



Condition & Retrofit Assessment Report

LOUIS KING (2320088)

RETROFIT CO-ORDINATION AND MANAGEMENT (ACBA5026)

ECO-RETRO SOLUTIONS LTD



Property Address-	6 Ferry Way, Haverfordwest, Dyfed, SA61 1LZ
Assessor's Name	Louis King
Assessor's Number	2320088
Assessor's Organization	Eco-Retro Solutions LTD
Assessment Date	30/12/25
Was the property built pre-1920?	No
Risk Assessment Completed?	Completed before assessment
Air Test Score	<i>To completed by following the assessment.</i>

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1.0 Introduction

The transition of the UKs existing housing stock toward the 2050 Net-Zero target requires a shift from isolated repairs to holistic retrofit strategy (*What Is Climate Change? - Climate Action Wales*, n.d.). This report evaluates 6 Ferry Way, a 1980s end-terrace dwelling in Haverfordwest, a high-exposure coastal zone in Pembrokeshire to establish a pathway for carbon reduction and improved occupant health.

1.1 Property Details.

	Property Details
Construction	Purpose-built 3-bed end-terrace (1980s),
Tenure / Status	Freehold; Not listed; Not in Conservation Area (<i>Conservation Area Checker / UK Property Conservation Status</i> , no date) (Historic England, no date)
Dimensions	Floor Area: 71m². Envelope Area: 200.2 m². Vol: 170.4 m3
Build Form	Cavity wall (face brick & Block) Solid GF, Suspended 1st floor
EPC Rating	Current: C (72) with a potential for B or higher
Radon Risk	10-30% potential (Very High) (<i>UKradon - UK maps of radon</i> , no date)
Climate	Property faces severe wind-driven coastal rain. (Welsh Parliament <i>et al.</i> , 2025)
Inspection Weather	Dry, 8°C, 80% humidity.

1.2 Intended Outcomes.

The retrofit plan aims to transition the property to a high-performance home through:

1. Decarbonization: Transition to a 5kW Air Source Heat Pump (ASHP) integrated with Solar PV and battery storage to reach a high SAP score.
2. Fabric Efficiency: Achievement of a "Triple-Shield" envelope (U-value improvement) via combined IWI, CWI, and external rain-screen cladding.
3. Health & Safety: Mitigation of 10-30% Radon potential and moisture control via active sump extraction and whole-house MVHR.
4. Durability: Future-proofing the structure against severe exposure.

1.3 Occupancy Details.

	Occupant Details
Name of Occupant	Mrs. M Jones
Age Range	0-30
Status of Occupant	Owner-Occupier
No. of Occupants	3 (Two adults, one child)
Electricity Bill Payer	Owner-Occupier
Shower Type	Mixer showers for the shower and bath.
Showers Per Day / Week	3 per day / 21 per week (Variable)
Baths Per Day / Week	2 per week

2.0 Occupancy & Energy Assessment.

2.1 Occupancy Profile & Assumptions.

The household comprises adults in full-time employment and a child in early years education, with a first-floor office indicating at least one adult works from home several days per week. Heating demand peaks on weekday mornings and evenings, with sustained daytime use in the Office and Lounge. With three occupants under 30, hot water demand is high, placing significant load on the mains gas combi boiler. Frequent use of moisture-generating appliances, combined with the property’ s 1980s construction, increases the risk of condensation unless ventilation is upgraded. As long-term owners aiming for a phased 20-year Net Zero pathway, the clients prioritize early fabric improvements as a “no-regrets” strategy.

2.2 Energy Usage & Fuel Data.

The property currently utilizes a gas boiler for heating and hot water, this is a high demand of energy in comparison to some of the low carbon heating systems on the market, such as an air source heat pump, this would eliminate the need for a gas supply and paired with the right systems can significantly reduce the properties running costs and CO₂ consumption.

	Current Assessment.
Current Energy Efficiency Rating	C / SAP Score 72
Potential Energy Efficiency Rating	High B/Low A

Total Internal Floor Area	71 m ²
Primary Heating Fuel	Mains Gas
Estimated Annual CO ₂ Emissions	~2.4 tons (Typical for Band C, 71m ² semi/end-terrace)
Main Heating System	Gas combi-boiler (Ideal Logic) with Room stat, Radiators and TRVs

Service	Meter Type	Estimated Yearly Usage
Electricity	Smart Pre-Payment Digital	3,627 kWh
Mains Gas	Smart Pre-Payment Digital	9,468 kWh

Energy Control	
Heating Settings	Controlled Via Thermostat set at 18.5°C in the Hallway. (On constant)
Primary Hot Water Settings	Controlled via the Programmer on the combi boiler.
Household Appliances	1x Fridge Freezer, 1x Electric Oven, 1x Electric Hob, 1x Condensing Tumble Dryer, 1x Washing Machine, Provision for drying clothes externally.

3.0 Condition & Significance Survey.

3.1 Property Significance Survey

As a dwelling of low heritage significance, the property is well suited to invasive thermal upgrades. Its coastal location and exposure to wind-driven rain require consideration of moisture risk and durability, requiring strategies that relocate the primary weather barrier away from the original masonry.

Element	Description & Significance	Potential for Enhancement / Risk
Main Walls	1980s cavity wall construction with face brick outer leaf and concrete block inner leaf; low heritage	High enhancement potential. Internal Wall Insulation (IWI) is preferred to avoid boundary constraints and planning implications associated with EWI, while maintaining the existing brick aesthetic. A ventilated brick-slip rain-screen system

	significance and high uniformity with neighboring dwellings	provides improved resistance to wind-driven rain and reduces moisture risk (<i>Benefits of Rainscreen Facade Systems</i> , no date).
Roof	Pitched concrete tile roof over felt; no heritage constraints identified.	High potential for upgrade. Roof renewal presents an opportunity for integrated solar PV installation alongside improved breathable membrane detailing to support controlled ventilation and long-term durability.
Windows	Modern uPVC double glazing. Not significant	Units approaching end of service life with evidence of seal failure. Replacement with high-performance triple glazing offers significant thermal and comfort benefits while maintaining consistency with local housing.
Rainwater Goods	PVC fascias, gutters and downpipes with a flush fascia roofline and minimal eaves overhang.	The increased wall thickness associated with the rain-screen system necessitates extension of the roofline to prevent water bypass. This intervention allows for upgraded rainwater goods, ensuring effective management of runoff in a high-exposure coastal environment.

3.2 External Element Condition.

During the condition assessment each element of the structure is graded in a certain way for ease of use. Below is the grading structure.

NI	-Not Inspected
1	No repair is presently required. Normal maintenance must be undertaken.
2	Repairs are required but not considered to be serious.
3	Defects of a serious nature or defects requiring urgent repair

The overall property condition is good, showing some smaller defects relative to the age of the property, and it is necessary to maintain the property regularly to prevent any small defects from turning into larger issues that would require immediate remedial work. No serious defects were picked up on the inspection.

Element	Grade	Condition Summary
Roof	2	Weathered concrete tiles with an estimated remaining lifespan of 10–15 years, typical of properties of this age (RICS, 2019).
Rainwater Goods	1	PVC gutters and downpipes in serviceable condition; flush fascia roofline with limited eaves overhang, increasing exposure to wind-driven rain (HM Government, 2021c).
Walls	1	Stable 1980s cavity wall construction with standard face brick outer leaf
Windows	2	uPVC double-glazed units with evidence of failing seals and elevated heat loss. Replacement recommended to improve thermal performance and comfort (BSI, 2023).

3.3 Internal Element Collection.

Element	Grade	Condition Summary	Retrofit Intervention Logic
Roof Structure	2	Truss frame design; restricted access at eaves.	Upgrade roof ventilation using rain-resistant solutions appropriate to the flush fascia design (e.g. ridge or felt lap vents) (Fix My Roof, 2024). Increase insulation on loft hatch to 370mm to maintain a continuous thermal layer to eliminate localized heat loss.
Ceilings	2	Plasterboard with minor cracking; textured "Artex" coatings noted.	Textured coatings are assumed to contain asbestos pending confirmation. A P402 asbestos survey is required prior to intrusive works. Where confirmed, works must comply with CAR 2012 requirements. (British Occupational Hygiene Society (BOHS), 2023)
Internal Walls	1	Mix of solid masonry and lightweight partitions; no elevated damp readings recorded.	Suitable substrate for Internal Wall Insulation (IWI). Moisture levels to be monitored post-installation to manage condensation risk associated with increased airtightness.
Floors (Ground)	1	Presumed uninsulated solid concrete slab (as built) with fixed finishes.	To achieve high thermal performance without reducing floor-to-ceiling height, Vacuum Insulation Panels (VIPs) are proposed. This approach minimizes disruption while significantly improving floor U-values (<i>The Main Features of VIPs - VIPA International</i> , 2021).

Floors (First)	2	Suspended timber floor: localized creaking noted.	Improve airtightness using an "up-and-over" membrane to joists in conjunction with floor renewal, ensuring continuity with the IWI system. (Wallace, 2025)
			
Internal Woodwork	2	Timber joinery is generally serviceable.	Door undercuts to be increased to provide a minimum 7,600 mm ² free air transfer per habitable room door, supporting MVHR performance. As seen in section 4.3.
Bathroom Fittings	1	Sanitary fittings in working order; mixer shower present.	Mechanical extract to be integrated into the MVHR system to manage moisture load efficiently. Future replacement of an electric shower may be considered aligned with PV-supported electrical demand.
Dampness	1	No significant dampness was recorded during inspection. (probe meter)	Baseline conditions acceptable; improved airtightness necessitates robust ventilation and post-installation monitoring using smart environmental sensors. (Anderson, 2025)
Services	2	Gas combi boiler providing space heating and hot water.	Boiler approaching service milestone. Strategy is to transition to low-carbon heating via ASHP following fabric improvements.
Ventilation	2	Passive ventilation only; no mechanical extract present.	Installation of whole-house MVHR required to support airtightness, control moisture, and maintain indoor air quality.

3.4 Risks to People and Building.

UKHSA data identifies a 10–30% potential for elevated radon concentrations at the site (*UKradon - UK Maps of Radon*, n.d.). This exceeds the action level of 200 Bq/m³, requiring active mitigation to protect occupant health.

Asbestos (Moderate Risk): 1980s "Artex" textured coatings are present on ceilings. A P402 survey and CAR 2012 compliance (*Managing and Working With Asbestos - HSE*, n.d.) are mandatory before intrusive MVHR ducting works begin.

Moisture and Mold: High occupancy (3 persons) and frequent showering (21/week) create a high vapor load. Without mechanical intervention, the increased airtightness from the "Triple-Shield" fabric will lead to interstitial condensation.

4.0 Services & Ventilation Strategy

4.1 Existing and Proposed Heating Systems

The existing Ideal Logic gas combi-boiler is graded as condition 2 and represents the primary source of operational carbon emissions. In line with PAS 2035 guidance, the system is proposed to be replaced with a 5 kW Air Source Heat Pump (ASHP) following completion of fabric improvements such as this LG Therma V 5kW R32 Monobloc S Heat Pump (BSI, 2023).



(Fig A)(*LG Therma V 5KW R32 Monobloc S Heat Pump*, n.d.)

The current heating system utilizes 15 mm copper distribution pipework designed for high-temperature operation, which is unsuitable for efficient low-temperature heat pump performance (CIBSE, 2016). To support the proposed 5 kW Air Source Heat Pump (ASHP), upgraded pipework, appropriately sized heat emitters and an unvented hot water cylinder are required to ensure efficient operation at reduced flow temperatures and maintain occupant comfort (MCS, 2017).

4.2 Ventilation System Details

Given the identified radon risk and the increased airtightness resulting from fabric upgrades, a whole-house Mechanical Ventilation with Heat Recovery (MVHR) system is specified to maintain indoor air quality and manage moisture levels (HM Government, 2021a; UKHSA, 2023). MVHR provides continuous, balanced ventilation while recovering heat from extracted air, supporting both energy efficiency and occupant health.

To mitigate the risk of radon accumulation beneath the dwelling, the MVHR system will be combined with an active radon sump and barrier linked into the existing damp-proof course, in accordance with BRE guidance (BRE, 2023). This dual approach addresses both internal air dilution and external gas ingress, ensuring compliance with UKHSA recommendations. The MVHR system will replace existing passive ventilation and be commissioned to meet Approved Document F extract rates (HM Government, 2021a).

4.3 Door Undercut Analysis

To ensure the MVHR system functions effectively, internal air must circulate freely between the rooms. Without adequate air transfer, the balanced ventilation system will fail due to factors such as Radon concentrations, high moisture loads, or CO₂ Build up.

Regarding the Technical Requirement, Building Regulations Approved Document F and PAS 2035 standards mandate a minimum "free area" for air transfer of 7,600mm² per door (HM Government, 2021a; BSI, 2023). This is calculated using the following formula:

$$\text{Width (mm)} \times \text{Gap (mm)} = \text{Area (mm}^2\text{)}$$

The 6 internal doors were measured at a standard width of 762mm +/- 2mm. The target gap is at least 10mm (7620 / 762 = 10mm). The current doors all failed on this with a range from 2-7mm, these doors will need to be taken off, undercut and re-installed for maximum efficiency.

5.0 Proposed Retrofit Strategy

5.1 Fabric First & Air Tightness

Following the PAS 2035 principle of "Fabric First," this strategy prioritizes the building envelope to reduce space heating demand before transitioning to low-carbon heating systems (BSI, 2023). By addressing the building holistically, it ensures that individual measures do not create unintended consequences, such as interstitial condensation, poor indoor air quality, or moisture ingress (BSI, 2023; Pebble Trust, 2021) To achieve high thermal performance, we must prioritize the right steps.

Step 1. Injected Cavity Wall Insulation (CWI)

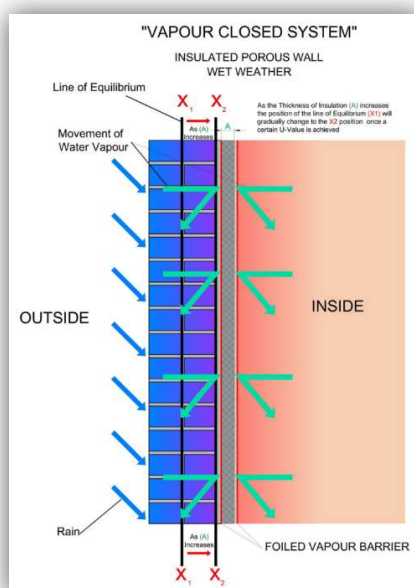
Inject EPS bonded beads into the existing structural void to provide high thermal resistance without slumping. Their closed-cell structure prevents capillary water absorption, a critical requirement for maintaining thermal performance in severe coastal exposure zones (BRE, 2002).

Step 2. External Rain-screen Cladding

Install high-performance BBA-certified FastClad brick-slips on timber counter-battens to create a 50mm drained/ventilated cavity. This moves the primary weather barrier away from the masonry, shielding the CWI from wind-driven rain in accordance with Approved Document C (HM Government, 2021c).

Step 3: Vapor-Closed Hybrid IWI

To preserve the 71m² footprint, apply a 10mm AeroGel blanket to internal blockwork followed by 25mm PIR-insulated plasterboard. The foil-faced PIR acts as a Vapour Control Layer (VCL), preventing interstitial condensation by shifting the dew point externally (BSI, 2021), as seen in Fig B.



(Fig B)

Step 4. Integrated Airtightness Strategy

The installation of the counter-battened rain-screen (Step 2) increases the external wall thickness by approximately 50-70mm. To prevent water bypassing the gutters, timber sprockets will be fixed to the rafters to extend the eaves. This ensures the new uPVC gutters capture runoff clear of the cladding face, preventing saturation of the external envelope (TRADA, 2016).

Step 5: Eaves Extension & Rainwater Management

The installation of the counter-battened rain-screen (Step 2) increases the external wall thickness by approximately 50-70mm. To prevent water bypassing the gutters on the existing "flush fascia" roofline, timber sprockets will be fixed to the rafters to extend the eaves. This creates sufficient overhang, allowing new uPVC gutters to capture runoff clear of the new cladding face.

Step 6: High-Performance Openings

All windows will be replaced with triple-glazed units to eliminate the current thermal weak spots. These units will be set back within the reveal to meet the AeroGel IWI layer, as seen in section 5.2. Minimizing linear thermal bridging (U-values) (BSI, 2023)

Step 7: Integrated Renewables

During the roof renewal, Integrated Solar PV panels will be installed. This system will be paired with an externally mounted battery storage system to maximize self-consumption during peak evening hours (MCS, 2022). This renewable power provides the necessary electrical offset for the MVHR and future ASHP.

Step 8: Low-Carbon Heating Transition

Following the fabric-first upgrades, the existing gas combi-boiler will be replaced with a 5kW Air Source Heat Pump (ASHP).

5.2 Thermal Bridging Mitigation

To prevent "cold spots" and localized mould growth, specific attention is paid to the junctions where different elements meet, in accordance with BRE Digest 262 (BRE, 2002). When the windows are replaced with triple glazing, the IWI must return into the window reveal to meet the frame. This creates a continuous thermal break and prevents heat from bypassing the insulation through the masonry reveal (BSI, 2023). Frames will be sealed to the structural masonry using airtightness tapes to prevent perimeter air leakage as required by Approved Document L (HM Government, 2021b).

Furthermore, the stud wall junction with the external walls must be demolished and insulated behind before re-instating. Failing to do this often creates a vertical cold strip that leads to persistent mould growth in the corners of rooms and behind the partition, a common "unintended consequence" in retrofits (Pebble Trust, 2021). On the ground floor, the Vacuum Insulation Panels (VIPs) must also meet the AeroGel IWI at skirting level. This floor-to-wall connection is imperative to maintain the efficiency of the thermal envelope (BSI, 2023).

5.3 Operational Carbon Upgrades

To offset the electrical load of the new mechanical services, an Integrated Solar PV system will be installed during the roof renewal. Unlike traditional bolt-on arrays, these panels sit flush with the roofline, functioning as the primary weather-proofing layer while preserving the aesthetic in line with local planning guidance (MCS, 2022). This system is coupled with an externally mounted battery storage system, designed to capture daytime solar surplus and discharge it during peak evening hours when occupancy and heating demand are highest. By prioritizing self-consumption over grid export, this directly subsidizes the running costs of the ASHP and MVHR, significantly advancing the property toward the government's 2050 Net-Zero target (DESNZ, 2021).

6.0 Roadmap & Conclusion

6.1 Recommendations

The retrofit for 6 Ferry Way follows a sequence to manage costs while ensuring compatibility between fabric and services.

Immediate Recommendation

- Install smart air quality monitors and Aico Sensors to monitor moisture, air quality, and CO₂ Build-up.
- Install Radon Monitoring sensors to monitor radon levels.

Short-term (1–2 years): Maintenance & Risk Mitigation

- Service the Ideal Logic boiler and replace external doors and windows with triple glazing.
- Install the active radon sump and MVHR system to address the 10-30% risk.
- Commission asbestos sampling on Artex ceilings before ductwork installation.

Long-term (5–10 years): Deep Retrofit & Decarbonization

- Install breathable CWI, the brick-slip rain-screen, and AeroGel IWI system to eliminate heat loss in the very severe exposure zone.
- Renew the roof coverings with integrated Solar PV and externally mounted battery storage during the eave extension.
- Once the fabric is secured, replace the gas supply with a 5kW ASHP and upgrade pipework.

6.2 Conclusion

The integrated retrofit of 6 Ferry Way is expected to deliver a significant improvement in building performance by addressing the performance gap typical of 1980s dwellings. The implementation of high-performing fabric and services stabilizes internal surface temperatures, significantly reducing cold spots and draughts, while the 5 kW ASHP supports consistent occupant comfort and reduces annual CO₂ emissions from the 2.4-tonne baseline toward Net Zero.

This retrofit strategy aligns with the five principles of deep retrofit through a whole-house, fabric-first approach that prioritizes ventilation before airtightness and the avoidance of unintended consequences. Sequencing ensures heat demand is reduced before the introduction of low-carbon technologies, while balanced MVHR, active radon mitigation and robust junction detailing protect occupant health and building fabric. Post-installation monitoring and a phased roadmap support long-term performance, adaptability and quality assurance.

From a health perspective, the transition from passive ventilation to whole-house MVHR significantly reduces the risks associated with radon, damp, mold and condensation. Collectively, these measures are expected to move the property from EPC Band C (72) to a potential Band B or higher, creating a durable, healthy and energy-secure home for the occupants over the long term.

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8.0 Appendices

Appendix A.

Openings Schedule (Windows & Doors).

General Specification (External):

- Glazing Standard: Triple-Glazed Argon-filled units with warm-edge spacer bars.
- Target U-Value is around 0.80 W/m²k (Passivhaus standard recommended for "Severe" exposure).
- Insulated uPVC or Alu-Clad Timber (Anthracite Grey/White to match streetscape).
- Units to be set back into the reveal to abut the AeroGel IWI layer. Compriband expanding foam tape and Tescon Vana airtightness tape to be applied to all perimeters.
- NO Trickle Vents installed. Background ventilation is strictly managed by the MVHR system to prevent uncontrolled heat loss.

Ref	Location	Existing Condition	Proposed Action	Dimensions (Est.)	Notes
W01	Lounge (Front)	PVC Double Glazed (Failing Seals)	Replace (Triple)	1800×1200 mm	Large span; prioritize solar gain (g-value >0.5).
W02	Kitchen (Rear)	PVC Double Glazed (Drafty)	Replace (Triple)	1200×1000 mm	Safety glass required (if <800mm from floor).
W03	Bed 1 (Front)	PVC Double Glazed (Condensation)	Replace (Triple)	1200×1200 mm	Acoustic laminate recommended for street noise.
W04	Bed 2 (Office)	PVC Double Glazed	Replace (Triple)	900×1200 mm	Critical for thermal comfort during sedentary work.
W05	Bed 3 (Rear)	PVC Double Glazed	Replace (Triple)	900×1000 mm	Child safety restrictors required.
W06	Bathroom	PVC Double Glazed (Obscure)	Replace (Triple)	600×900 mm	Obscure glass (Level 5 privacy).

Appendix B.

Proposed Radiator & Emitter Schedule

Design Parameters:

- Heat Source: 5kW Air Source Heat Pump (ASHP)

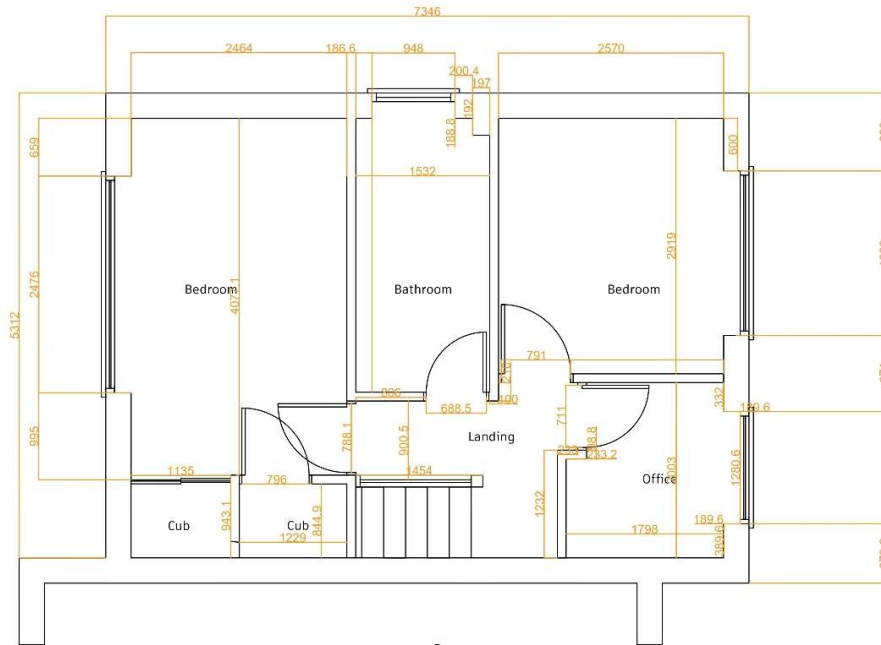
- Target Flow Temperature: 45C
- Design Delta T: 25C
- Pipework Specification: All drops and feeds upgraded to 15mm copper; primary distribution loop upgraded to 22mm.

Room Location	Heat Loss Est. (Watts)	Proposed Emitter Type	Dimensions (H x W)	Control Strategy	Notes
Lounge	1,200 W	Type 33 (Triple Panel)	600×1400 mm	Smart TRV	High output required for sedentary comfort. Type 33 selected to fit existing wall space.
Kitchen / Diner	800 W	Type 22 (Double Panel)	600×1000 mm	Smart TRV	Sized to overcome extract ventilation heat loss (13 l/s).
Hallway	600 W	Type 22 (Double Panel)	600×800 mm	Thermostat (No TRV)	Reference Room: Radiator stays open to ensure minimum flow rate for the ASHP cycling.
Landing	400 W	Type 11 (Single Panel)	600×600 mm	Smart TRV	Heat rises from Hallway; lower output required.
Bedroom 1 (Main)	900 W	Type 22 (Double Panel)	600×1200 mm	Smart TRV	Oversized to allow rapid warm-up times at low flow temperatures.
Bedroom 2 (Office)	700 W	Type 22 (Double Panel)	600×1000 mm	Smart TRV	Critical for home working comfort (static occupancy).
Bedroom 3	500 W	Type 22 (Double Panel)	600×800 mm	Smart TRV	Child's room; TRV can be limited to prevent overheating.
Bathroom	450 W	Hybrid Towel Rail	1200×600 mm (High Output)	Manual Valve	Sized for ASHP flow temps. Electric element included to allow for towel drying in summer when the primary heating system is off.

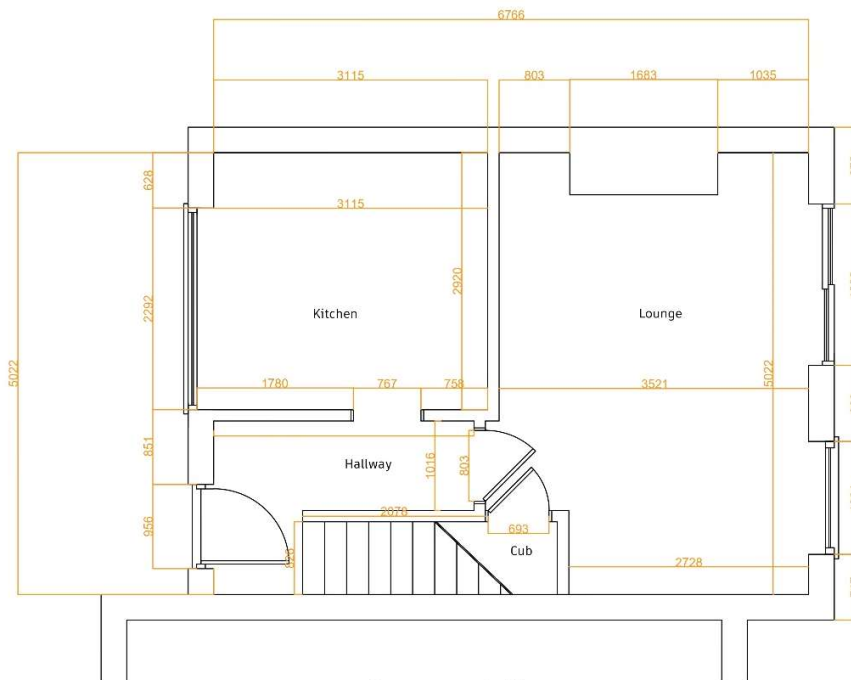
Heat loss estimates are based on the improved fabric performance (U Values=0.18.-0.22 W/m²K)

Appendix C.

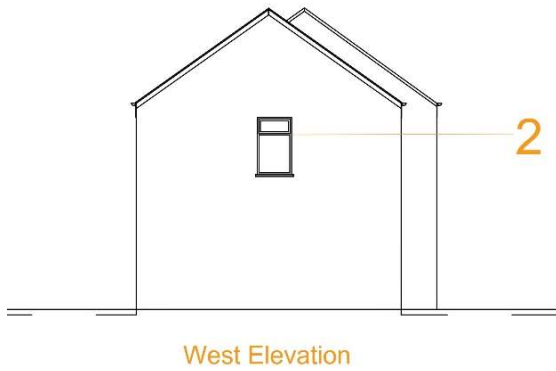
Floor Plans & Section.



First floor.



Ground floor.



West Elevation Section

Key

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

Elements

- Face brick outer leaf
- PVC Window
- PVC Door
- Plastic rainwater goods
- PVC Facias
- Concrete roof tiles
- Finish floor level
- Ground level



Appendix D.

Site Photographs (Existing Condition).

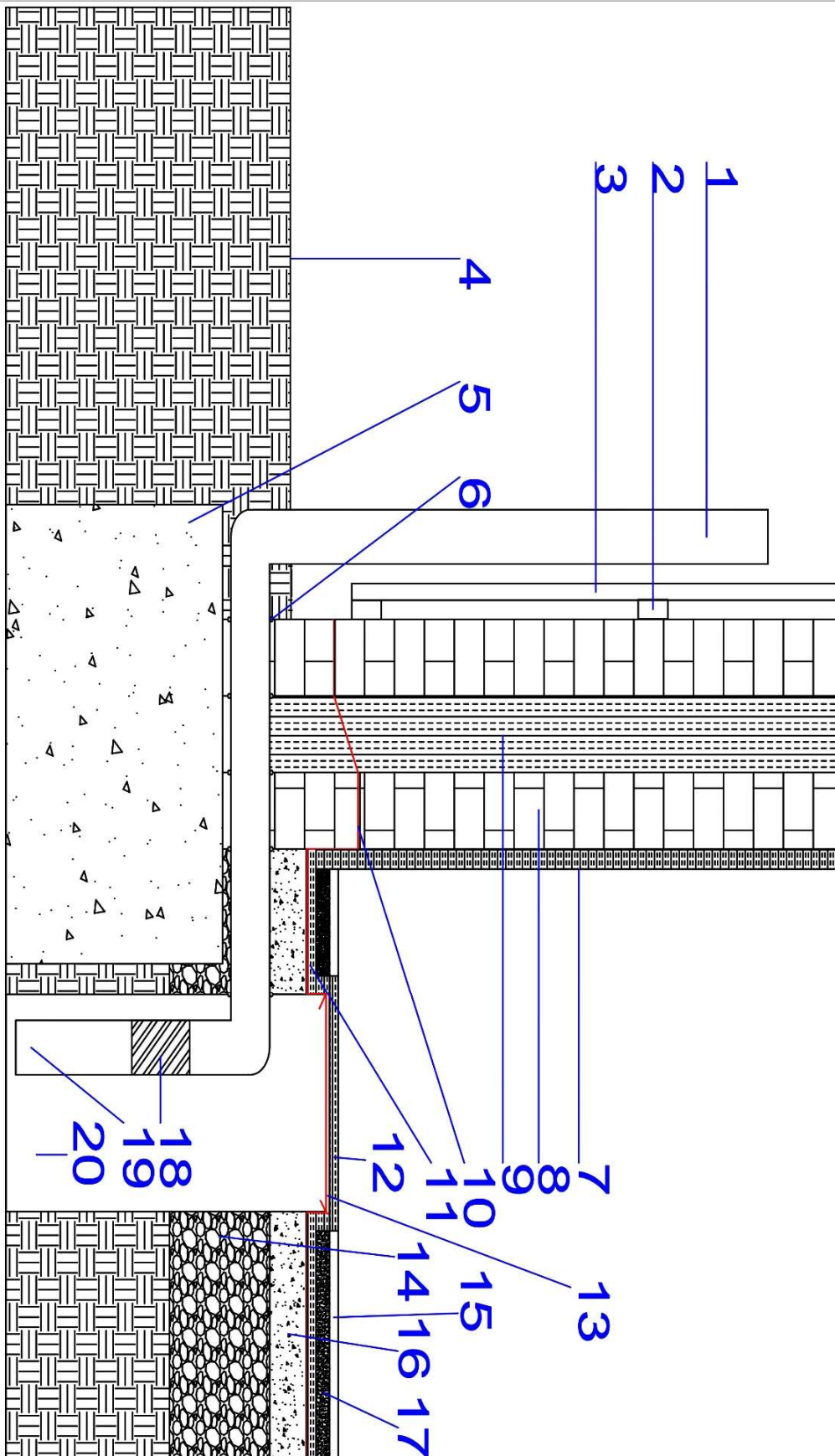








Appendix E.
Wall Detail & Radon System



Ref No.	Element Name	Technical Description & Function
1	Sump pump extractor Flue	External exhaust path for the active radon system, ensuring soil gases are vented safely away from building openings.
2	Counter-battens	Timber battens with integrated DPC, creating a ventilated cavity to manage moisture and wind. Includes rodent mesh to prevent infestation.
3	Brick Slip Rain-screen	High-performance system that mimics the existing external finish providing a primary weather barrier.
4	External ground level	Finished grade featuring an Aico Drain system to manage runoff from the rain-screen into existing soakaways
5	Existing Strip Foundation	Original 1980s structural concrete footing
6	Water/Air proof seal around penetrations.	Specialist sealant around penetrations to prevent groundwater and soil gas ingress into the sub-structure.
7	Internal Wall Insulation (IWI)	High-performance PIR fixed internally with thermal break fixings.
8	Internal Blockwork	The original 1980s concrete block inner leaf serving as the primary thermal mass.
9	New Cavity Wall Insulation	Injected expanded polystyrene (EPS) bead bonded with an adhesive (CWI) filling the existing structural void.
10	Radon Barrier Detail	Radon Barrier membrane tied into the existing DPC/Cavity tray to create a continuous gas-proof envelope.
11	Floor Insulation	Ultra-thin 25mm Vacuum Insulation Panel providing high thermal resistance without floor height issues, complete with puncture protection barrier and separation barrier allowing the screed to move independently.
12	Insulated Over Service Hatch	Critical sealed junction at the sump pump lid, allowing for future maintenance without compromising airtightness
13	Airtight Gasket to Sump Pump	Mechanical airtight seal ensuring no radon ingress into living space.
14	Subbase	Compacted hardcore
15	Flexible Levelling Screed / Bedding	A thin, flexible layer to ensure a flat surface for floor finishes.
16	Existing concrete Slab	The original 1980s uninsulated 100mm solid floor
17	25mm PIR Insulation board	Secondary insulation layer used to reach a total floor thickness of 60-70mm, significantly exceeding standard building regs thermal requirements.
18	Radon Extract Fan (Active)	Low-wattage inline fan to create negative pressure beneath the slab.
19	Sump pick-up	Primary collection point for sub-slab gases, positioned at the lowest point of the enclosure.
20	Purpose build Sump enclosure	Specialized sub-floor chamber designed by a Radon Engineer