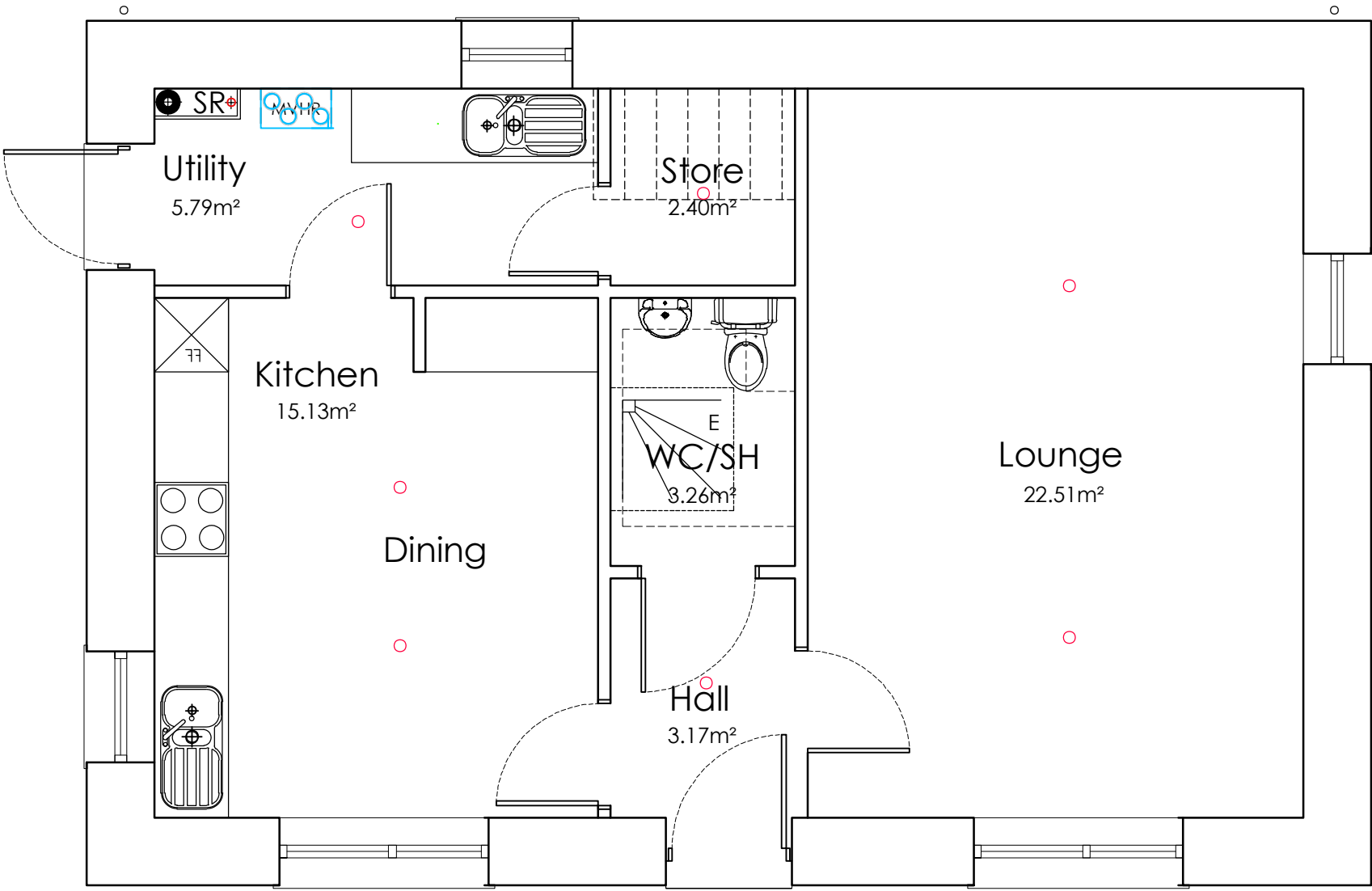
Symbol	Meaning
MMHR	MMHR unit location (EnviroVent energySava 200)
S	Supply air terminal (lounge / bedrooms)
E	Extract air terminal (kitchen / utility / WC / bathroom)
Green line	Supply duct route
Red line	Extract duct route
UP/DN	Duct riser / drop between floors
OA	Outside air intake
EA	Exhaust air discharge
ATT	Acoustic attenuator

NOTE: MMHR intake and exhaust terminals shall be separated to prevent short-circuiting. Exhaust ductwork shall be routed externally and discharged vertically to maintain adequate distance from the intake

Project HT 641 – New Build Dwelling MVHR Design	Designed by L King	Checked by N/A	Module Title Building Services 2 - Integration (ACBA5017)	Date 17/01/2026	Scale 1/50	Tutor Ian Brown
	Drawing Title HT 641 – New Build Dwelling MVHR Design					Drawing No. HT641-M-01



FIRST FLOOR PLAN

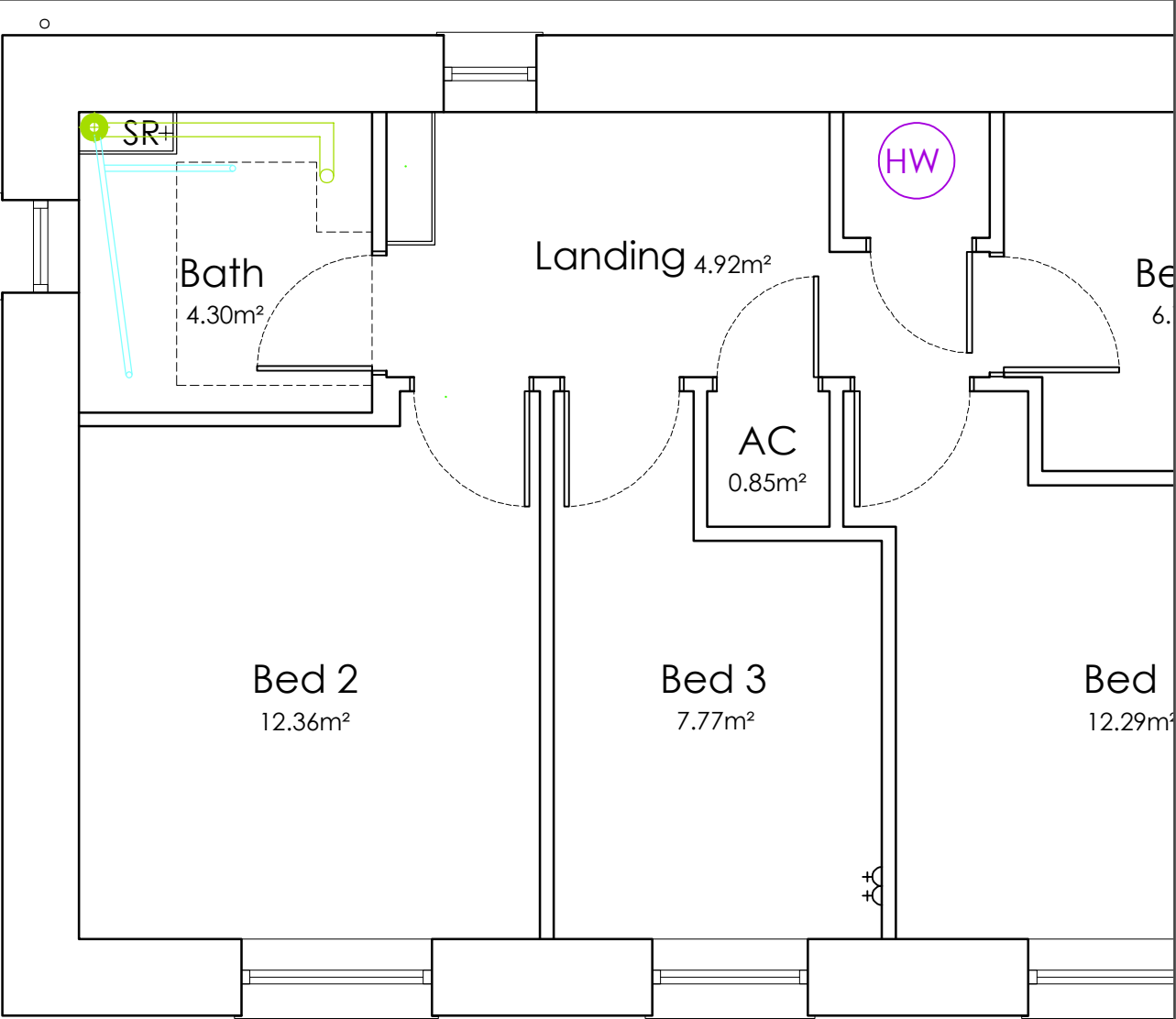


GROUND FLOOR PLAN

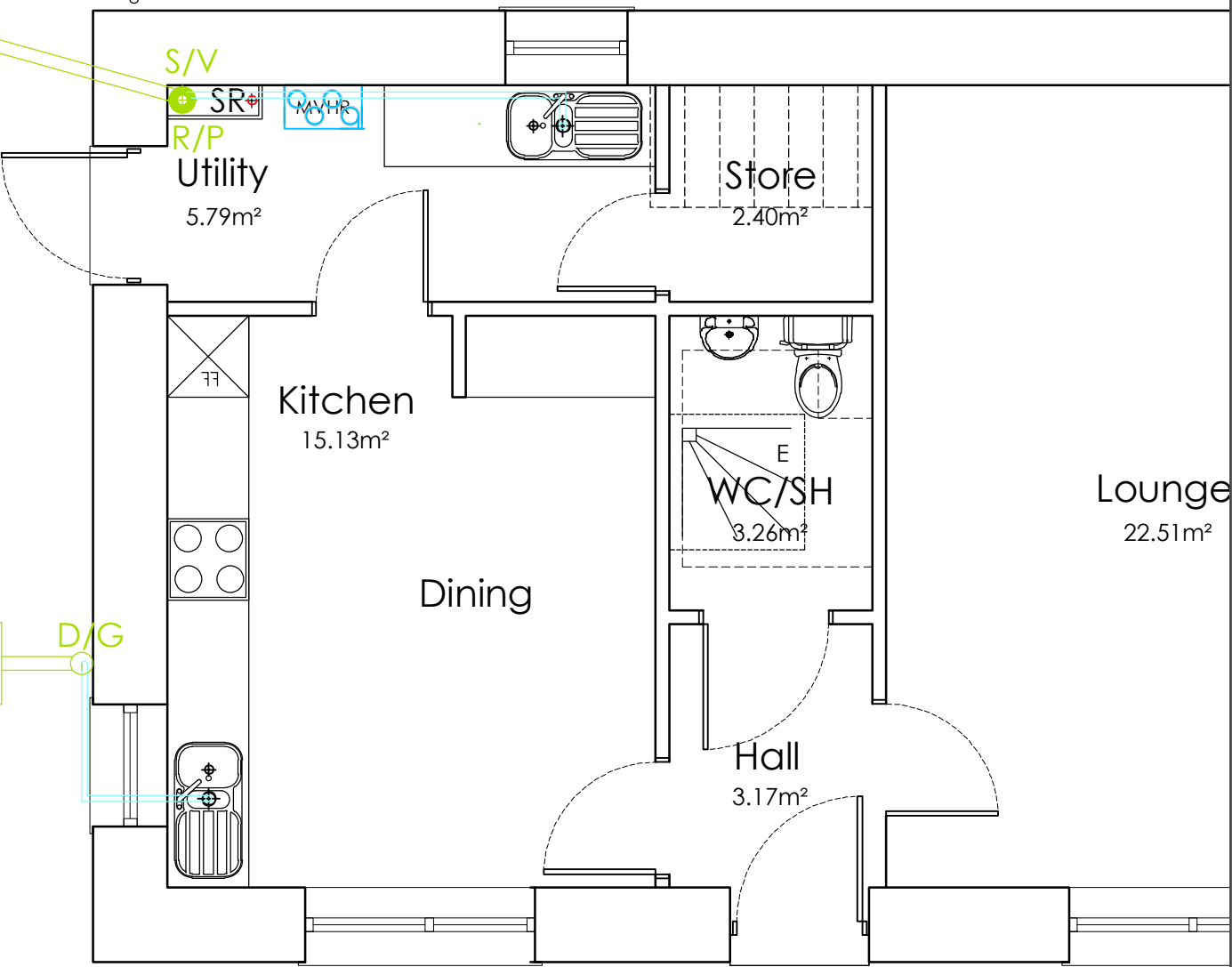

SPRINKLER HEAD

Note-
Sprinkler head locations shown are indicative only for coordination purposes. Final sprinkler design (including hydraulic calculations, head spacing, pipework routing, and water supply requirements) shall be undertaken by a competent specialist sprinkler contractor/engineer in accordance with BS 9251 and Approved Document B (Wales).

Project HT 641 – Provisional Sprinkler Head Plan(GF & FF)	Designed by L King	Checked by N/A	Module Title Building Services 2 - Integration (ACBA5017)	Date 17/01/2026	Scale 1/50	Tutor Ian Brown
	Drawing Title HT 641 – Provisional Sprinkler Head Plan(GF & FF)					



FIRST FLOOR PLAN



GROUND FLOOR PLAN

Symbol	Meaning
D/G	Drainage Gully
Cyan	44mm Domestic Waste Pipe
	100MM Waste Pipe
I/C	Inspection Chamber
S/V	100mm Soil Vent Stack
S/C	Smart Thermostat / zone control
R/P	Rodding Point

Note-
All foul drainage to discharge to mains sewer connection (assumed), unless confirmed otherwise by site survey.

All above-ground sanitary pipework to be installed to adequate falls and sized to suit appliance discharge, in accordance with Approved Document H (Wales).

Rodding access to be provided at changes of direction, junctions and the head of drains to allow maintenance and clearance of blockages.

Inspection chambers (I/Cs) to be provided at key junctions and changes in direction, with covers selected to suit location/loading.

Soil vent stack (SVP) to terminate externally and be fitted with appropriate terminals; internal connections to be vented to prevent trap seal loss.

Surface water drainage not shown in detail on this drawing; surface water shall discharge in accordance with the SuDS hierarchy, subject to final site constraints and approvals.

MAINS SEWER CONNECTION

I/C

I/C

D/G

S/V
SR+
R/P

Utility
5.79m²

Kitchen
15.13m²

Dining

Store
2.40m²

WC/SH
3.26m²

Hall
3.17m²

Lounge
22.51m²

Landing
4.92m²

AC
0.85m²

Bath
4.30m²

Bed 2
12.36m²

Bed 3
7.77m²

Bed
12.29m²

HW

SR+

Project

HT 641 – Above & Below Ground Drainage (GF & FF)

Designed by

L King

Checked by

N/A

Module Title

Building Services 2 - Integration
(ACBA5017)

Date

17/01/2026

Scale

1/50

Tutor

Ian Brown

Drawing Title

HT 641 – Above & Below Ground Drainage (GF & FF)

Drawing No.

HT641-M-05