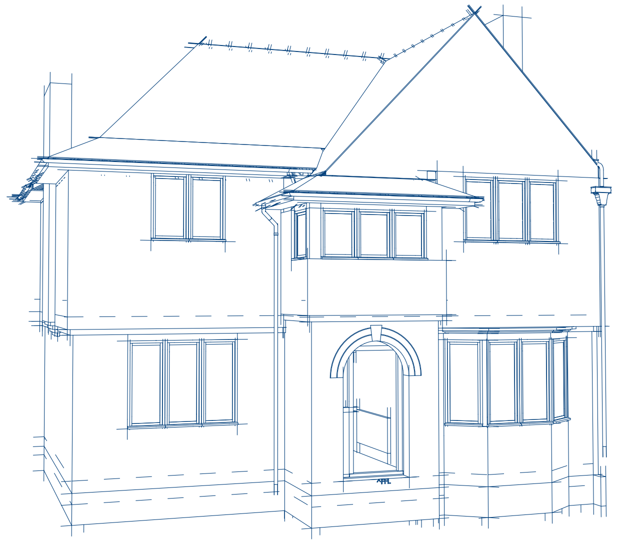
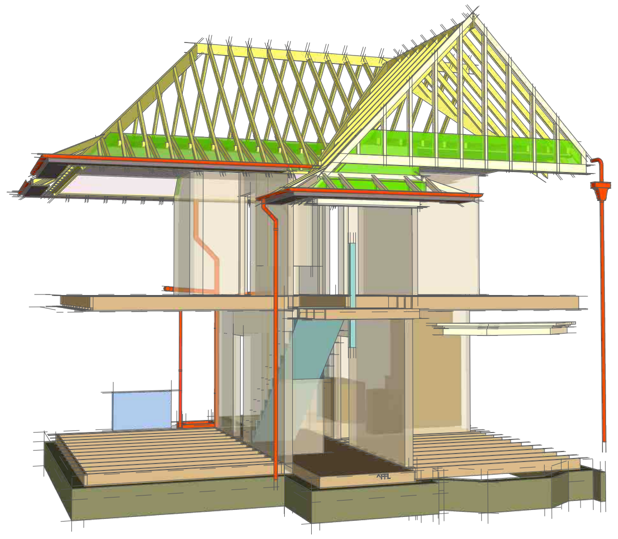
HOME UPGRADE GUIDE

1 Your Street, UK





Your personalised renovation pathway to a comfortable, efficient home.

RVI Architectural Design
January 2026

Enhancing comfort, energy efficiency, health, climate resilience and value at every step.

We have explored the issues discovered, proposed options for optimum upgrades to meet your objectives and provided you with an informed understanding of your home.

A detailed digital twin (3D model) of your home has been created which is used to explain the HUG options in this document. The model can be updated to record upgrades and remains a live reference guide for you and your Home Logbook.

We can arrange access to the digital twin which can be accessed through free viewer software to explore and interact with the model. This requires additional processing work and if required it will be quoted for separately.

You may be eligible for grant funding. To check your eligibility for grants that might be available to you see Citizens Advice:
https://www.citizensadvice.org.uk/consumer/energy/energy-supply/save-energy-at-home/get-help-with-the-cost-of-energy-efficiency/

Home Logbook

A home logbook is where your HUG can be stored for reference along with other key documents. You can create your own for free or we can provide a service to setup and populate this for you.

Chimni, HOP and The National Deeds Depository are the only 3 ‘official’ systems that are designed for individual private residences.

Are Digital Logbooks Even A Question Anymore? and article by Matt Milloy of Refurb and Retrofit Magazine.
https://www.refurbandretrofit.com/are-digital-logbooks-even-a-question-anymore/

https://chimni.com
https://www.homeownerspassport.com/hop-consumers/
https://www.thedeedsdepository.com/

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HUG Overview

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RVI Architectural Design
50 Oaks Road, Croydon, CR0 5HL 07525 901 647

The Purpose of your Home Upgrade Guide - HUG.

This guide informs and empowers you to confidently coordinate renovation works in phases.

Every step designed to safely enhance comfort, health, value and efficiency based on clear, straightforward architectural advice.

Helping you define and record a program of works to suit your needs, budget, timescales and patterns of everyday life.

Discounted finance and grants may be available, depending on your circumstances, when you present this HUG.

What to expect from your HUG...

- Survey of your home inside and out with risk summary
- Assessment of defects, repair and maintenance requirements
- Understanding performance characteristics
- Proposing phased works program tailored to your priorities
- Priority upgrades checklist - comfort, health and energy efficiency
- Rigorous architectural design with coordinated specification
- Designed for simplicity, integrity and practicality
- A gas or oil boiler 'funeral plan'
- Control over costs, finance options, programs and outcomes
- Adaptable for future extension or renovation
- Appropriate guidance for manageable DIY tasks
- A logbook recording your home upgrade journey
- A digital twin of your home and all its features
- A home fit for the future

Designed to solve these common problems:

...hard to keep warm during winter

...draughty, uncomfortable spaces

...overheating during summer

...persistent mould and damp

...expensive to run

...worry about fuel cost and price rises

...environmental impact

...some rooms are unusable at times

...lacking understanding of how the house performs

Designed to overcome these common barriers:

...knowing where to start

...understanding what upgrades are possible

...being sure you're getting good advice

...finding and briefing installers

...accessing grants available

...qualifying for discounted long-term finance

...confidence in adding value

...reliable quality assurance and guarantees

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Purpose of your HUG

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Why does your home need a HUG?

The official term for your HUG, according to official govenrment guidance in PAS 2035:2023 is a MEDIUM-TERM IMPROVEMENT PLAN (M-TIP):

"The purpose of a medium-term improvement plan is to guide the staged or phased improvement of a dwelling by identifying the improvements that are needed and an appropriate order for their implementation, and by highlighting critical interactions between them. Such plans should be updated to respond to changes in standards or the availability of new technologies, and to record improvements as they are made."

Key advisory services and organisations provide their own definitions and explanations of upgrading your home for improved efficiency and comfort outcomes. All emphasise the need for a holistic plan of works. These plan form the basis of many lending requirements for 'green' loans and mortgages. Your HUG identifies the optimum M-TIP for your home and your circumstances:

Energy Saving Trust

- partner to Lloyds, Halifax, Barclays, Co-operative, Santander and others.

"Because everything in a home is connected, it helps to think about the whole building, not just one bit at a time. This can reduce the risk of problems like damp or poor ventilation. That's why it's a good idea to have a whole house plan. This doesn't have to be complicated.
A whole-house plan means you reduce the risk of unintended problems later by:

- *Understanding how your home works now.*
- *Thinking about what changes you might want to make in the future.*
- *Making sure different improvements will work well together.*

You can still do the work in stages, over time. That's normal and often the only realistic option. But even if you only make one change now, knowing how it fits into the bigger picture can help you make better decisions.
It's about good planning and design, not about having to do everything at once."

Centre for Sustainable Energy

- a national charity tackling the climate emergency the suffering caused by cold homes.

"Retrofitting your home can be quite daunting – where should you start and what should you prioritise? Each home is unique; how a home is built, what adaptions have been made and how it's used will influence the best approach to retrofit

It's important to consider the whole house as a system, looking at not just energy bills but also at comfort, aesthetics, heritage and maintenance needs.

The best place to start is with the basics to make your home more comfortable and easier to keep warm and healthy. CSE's retrofit experts recommend a 'fabric-first' approach, prioritising repairs, insulation, draught-proofing and ventilation before more exciting measures like solar panels and heat pumps. A home that leaks heat through draughts or poor insulation wastes energy, whether it's renewable or not!"

Green Finance Institute

- GFI is at the forefront of shaping how finance can be used to facilitate a real economy transition.

"Green mortgages are designed to either incentivise sustainable purchasing decisions in the residential property market, or directly finance energy-efficient home improvements. By offering preferential terms – such as lower interest rates, cashback, or enhanced affordability – green mortgages reward customers for purchasing energy-efficient homes. Green further advances, second charge loans and cashback offerings can also fund retrofit works directly, significantly bringing down retrofitting costs – especially when coupled with government grants like the Boiler Upgrade Scheme (BUS)."

National Retrofit Hub

- NRH is a nonprofit organisation that brings together all those involved in retrofit to collectively drive retrofit at scale. The GFI works closely with the NRH to continue evolving the finance opportunities for retrofitting of homes at scale.

Matthew Goldschmied - the founder of RVI and creator of the HUG concept, co-authored the NRH definition of solution-agnostic retrofit in April 2024. This principle underpins the HUG. The RVI approach builds a framework of enhanced information and architectural intelligence to deliver your tailored plan.

A solution agnostic approach is outcomes based, where the most appropriate products, technologies and services are integrated in the context of a whole house retrofit, to minimise risk, protect the occupant, building, and its surroundings.
A whole house retrofit can be carried out in one or multiple stages.

Products, technologies and services for retrofit include, but are not limited to:

- *Energy efficiency, building fabric and ancillary measures.*
- *Low carbon space heating and hot water systems.*
- *Energy generation, storage and heat networks.*
- *Controls, smart technologies and performance improvement.*
- *Climate change adaptation, health, safety and wellbeing.*
- *Broader sustainability e.g. embodied carbon and circular economy.*
- *Taking into account the building, the local area energy plan, the customer, end user and workforce needs.*

How the HUG sets new standards of quality?

- *Detailed constructional analysis of your home*
- *Heritage and conservation area sensitive design and specification (where required)*
- *Appropriate solutions for traditional buildings (hard to treat)*
- *Moisture & ventilation assessment and safety strategy*
- *Plans that integrate with typical renovation projects*
- *Health-focused material upgrade specifications*
- *Window, door thermal bridging analysis and strategy*
- *Assessment of IWI/EWI feasibility and risk*
- *Floor, roof & wall assembly design and upgrade options*
- *Heat pump readiness and fossil-fuel 'funeral plan'*
- *Solar feasibility outline*
- *Risk mitigation & sequencing*
- *Full 3D digital twin model of your home and use guidance*
- *Installer-ready annotated drawings*
- *Home logbook setup*

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OUTCOMES and OBJECTIVES

FINANCIAL	Lower Energy Bills	Minimise energy needed to run the home - reduce gas and electricity consumption
	Phased Implementation Pathway	Inform the sequencing and programming of works and upgrades over time whilst ensuring holistic outcomes
	Good Investment	Ensure upgrades avoid the risk of adverse outcomes and improve the building's integrity
COMFORT	Warmer in Winter	Reduce heat loss and draughts to easily maintain a comfortable temperature
	Cooler in Summer	Reduce the instances and risk of overheating in the summer
	Installation Disruption	Present upgrade options that can be implemented in simple packages minimising disruption to everyday life
	Informed Decision-Making	Provide you with knowledge and understanding to communicate your needs to installers and specifiers
HEALTH	Healthy Ageing	Improve habitable conditions to support heatlh and safety for later living
	Improved Indoor Air Quality	Ensure that toxic air from cooking and washing is expelled and fresh air is brought in whilst minimising heat loss
	Eliminate Mould and Mildew	Regulate the internal humidity conditions so mould and mildew find nowhere to grow
	Lower Environmental Impact	Reduce gas flue emissions immediately and facilitate pathway to electric heating and hot water
RENOVATION	Improve Functionality	Investigate remodelling and extension at the rear on ground floor to support specific usage requirements in design brief
	Integrate Upgrades	Evaluate and tailor proposed performance upgrades to context of proposed remodelling and extension

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HUG Objectives

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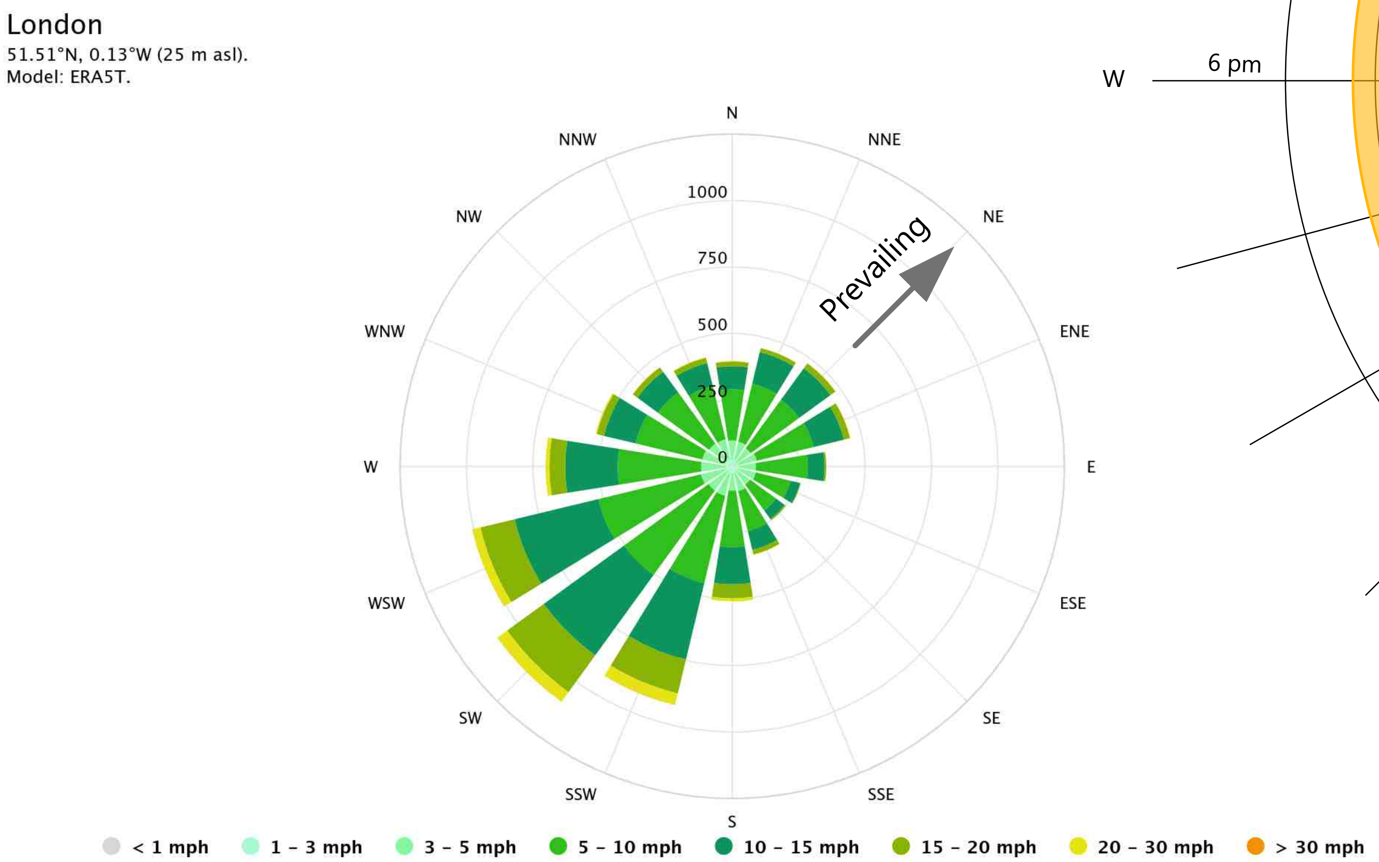
SITE and CONTEXT

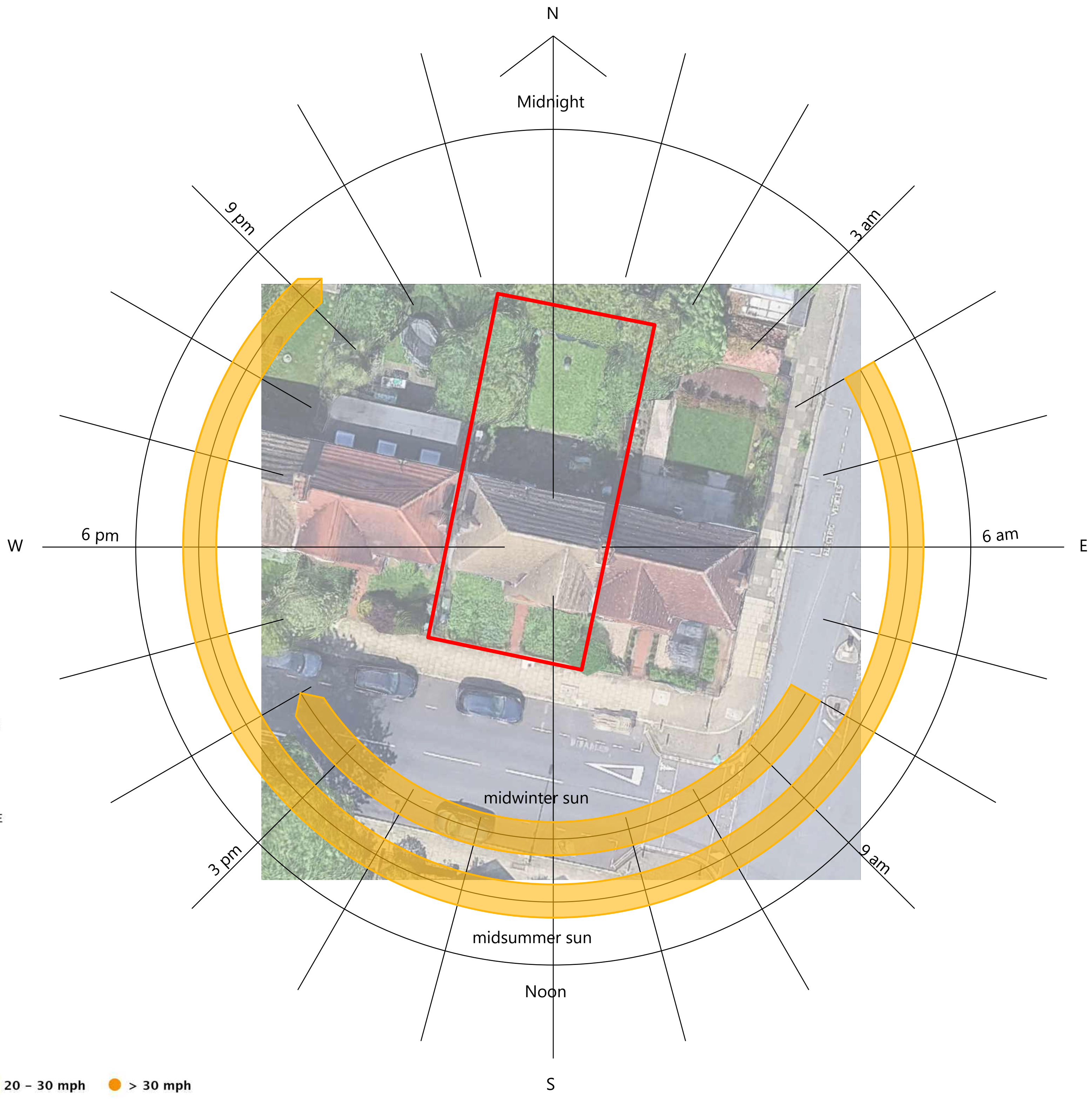
Prevailing wind and rain is from a south-westerly direction towards the rear elevation of the house.

Building orientation means front (S) elevation is exposed to consistent direct solar radiation. In warmer months this can provide beneficial solar gain and in cooler months assist with moisture evaporation. The side (W) elevation is largely shielded from exposure to wind driven rain by No. 95. However, wind driven rain may be funnelled through the alleyway and affect the exposed side of the external chimney breast. Both chimneys are exposed to wind, rain and direct solar radiation.

The house has one attached side to No 99 leaving 3 sides exposed externally. The house has no later additions to the original house which was built in early C.20th.



Wind rose



Sun path

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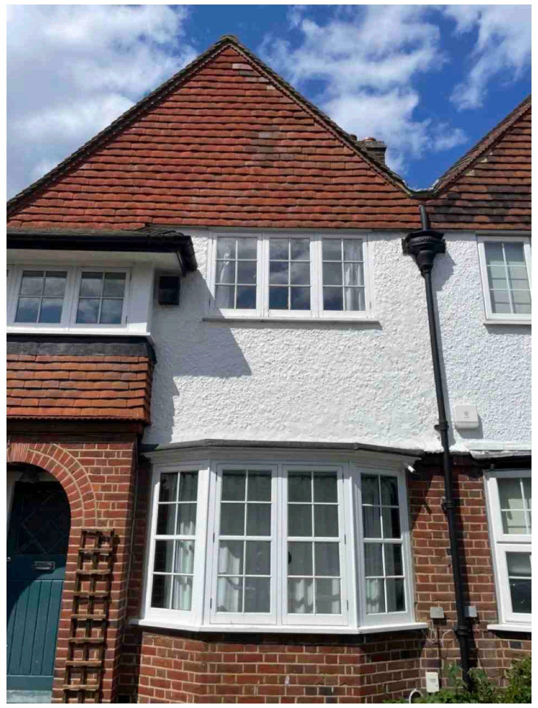
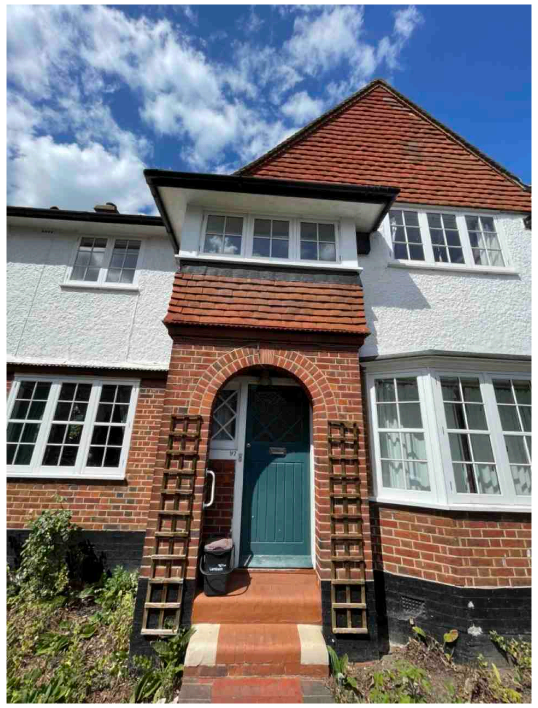
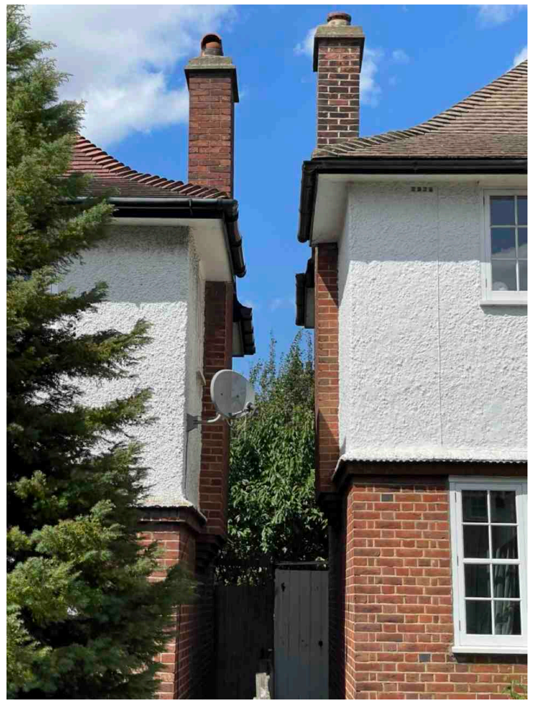
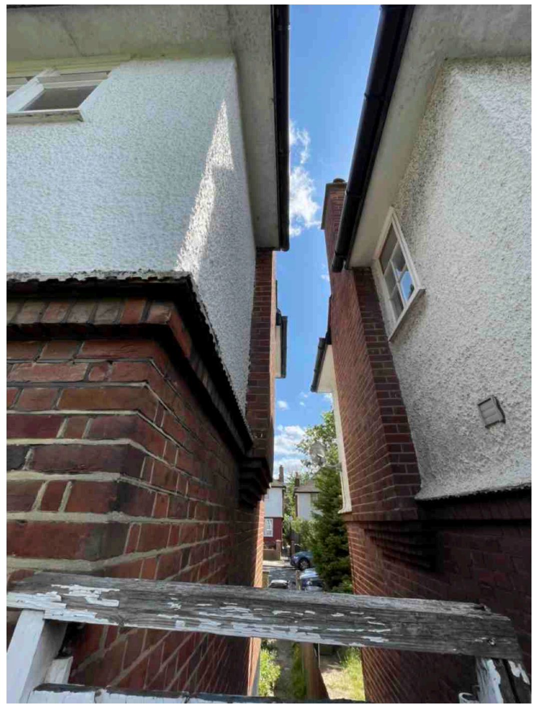
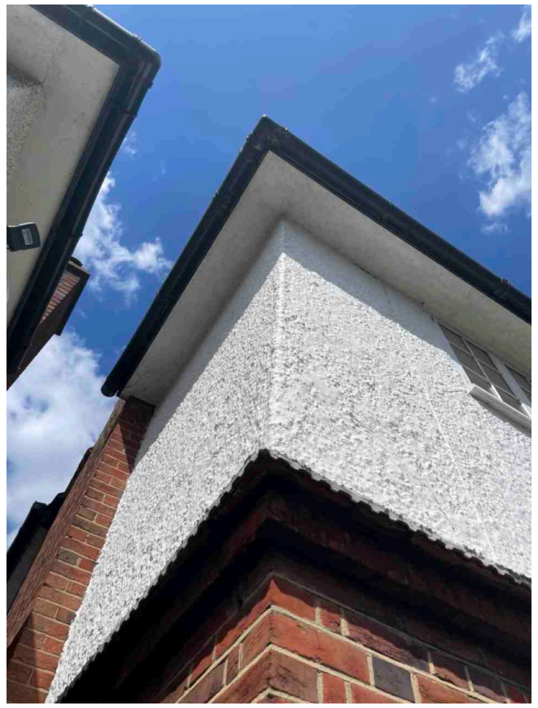




Front South elevation


Rear North elevation



Side passage to West



Southwest corner

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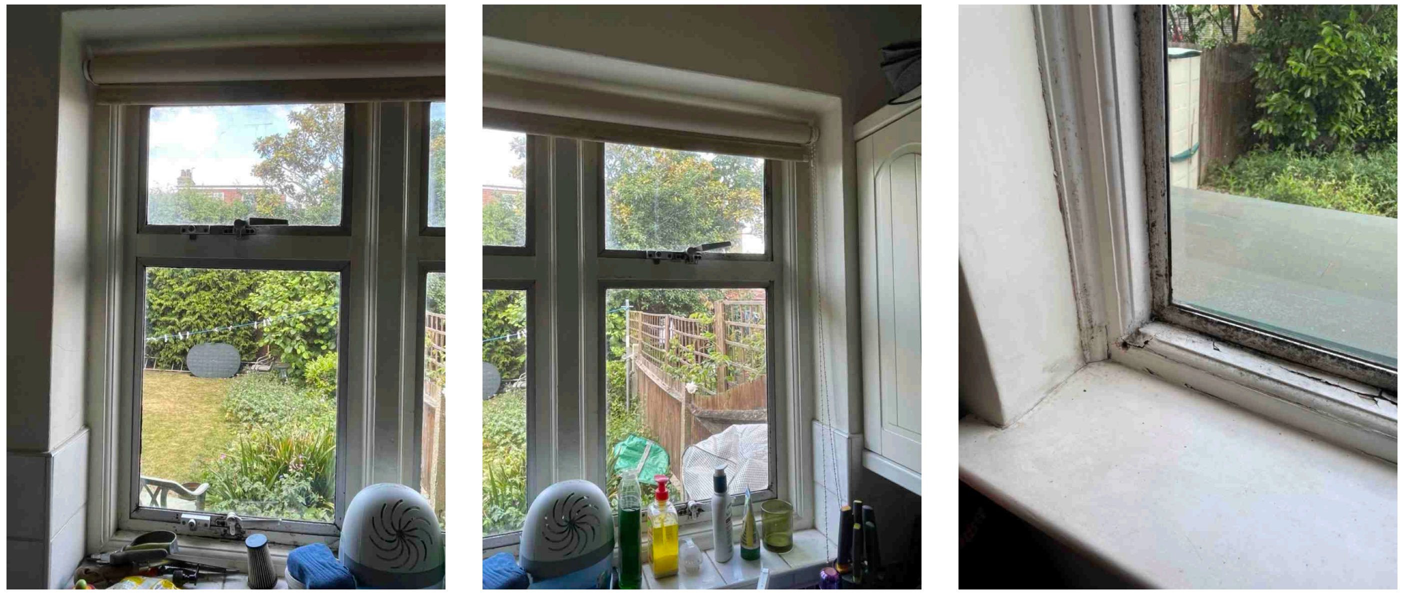
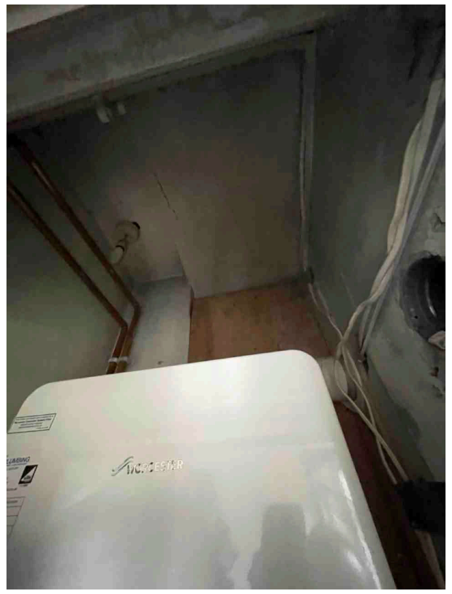
Timber windows to front elevation - failed DG units and condensation damage to timber framing

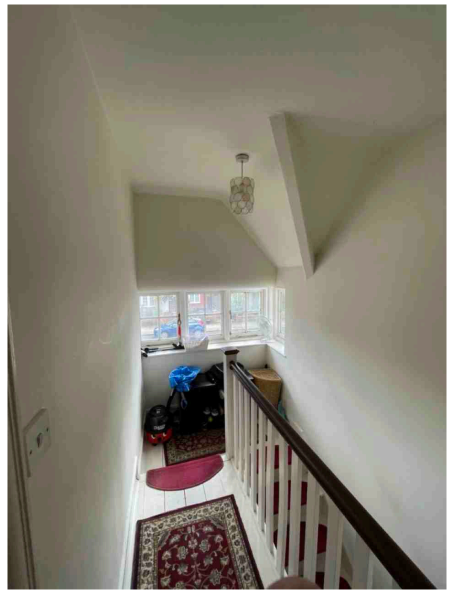


Aluminium framed glazed units set within original timber framing - condensation damage and mould growth

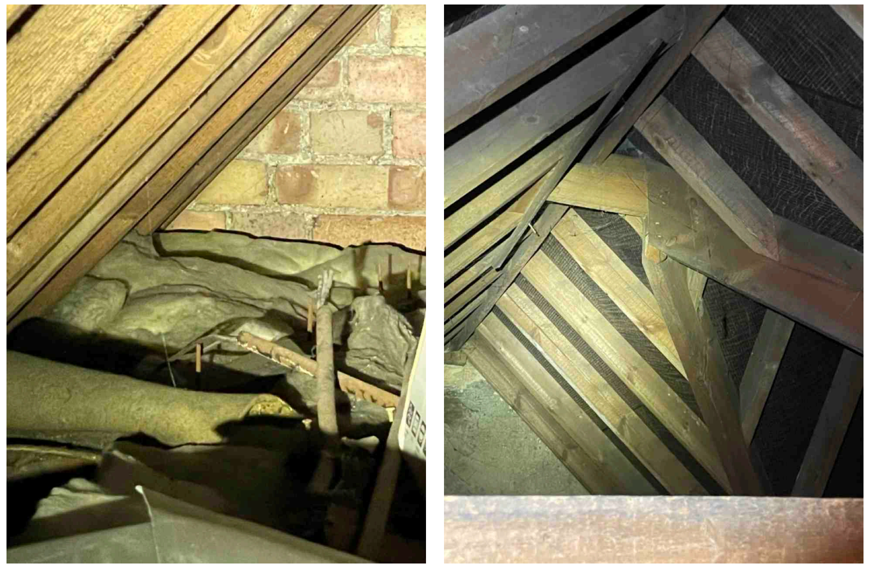
Water penetration and excessive moisture buffering in localised areas of walls and ceilings



Gas boiler



Front bay interior with vaulted ceiling



Inconsistenct roof insulation between joists, uninsulated rafters

Flexible extract ducting, damaged sarking felt and good natural ventilation into roof void

Loft hatch - not sealed or insulated. Basic iMEV in bathroom and kitchen

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ASSESSMENT and OBSERVATIONS

WALLS - 33% of total heatloss*

Original house is constructed of sold brick and suffers from the typical comfort and heating challenges associated with solid wall buildings fitted with intermittent output gas boiler central heating systems. Exterior is rendered and decorated with a modern plasticised exterior paint coating. Water ingress is evident internally where damage has resulted in peeling paint, staining and mould, particularly below the valley gutter shared with No.99.

Internally walls are plastered, papered and decorated with paint, wallpaper or tile.

Front bay at 1F level and front gable front are clay tile hanging over timber frame.

ROOFS- 25% of total heatloss*

Roof is a typically thermally inefficient construction that struggles to retain heat in winter and allows significant internal overheating in summer.

Initial inspection indicates the roof structure is in good condition but the bituminous hessian sarking felt appears to be damaged in isolated areas. Further investigation of valley gutter at SE corner is required to assess timber condition and junctions.

The lightweight insulation materials installed between the ceiling joists do not have the thermal capacity properties to protect against more frequent and prolonged warm weather conditions. Installation appears inconsistent and not continuous. Skeiling slopes do not appear to be insulated at all.

Roof coverings appear to be in generally good condition and there is no expectation that they need replacing in the short to medium term.

WINDOWS and DOORS - 15-25% of total heatloss*

The front door and sidelight appear to be the only original controlled openings remaining.

To the front, conservation area approves timber windows with various types of glazing units have been installed to replace dilapidated originals. To the rear most windows have been modified to replace original casements or fixed glazed panels with slimline aluminium framed units. These appear to be fitted into the original frames. Glazed surfaces represent a significant proportion of the total external area of the house.

FLOORS - 10-20% of total heatloss*

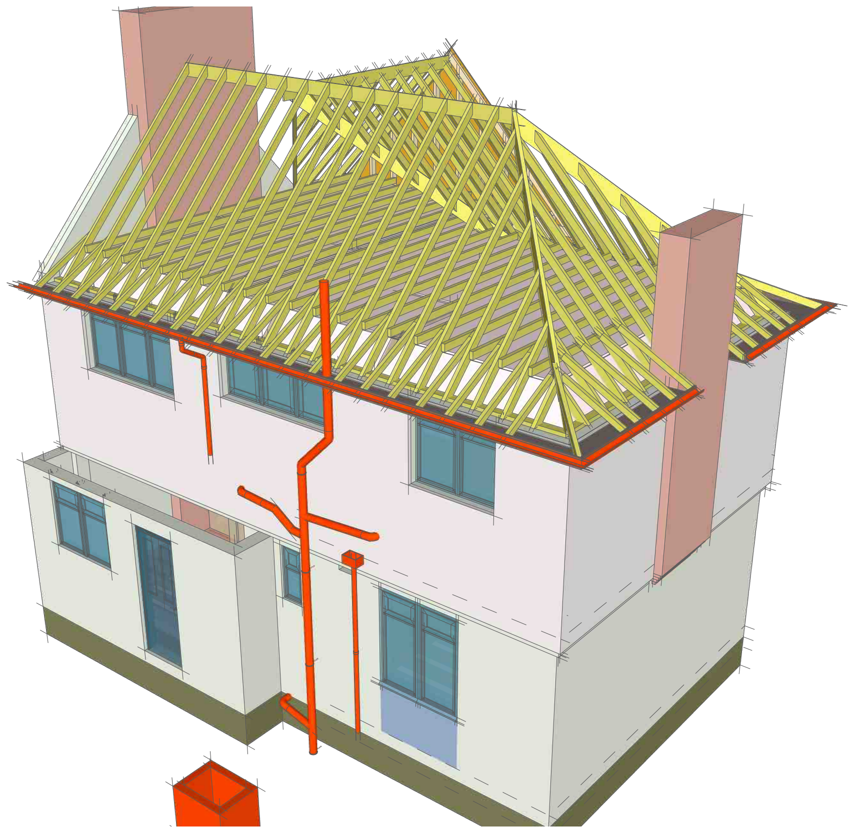
Ground floor is predominantly suspended timber construction which radiates cold to all internal rooms during colder seasons. Cross ventilation across the void has been correctly retained to ensure underfloor moisture is appropriately managed. The central spine hallway floor appears to be solid and buttresses the brick walls that take lateral joist spans.

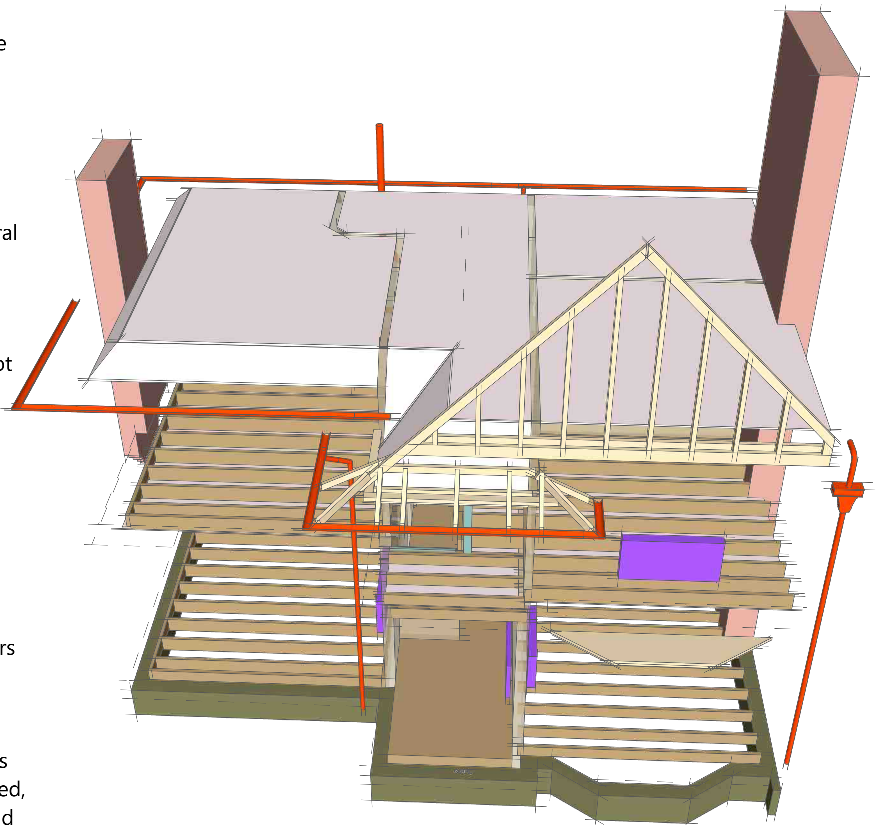
HEATING

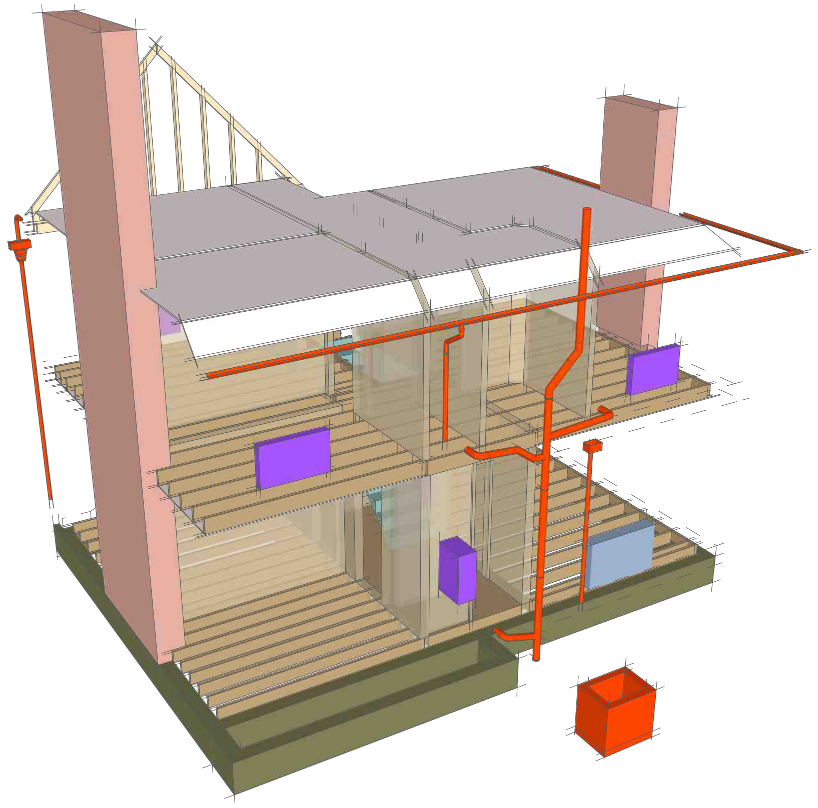
Modern condensing combination boiler serves the house with central heating and hot water directly to DHW outlets and into a flow/return CH loop. Future opportunity to transition to an electric heating system will be facilitated within the upgrade plan including location of a new HWC. The immediate requirement is to reduce gas usage by reducing demand. This will be achieved through improving heat retention and operational efficiency.

VENTILATION

Ventilation comprises a mixture of active and passive systems.
Intermittent MEV (mechanical extract ventilation) to kitchen and bathroom.
Direct passive wall vents to master bedroom and living room. Boiler enclosure appears to have no passive ventilation.
Existing chimney flues allow uncontrolled ventilation (draughts) to varying amounts depending on wind speed and direction where openings have not been blocked.
Additional uncontrolled (and unwelcome) ventilation finds its way through small gaps between floorboards, at window junctions, at window openings where seals have failed, under doors and at the junctions of floors to walls. Overall the ventilation strategy and systems are inadequate to maintain appropriate humidity and air quality.







*typical heatloss of a home according to the Energy Savings Trust research

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EXISTING ROOFS

MAIN ROOF

Roof Pitches - Original roof rafters (4"x2") apparently in good condition support a bituminous sarking felt in generally good condition with clay tiles over.

The principal roof spans east to west with a hipped gable at the west side. Collars span north to south supporting the ceilings to rooms below and rafters extend below joist collar line to create skeilings in rooms below. Splayed rafters extend over skelings to deep projecting eaves covered by timber soffit boarding and fascia board carrying guttering. A large flat gabled dormer projects southwards forming valley guttering where it intersects with the main southern roof plane. This creates a complex detail at the party wall junction with No.99 which contains a concealed outlet taking rainwater via an internal pipe that emerges through the tile hung panel above the eastern skeiling void. This junction presents signs of water ingress and requires detailed inspection and repair.

Insulation - consists of glass wool between ceiling joists (c. 50-100mm). Pitched roof slopes have no insulation.

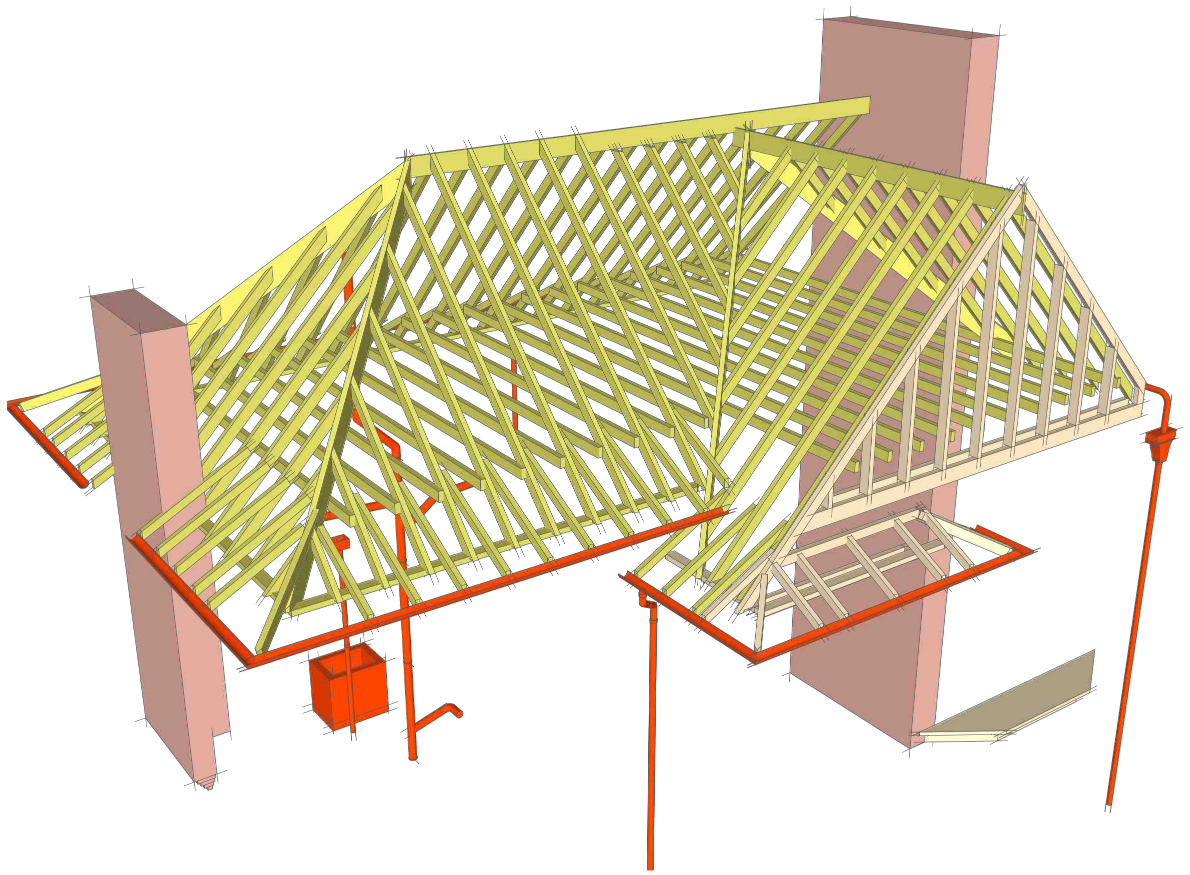
Eaves ventilation appears to provide free ventilation throughout the loft space and there are no signs of excess humidity or moisture.

CENTRAL BAY ROOF

A small hipped roof sits over the projecting central bay at the front which intersects with the dormer framing. The dual aspect bay appears to be of a timber frame construction with tile hanging to the solid section and timber framing with timber casement windows on two aspects. No invasive investigation conducted. TBC

FRONT BAY ROOF

The small flat roof over the projecting bay to the dining room is of timber construction with decorative mouldings supporting a mineral felt covered outer plane. This is unlikely to be insulated but no invasive investigation has been conducted. TBC



ROOF UPGRADES - General Strategy

MAIN ROOF

With no intention to extend the house into the roof or to utilise the space as a room in roof conversion, the most effective and cost efficient way to improve thermal performance is to insulate at joist level.

The loft space should be cleared of all contents existing insulation assessed and likely removed. Addition of high density biogenic insulation material, such as wood fibre or hemp, between the joists and a layer over joists abutting the pitched rafters at skeiling junction. Skeiling pitches should be insulated down to the top of brick walls ensuring that adequate ventilation pathways are retained above the insulation layer and below the sarking felt.

The flat Gable front is assumed to be a timber frame construction with external tile hanging facade. If this is the case then vertical insulation should be inserted within the timber frame that extends below joist level. Further investigation will be required to determine precise construction and insulation detailing.

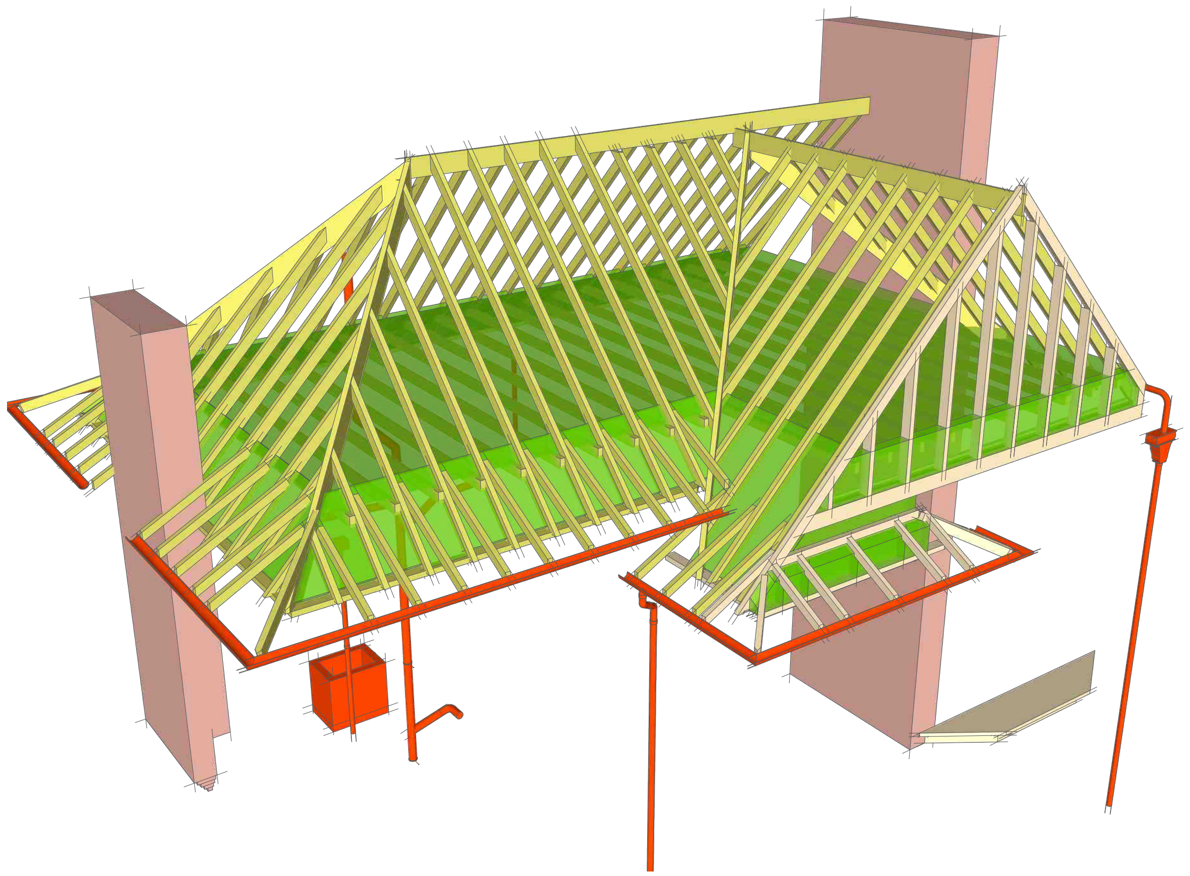
CENTRAL BAY ROOF

The internal walls and soffit finishes are likely supported by a complicated joinery frame that intersects with masonry and timber components at south and west planes. Further investigations will be required to identify the detailed insulation strategy required. particular attention should be paid to insulation installations that provide continuity and prohibit thermal bypass.

The use of vapour permeable and hygroscopic materials will be critical to reduce the risks of unintended moisture management consequences.

FRONT BAY ROOF

Further invasive investigation is required to identify the joinery construction and opportunities for retrofitting insulation. Junctions and integration of materials required will require detailed specification.



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MAIN ROOF UPGRADE SPECIFICATIONS

EXISTING

1 Cold Bridge enabling direct and rapid heat transfer

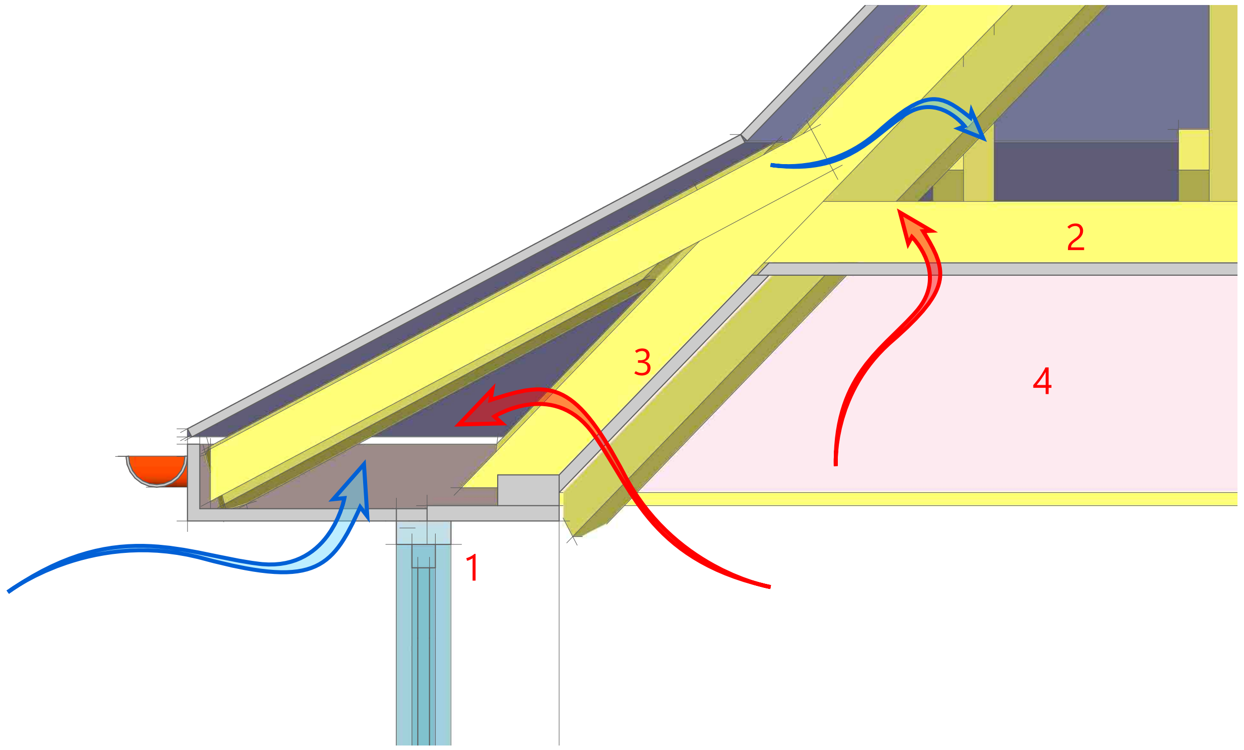
2 Poor thermal resistance and capacity. Inadequate heat retention and susceptible to overheating.

3 Poor thermal resistance and capacity. Inadequate heat retention and susceptible to overheating.

4 Thermal bypass between top of stud frame and roof rafter slope.

Thermal Protection	U-value 1	W/m2K	4
Moisture Proofing	Surface RH 2	%	>80
Heat Protection	Phase Shift 3	hours	0.1
	TAD 4		1
	Heat Storage Capacity 5	kJ/m2K	2.9

VERY POOR PERFORMANCE



Insulation materials with appropriate performance characteristics to effectively manage heat loss AND heat protection against overheating have been recommended. Currently there are few readily available, cost effective materials with these performance characteristics.

Wood Fibre and Hemp insulation have been recommended and used for evaluation purposes in this case.

PROPOSED

1 Add 100mm wood fibre or hemp batt between ceiling joists .

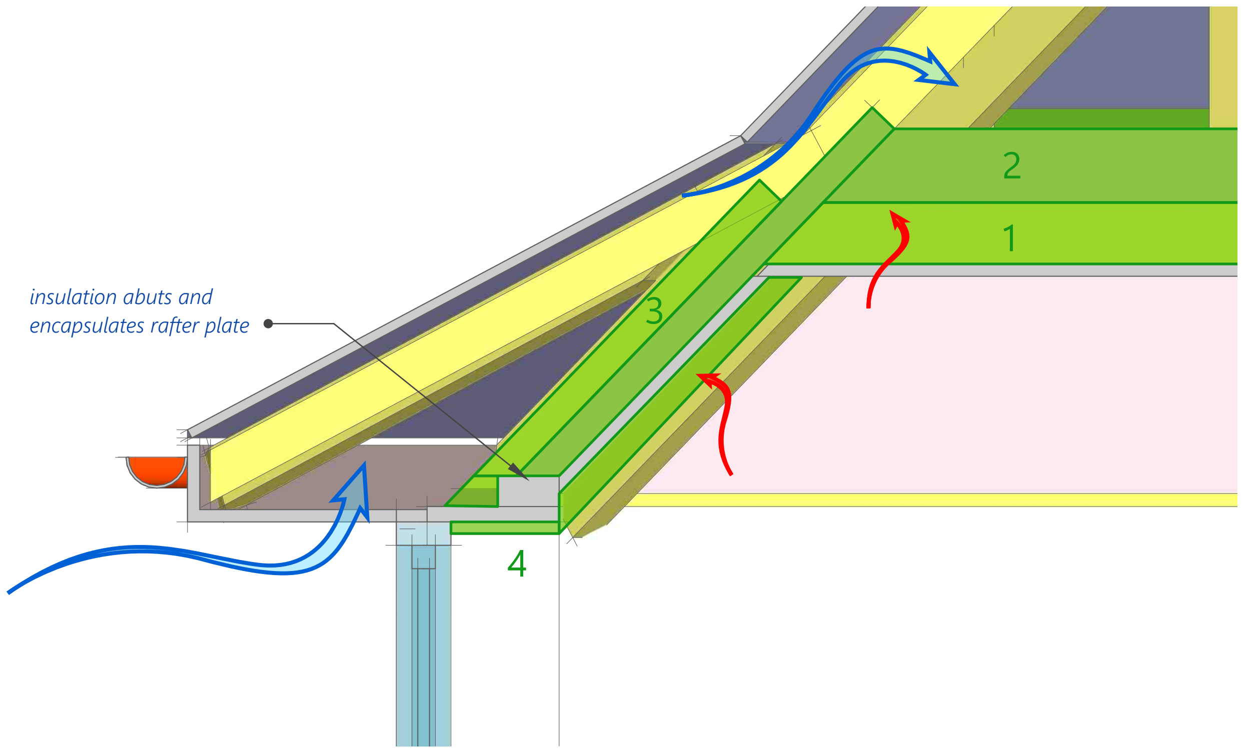
2 Add 100mm dense wood fibre board or hemp to top of ceiling joists and loft board over.

3 Add layers of wood fibre board or hemp to skeiling void. Stagger laying pattern to maintain free ventilation passage over. Additional internal layer and new plastered finish inside skeiling could be consideredDetailed design to be determined with specifier/installer.

4 Insulate reveal at head of window with calcium silicate or dense wood fibre board and lime plaster finish.

Thermal Protection	U-value 1	W/m2K	0.19
Moisture Proofing	Surface RH 2	%	56
Heat Protection	Phase Shift 3	hours	12.7
	TAD 4		17
	Heat Storage Capacity 5	kJ/m2K	60

SIGNIFICANTLY IMPROVED PERFORMANCE



TERMINOLOGY

[1] U-Value - How quickly heat escapes through a material or building element. Lower is better: A low U-value means better insulation — less heat lost.

[2] Surface Relative Humidity (RH) calculation, assessment of exposure to constant climate for 90 days, where inside is 20°C and 50% Humidity; outside is -5°C and 80% Humidity. Mould formation is likely to start above 80%. 40-60% is considered a reasonable range for healthy indoor air quality (IAQ).

[3] Phase Shift is the time in hours after which the temperature peak of the afternoon reaches the component interior. How many hours will the component assembly be able to prevent external heat from penetrating through it. Obviously longer is better at protecting from summer overheating.

[4] Temperature Amplitude Damping describes the attenuation of the temperature wave when passing through the component. A value of 10 means that the temperature on the outside varies 10x stronger than on the inside, e.g. outside 15-35 °C is a range of 20, inside 24-26 °C is a range of 2.

[5] Heat Storage Capacity quantifies the ability of a component to absorb and store heat supplied from the environment and to release it again when the environment cools down. Higher is better: A high specific heat means the material can absorb more heat before its temperature rises— useful for thermal mass and regulating temperature swings.

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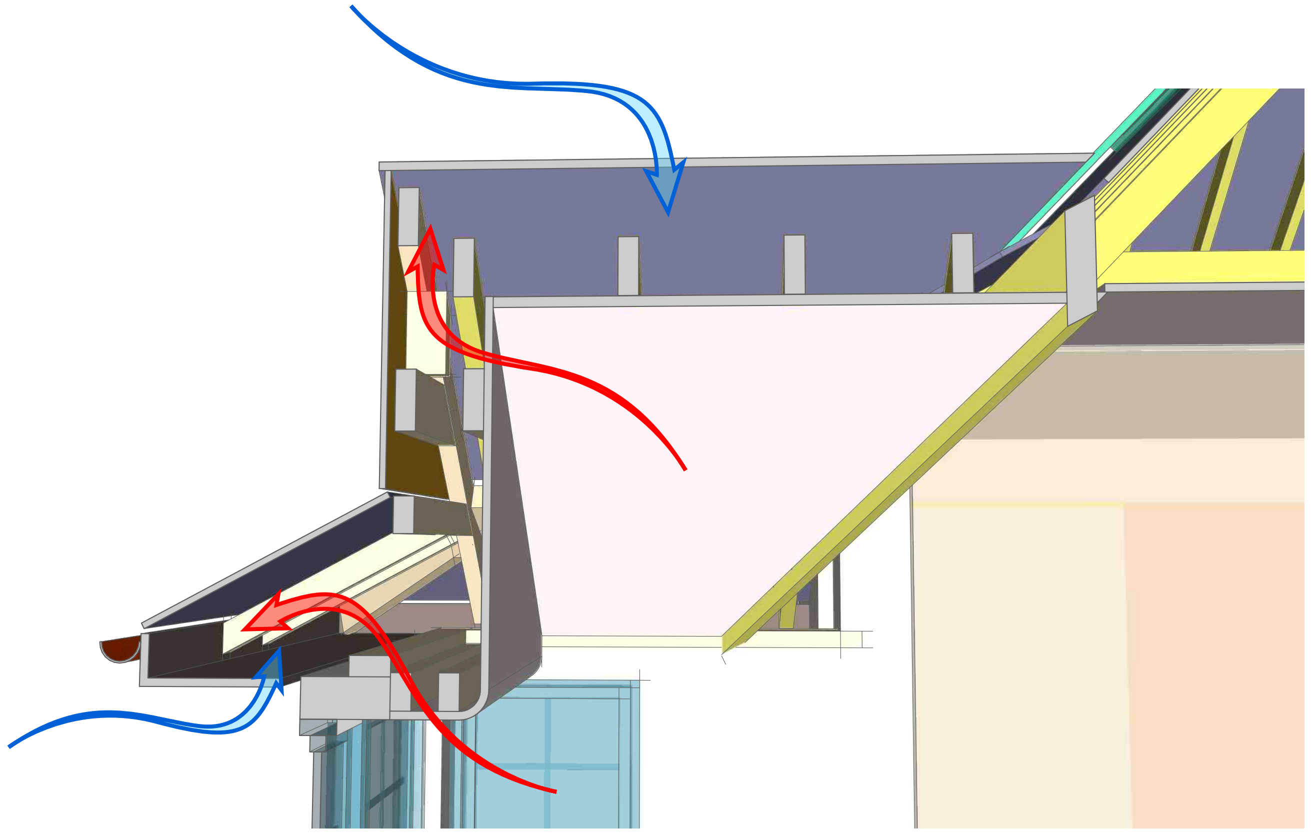
COMPLEX ROOF COMPONENTS UPGRADE STRATEGY

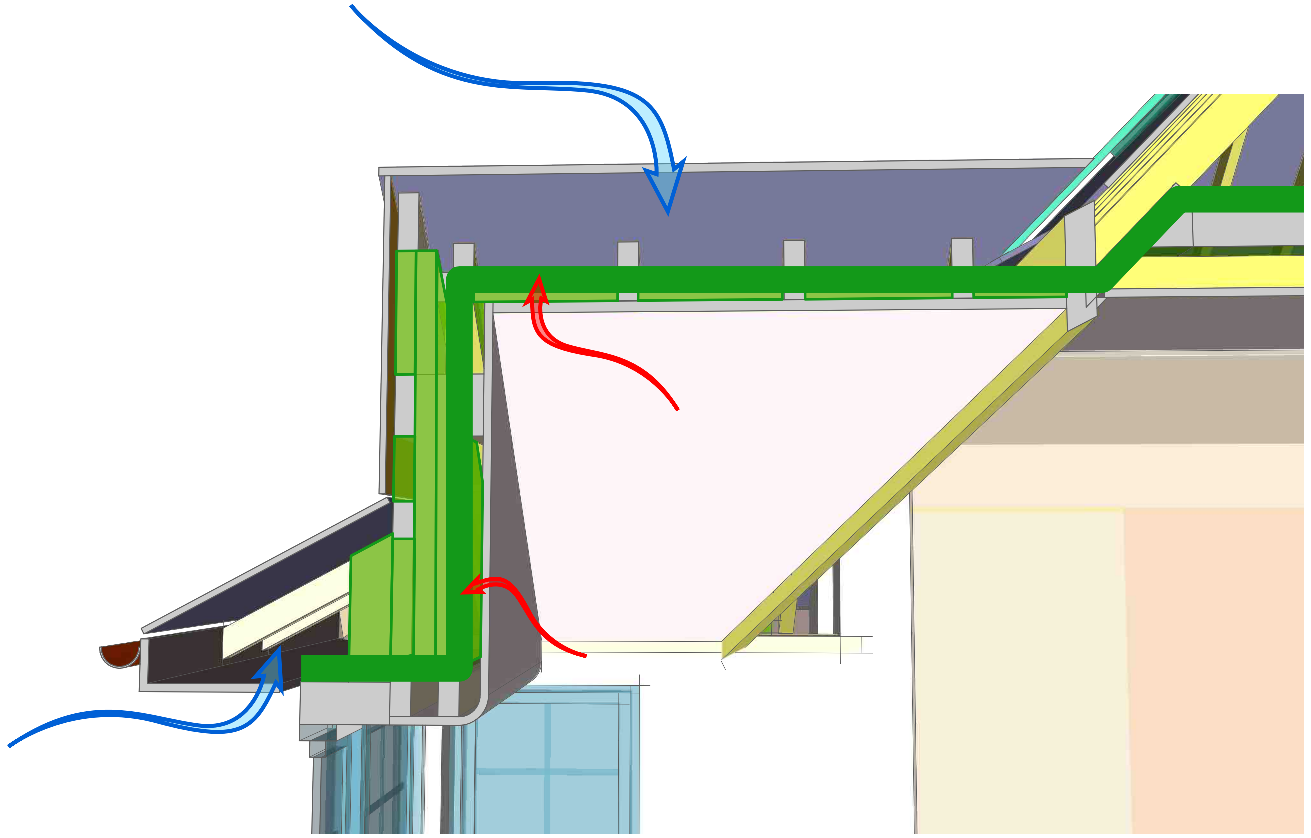


EXISTING - complex collection of junctions and integrated structural and weatherproofing components. Detailed investigation required.

A number of thermal bridging points are likely. The overall thermal performance and heat capacity of the assembly is very poor offering very little in the way of heat retention and overheating protection.

Insulation materials with appropriate performance characteristics to effectively manage heat loss AND heat protection against overheating have been recommended. Currently there are few readily available, cost effective materials with these performance characteristics.

Wood Fibre and Hemp insulation have been recommended and used for evaluation purposes in this case.



PROPOSED - seeking insulation continuity throughout the assembly (indicated by the green line.

The detailed specification will be delivered following invasive investigations on site.

Thermal performance improvements will be significant at this critical junction of the building.

TERMINOLOGY

[1] U-Value - How quickly heat escapes through a material or building element. Lower is better: A low U-value means better insulation — less heat lost.
[2] Surface Relative Humidity (RH) calculation, assessment of exposure to constant climate for 90 days, where inside is 20°C and 50% Humidity; outside is -5°C and 80% Humidity. Mould formation is likely to start above 80%. 40-60% is considered a reasonable range for healthy indoor air quality (IAQ).
[3] Phase Shift is the time in hours after which the temperature peak of the afternoon reaches the component interior. How many hours will the component assembly be able to prevent external heat from penetrating through it. Obviously longer is better at protecting from summer overheating.
[4] Temperature Amplitude Damping describes the attenuation of the temperature wave when passing through the component. A value of 10 means that the temperature on the outside varies 10x stronger than on the inside, e.g. outside 15-35 °C is a range of 20, inside 24-26 °C is a range of 2.
[5] Heat Storage Capacity quantifies the ability of a component to absorb and store heat supplied from the environment and to release it again when the environment cools down. Higher is better: A high specific heat means the material can absorb more heat before its temperature rises — useful for thermal mass and regulating temperature swings.

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Front Bay Upgrade - Strategy

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EXISTING EXTERNAL WALLS

ORIGINAL WALLS

Original walls are a traditional construction of solid brick 215mm (9") thick with a pebbledash render coating to the upper storey. Interior render is likely a lime plaster throughout but this has not yet been verified. The exterior render has been overpainted with a modern plasticised paint but there is little evidence of patch repairs to the exterior render coat.

Ground floor walls are exposed brick outside and plastered internally. General condition is good with pointing repairs evident in localised areas.

A few cracks in the render are evident particularly at junctions with window openings and penetrations.
There is also evidence of water ingress causing some damage to areas below rainwater pipe on the front. This requires further investigation and repair prior to any upgrade works. The rainwater management at the junction with No.99 is very likely the casue of persistent damp ingress into the brickwork and pebbledash rencer in this location.

Brickwork and lime renders are vapour open materials that were originally used for their ability to passively and effectively regulate their moisture content and dimensional constraints through variable climatic conditions typical in the UK. Cement renders and plasticised paints do not tolerate either dimensional change nor moisture variance leading to cracking and disintegration when overlaid onto vapour open materials.

FRONT GABLE AND BAY AT FIRST FLOOR

These elements are finished in a clay tile hanging which is most likely supported on a timber frame structure behind. Further detailed investigation is required. Condition appears to be good and no urgent or essential repairs have been noted.

			1	2	3
Thermal Protection	U-value 1	W/m2K	1.87	1.91	1.82
Moisture Proofing	Surface RH 2	%	92	95	74
Heat Protection	Phase Shift 3	hours	8.5	8	3
	TAD 4		4.6	4	1.3
	Heat Storage Capacity 5	kJ/m2K	371	343	82

REPAIR

FRONT WALL

As the most exposed elevation this wall should be dealt with as a priority.

Recommended minimum scope of work:
Repair rainwater issues as noted previously. Investigate extent of cracking and assess for repair using appropriate materials.

Ideally, strip off all paint, inspect for cement render and material that is vapour impermeable. Remove cementitious repairs to render coat and reinstate defective areas with suitable lime-based render and pebbledash finish. Redecorate with limewash or suitable vapour permeable paint.

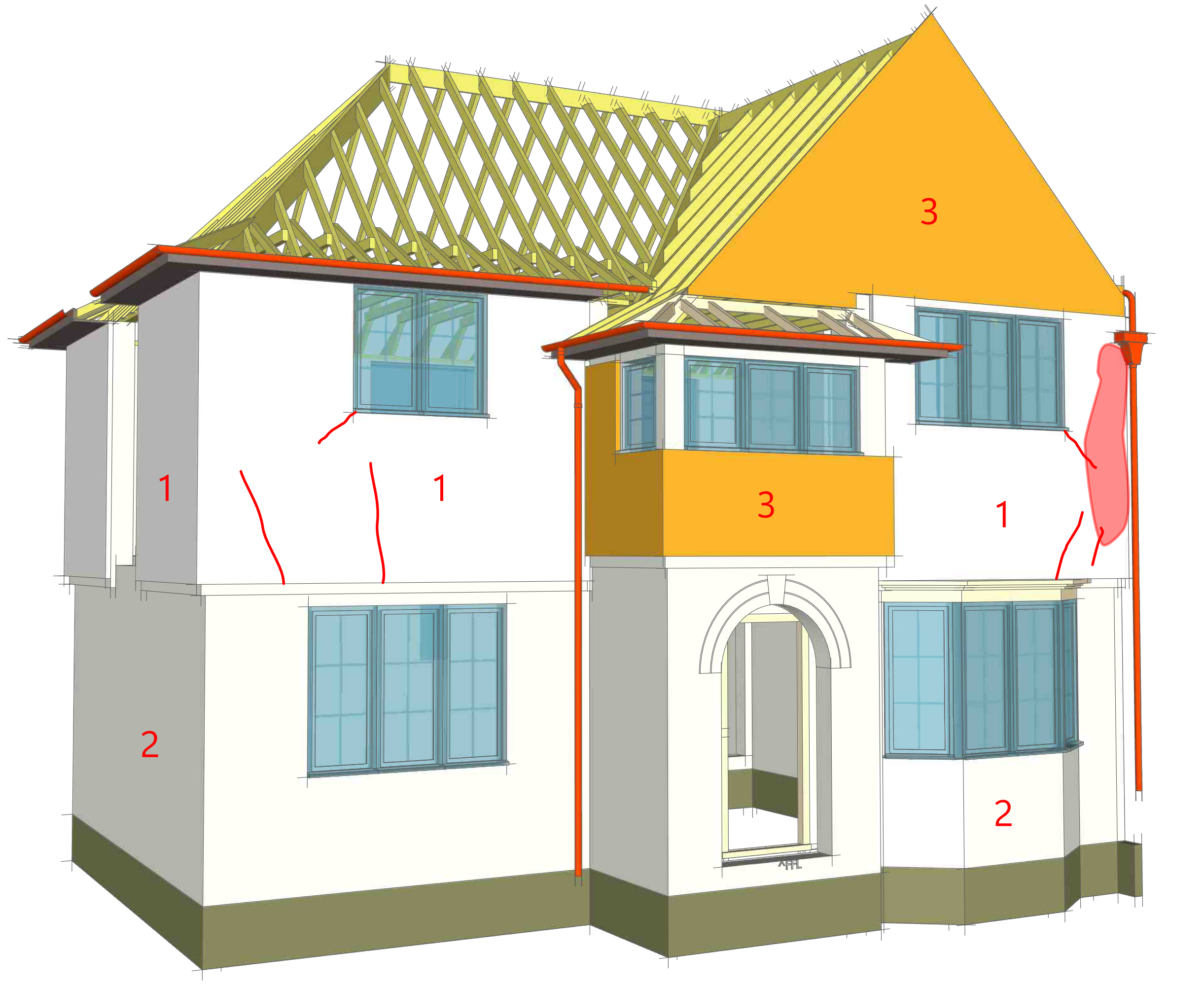
SIDE WALL

SIDE WALL including SIDE EXTENSION - Less exposed to weather extremes.
Generally in good condition with no obvious repairs required and no evidence internally of moisture ingress.
These walls would be suitable for EWI with appropriate detailing to critical junctions, openings and penetrations - subject to conservation area consent.

REAR WALL

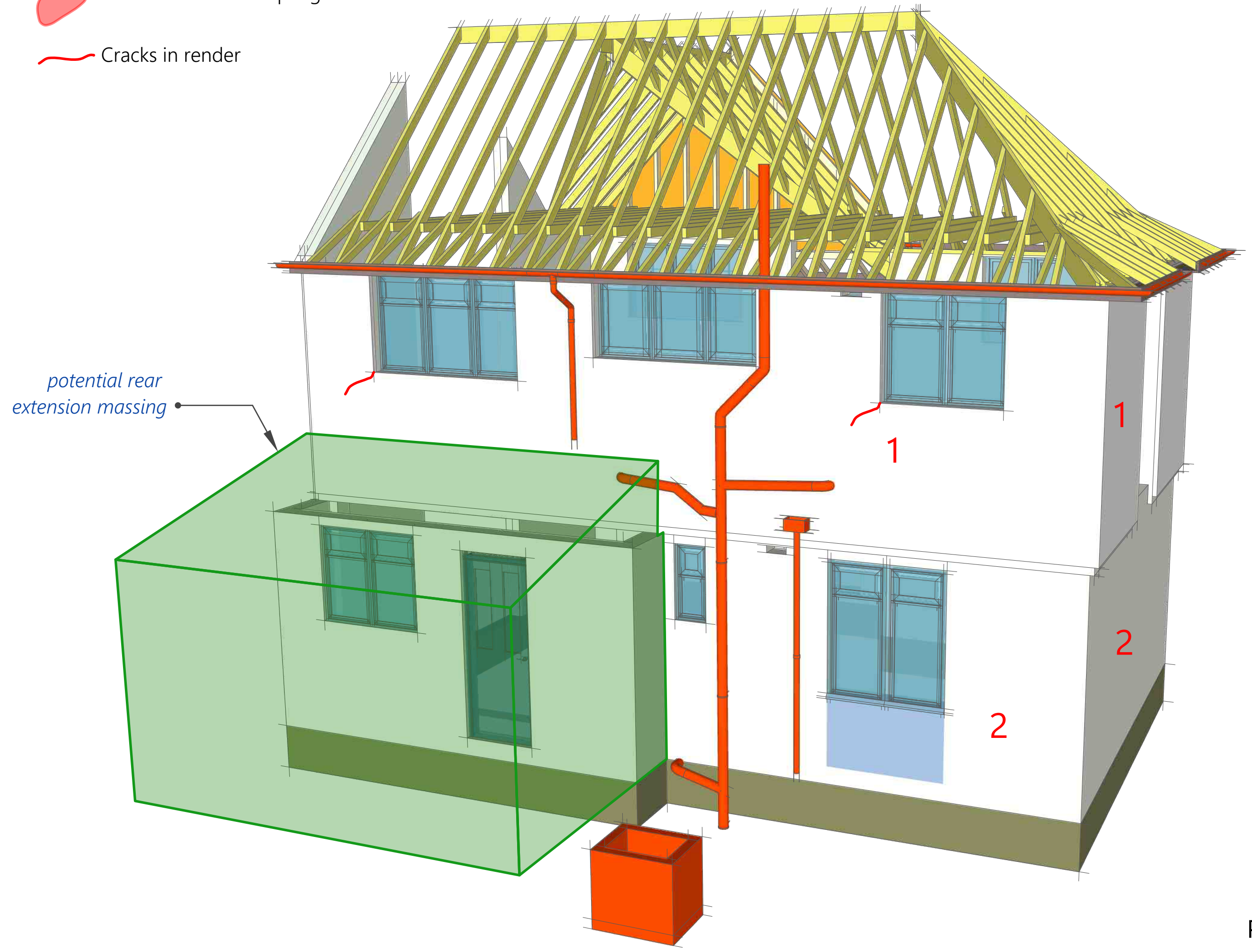
Less exposed to weather extremes.
Generally in good condition with only minor repairs required. No evidence internally of moisture ingress.
Proposed rear extension should seek to rationalise and upgrade rainwater and waste water management conduits for greater climate and operational resilience.

Once rainwater management is robust, these walls could be considered for insulation with appropriate detailing to critical junctions, openings and penetrations - subject to conservation area consent. Integration with potential rear extension to be consider in design phase following.



Area of evident damp ingress into render

Cracks in render



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External Walls
Condition and Repair

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POTENTIAL UPGRADES

External Wall Insulation (EWI) is generally expensive but less disruption to occupants. Internal Wall Insulation (IWI)is disruptive but cheaper to install. Installing IWI is best carried out when a room is due to be redecorated.

Both methods carry risk of unintended consequences if inappropriately specified or installed.
Leaving walls uninsulated can be an appropriate strategy when the whole house performance is considered holistically.

- Appropriate design detailing is essential to the success and safety of any wall insulation installations.
- Maintaining vapour permeability and ensuring the whole wall build-up facilitates a suitable 'drying-path' is essential with solid-walled constructions.
- Improved ventilation management also reduces the risk of condensation and mould formation.

1 & 2 BRICK WALLS

External treatment of these walls will depend on conservation area consent and it is unlikely that any external treat would be desirable or consented. A case for EWI applied to the rear wall could be presented and undertaken in conjunction with future repair, maintenance and construction works.

IWI - internal wall insulation is likely the only option to consider, where EWI has been ruled out.

Thermal performance can be significantly improved with the addition of 60mm of vapour permeable, hygroscopic, non capillary active rigid insulation fixed to existing vapour open lime plaster and finished with a new lime plaster skim. This will eliminate the risk of condensation and mould forming.

If this option is appealing, a detailed specification can be formulated with moisture movement and buffering assessment carried out. Indicative build-up detail on following page showing integration with window reveals.

Spray cork insulation - This is a spray applied mineral resin bound cork layer installed by a specialist. Thermal improvements are modest but the surface temperature improvements are likely to significantly reduce the risk of condensation and mould forming.

			Existing	Cork IWI	WF 60mm IWI
Thermal Protection	U-value [1]	W/m2K	1.8	1.45	0.5
Moisture Proofing	Surface RH [2]	%	92	82	60
Heat Protection	Phase Shift [3]	hours	8.5	10.2	14.2
	TAD [4]		4.6	9.9	16.2
	Heat Storage Capacity [5]	kJ/m2K	371	373	409

3 TILE HANGING

SUBJECT TO INVASIVE INVESTIGATION to confirm original construction assumed to be timber framing.

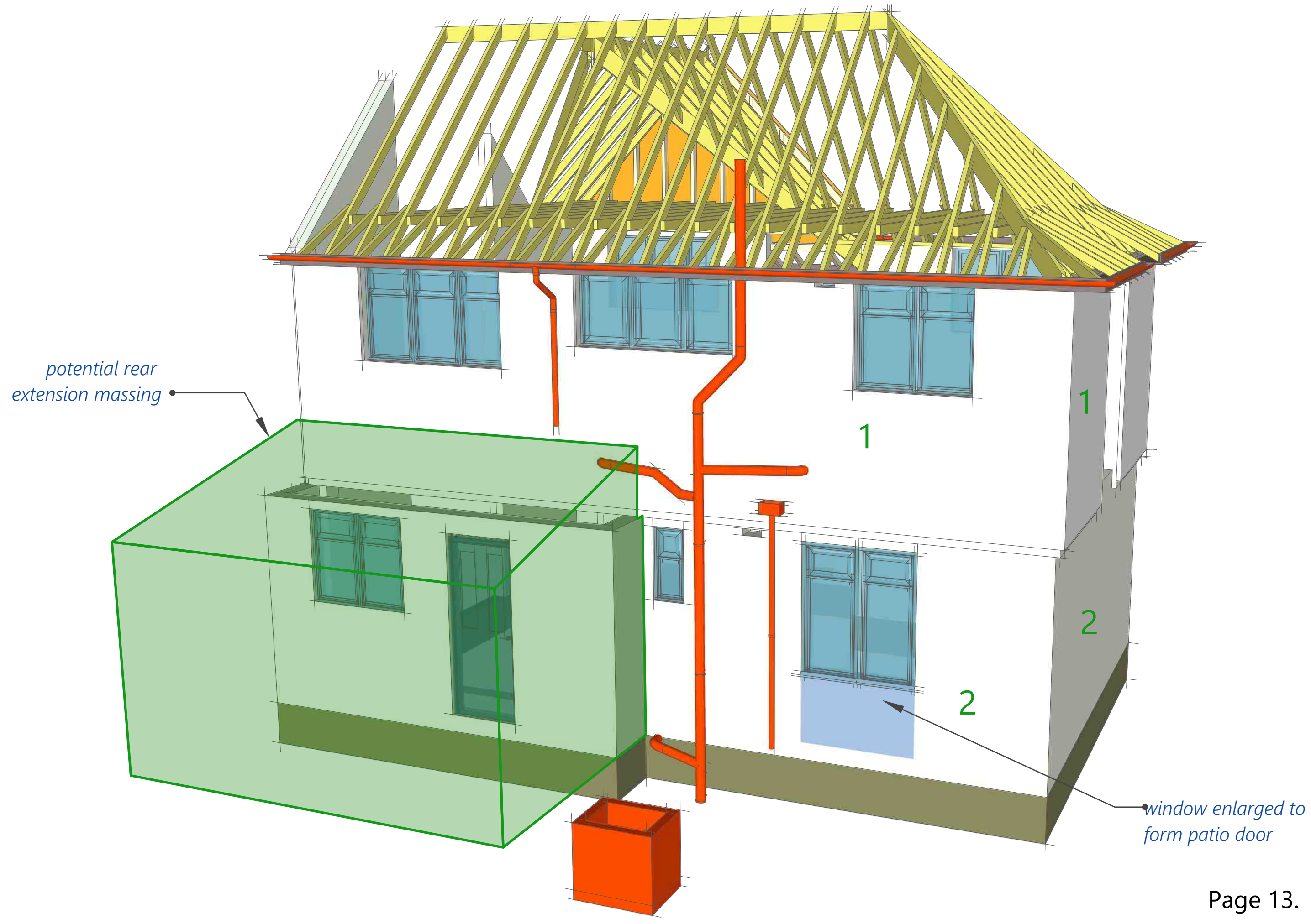
These panels are likely to be constructed of a timber frame with a sarking sheath (assumed felt) over and cross battens supporting the clay tiles. Internally oak lathes are likely fixed to the frame and finished with a lime plaster in habitable space and let open in the roof space.

Vapour permeable insulation is best installed between and inside the timber framing and internal finishes reapplied where required.

This can be conducted form outside for reduced disruption but costs could be increased due to scaffold and additional labour requirements to remove and rehang tiles and replace the felt.

The Gable panel would only need treating up to the line of the proposed loft insulation to ensure continuity to ceiling line of Bedroom 2. The upper part can remain untreated.

The first floor bay extension enclosing the stair landing could be treated from inside or outside TBC following further investigation.



Guide cost prices are sourced from Checkatrade and Homebuilding & Renovating

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External Walls
Potential Upgrades

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WINDOWS and DOORS

NOTE: Rear extension will be addressed in a separate detailed design project alongside this Home Upgrade Guide.

FRONT

Existing timber frames are in good or salvageable condition and full replacement is not anticipated.

Many of the slim double glazed units have failed and need to be replaced. Within conservation area constraints the replacement of the sealed units does not require conservation area consent.

BASIC UPGRADE

Replacement slimline sealed units with warm edge spacers from manufacturers such as Swisspacer, Technoform and Edgetech have demonstrated significant benefits over metal edge systems but the overall depth of dlazed units will increase thus requiring additional carpentry work to retrofit.

As an example, Edgetech claim:
Reduces condensation by up to 70% - Up to 65% warmer at the internal edge - Successfully tested from -40° to 85° C - Over 950 times less conductive than aluminium - Up to 2 decibels reduction in noise

ENHANCED UPGRADES

Replacement DG units with improved spacers and optional low-emissivity coatings is a simple, low-disruption upgrade.

Further enhanced thermal and acoustic performance can be achieved by installing 'vacuum glazing' units but costs may be prohibitive. Selective use of enhanced glazing could be considered for more exposed windows. Slimlite Glazing are well established manufacturers of slim DG units and have begun to offer a vacuum glazing option providing significantly enhabced thermal performance. https://slimlite.com/

All front elevation windows are exposed to significant solar gain and external shading would be ideal but subject to conservation area constraints.

REAR

As noted previously. The retrofitted aluminium sash frames glazed units are causing significant thermal bridging issues. These should be replaced as they are not fit for purpose.

The original timber frames appear to be in salvageable condition and new casement sashes with improved sealed glazed units (as described above) could be fitted. Alternatively, new window fame and sash units can be installed rather than just the sashes, although this is likely to be more costly.

This will significantly reduce the instances of condensation and mould formation on the frames and together with an upgraded ventilation strategy, improve comfort, health and ongoing moisture damage.

The rear window to the living room will likely be replaced with a door - subject to CA consent.

WINDOW REVEALS

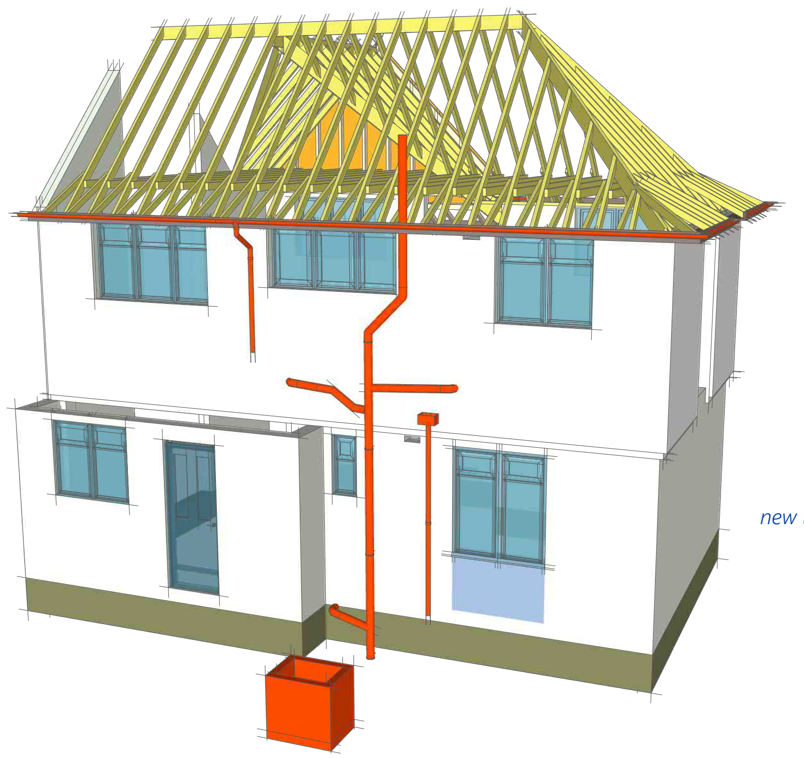
Additional linings on the inside of the cills, jambs and heads of all windows is recommended to reduce the risk of condensation and mould formation whilst simultaneously reducing heat loss. The goal is to minimise thermal bridging, thermal bypass and improve airtightness. This can be a disruptive procedure requiring some plastering work and decorating to make good. Easiest to implement when a room is undergoing redecoration.

Before any internal work commence it is essential to ensure that any penetrating damp from outside is remedied.
A vapour permeable construction must be used to effectively regulate moisture at these critical junctions. Refer to wall insulation section above for risk considerations of the 'enhanced' option.

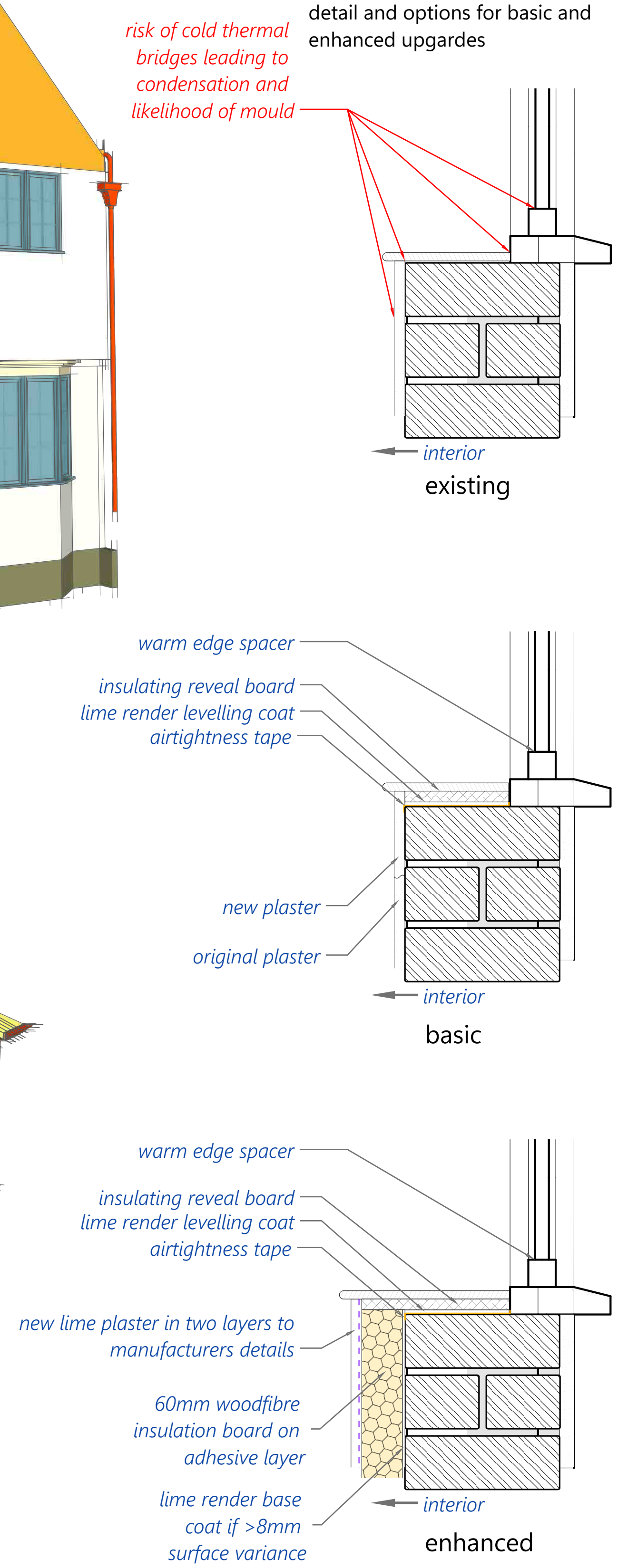
Reducing cold bridging will minimise the risk of condensation forming at the structural openings of window apertures and also improve airtightness by sealing the window frame junction with the wall.

Invasive investigation of each window and a detail design will need to be produced if the work phase is committed to.
Upgrade specifications for each window will need to be assessed in advance of work commencing.
Typical scope of work will include:

1. Remove and set aside window boards for reuse if possible
2. Hack off plaster from reveal (line of internal wall face to window frame inside face)
3. Add lime render levelling parge coat if required
4. Affix 15mm insulation board (calcium silicate or wood fibre) around reveal bedded on lime adhesive
5. Finish with a lime plaster skim coat
6. Refit window board if desired



Typical existing window reveal detail and options for basic and enhanced upgardes



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FLOORS

SUSPENDED TIMBER FLOORS - GROUND FLOOR

Ground floors are suspended timber joists spanning between masonry. Continuous airflow below and between the joists ensures that moisture cannot build up on the timber joists and the underside of floorboards. Essential to ensure long-term structural integrity and to prevent the risk of rot. However, this allows cold air to pass into the house through gaps and creates a cold floor structure.

The illustration on the left represents a 'best guess' at the likely arrangement of joists, their size, spacing, orientation and bearing points without disruptive invasive investigation. Detail design will require additional intrusive survey prior to installation.

Both upgrade options below will provide significant reductions in heat loss and eliminate drafts whilst ensuring adequate subfloor ventilation is maintained.

Controlling Void Ventilation

The AirEx Floorvent replaces traditional air bricks. With built-in sensors and weather information it manages airflow intelligently, closing to reduce heat loss and improve thermal comfort and then opening to reduce humidity and stop damp and mould, depending on environmental conditions. It improves EPC scores, reduces draughts, and improves heat retention. These are recommended whether insulating the floors or not. https://www.airex.tech/

Manual installation of bio-based insulation

Installing an airtightness barrier and insulation between the joists will be most effective at reducing heat loss and eliminating draughts. High density, flexible insulation with a low thermal conductivity is most suitable - material such as hemp/jute or wood fibre batts can be snugly fitted above an vapour permeable airtightness membrane.

Ecological Building Systems provide the best guide, offer material supply and technical advice for homeowners and contractors. Suspended Timber Floor Insulation: From Above and Underneath Installation Guides:

https://www.ecologicalbuildingsystems.com/post/suspended-timber-floor-insulation-installation-underneath

Manual installation will need to be carried out from underneath or from above. To insulate from above will require the floorboards to be lifted, insulation to be installed before floorboards and floor coverings are re-laid. This method is disruptive but presents the opportunity to install a low profile underfloor heating system allowing removal of wall mounted radiators from the ground floor.

The potential to insulate from below will depend on whether the void below the underside of the joists to the earth below is a). accessible and b). deep enough for an installer to operate in. Cost range £80-120/m^2

Robot installation of foam insulation

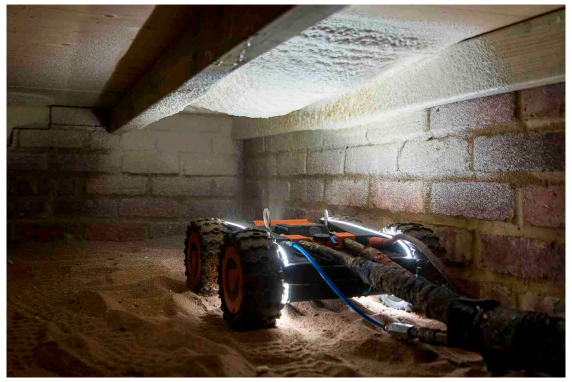
Q-Bot provide a sophisticated automated spray insulation system that is suitable for hard-to-reach floor voids.

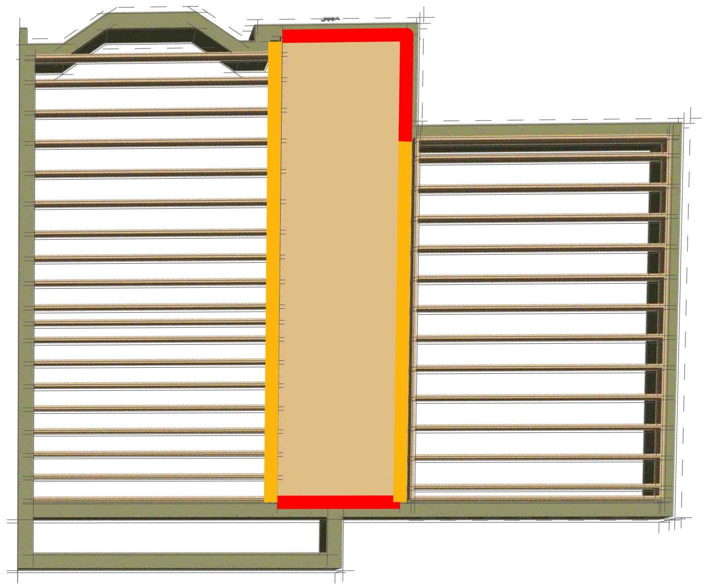
The system provides a suitable insulation layer under the existing floorboards and can effectively treat most areas and complex junctions.

The insulation foam used is likely to be derived from petrochemical sources, which may be a consideration in assessing CO_2e savings weighted against reduced gas consumption.

They provide a turnkey service from initial consultation to completion and warranty.

https://q-bot.co/underfloor-insulation-process/





Ground floor plan view showing estimated joist pattern.

Void depth below joists likely to be between 200-400mm - not surveyed.

			Existing	Bio	Foam
Thermal Protection	U-value 1	W/m2K	1.97	0.29	0.31
Moisture Proofing	Surface RH 2	%	92	58	60

SOLID FLOORS

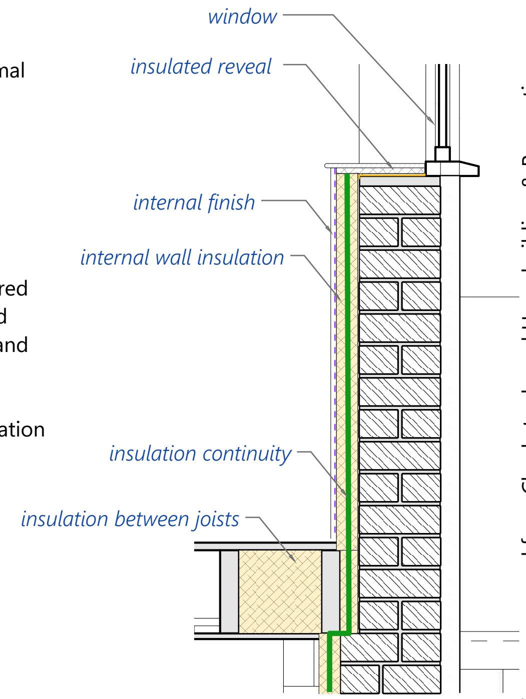
The likely solid area of flooring running front to back is more difficult to insulate without significant disruption and cost. The areas where it bridges to the exterior walls (red line) could be treated internally with discreet excavation and insertion of a thermally inert barrier such as compacfoam. This could be done when rear extension construction works are underway.

The sides of the slab are likely brick walls (yellow line) - a detail can be developed to integrate the underfloor insulation with a downstand thermal break to prevent the cold bridge from forming. This will require invasive investigations.

INTERMEDIATE FLOORS

If IWI is to be installed then a continuous insulation line should be explored extending into the floor void at the junctions with external walls. Detailed design and specification will be required when these areas are exposed and room improvements are planned.

The likely upgrade specification will look like this diagram ensuring insulation continuity and airtightness are established at the external wall junction:



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HEATING and ELECTRICS

GENERAL HEATING SYSTEM UPGRADES

Preparing a gas-boiler funeral plan is important as the inevitable electrification of home heating continues.

Start with maintenance and control optimisation to improve operational efficiency.

1. Commission a powerflush of the CH circuit.
2. Take advice from a CH specialist on additive products that maintain operational efficiency for longer.
3. Seek technical advice from a CH specialist on adding weather compensation control to your existing boiler.
4. Ensure thermostatic radiator valves are functioning correctly and take advice on smart control valves programmed to serve your individual room needs.
5. All CH flow and return pipes and DHW supply pipework should be appropriately insulated.

Short term strategy - continue using existing radiators with combination gas boiler. Hot water is supplied direct to DHW outlets. With upgraded thermal performance, heat demand and gas consumption will be significantly reduced. A weather compensation controller changes the boiler flow temperature directly as the outdoor temperature changes, ensuring timely changes in the heat delivered, optimised temperature output and reduced gas usage.

Medium term strategy - potential to replace ground floor radiators with under floor heating system over insulated floor can be considered. This would free up wall space and provide greater efficiency in operation of gas heating and future electric heat pump. For transition to electric heating and hot water and heat pump can easily be located externally in the north-facing garden with a new hot water cylinder located in the vicinity of the existing central heating circuit.

For specific areas inadequately served by the existing CH circuit, efficient direct electric heating, infrared panel systems can be considered. These are simple standalone installations that can be specified and installed at a later date.
Energy Carbon provide a range of high quality retrofit products that may be well suited to your home. https://www.energycarbon.co.uk/products

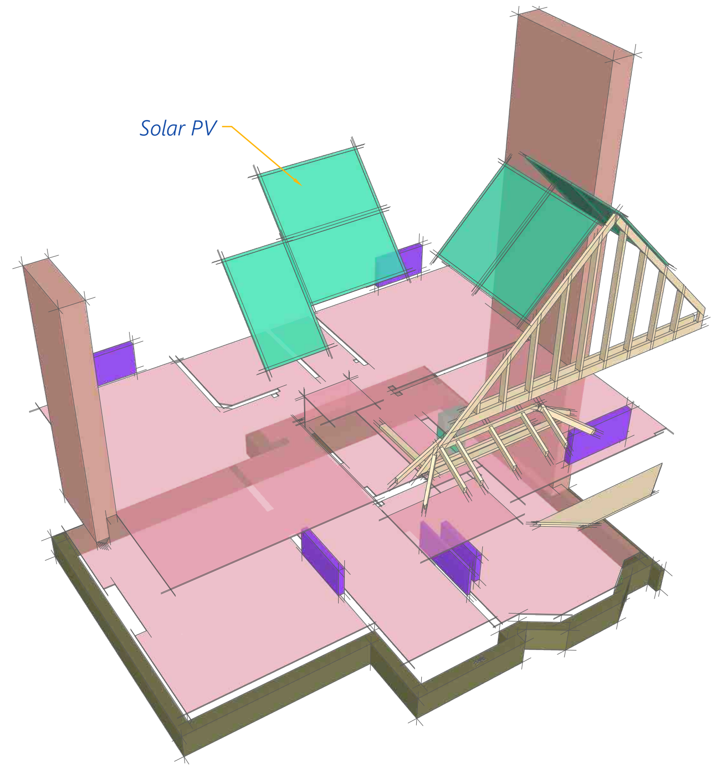
Solar PV - Adding Solar photovoltaic panels to the roof and a battery is potentially desirable but subject to conservation area constraints. A specialist design should be commissioned to evaluate costs, savings and optimum supplier/tariff options. Size and location of panels, battery and connectivity are indicative only.

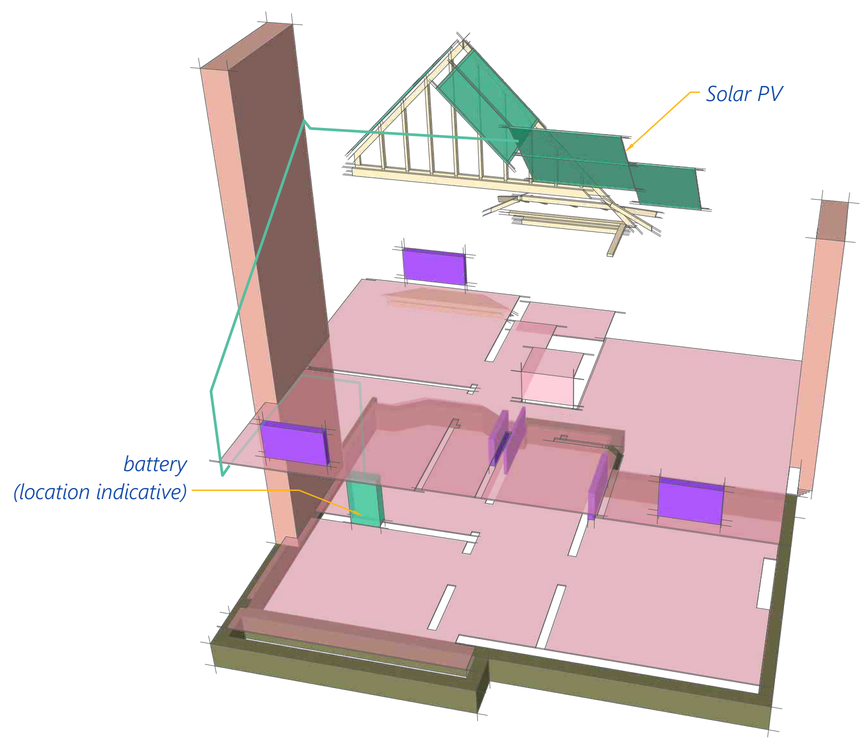
Safety regulations around battery installations may require additional fire compartmentalisation works and additional control systems may be required.

Other upgrade considerations
Solar PV and Solar Thermal can both provide direct heating input into a compatible HWC. Calculating potential on-site generated input capacity from both solar systems would be a worthwhile exercise. Installation of solar panels will require scaffolding so careful planning of all scaffold dependent works needs to be considered and carefully programmed in advance to maximise cost efficiency.

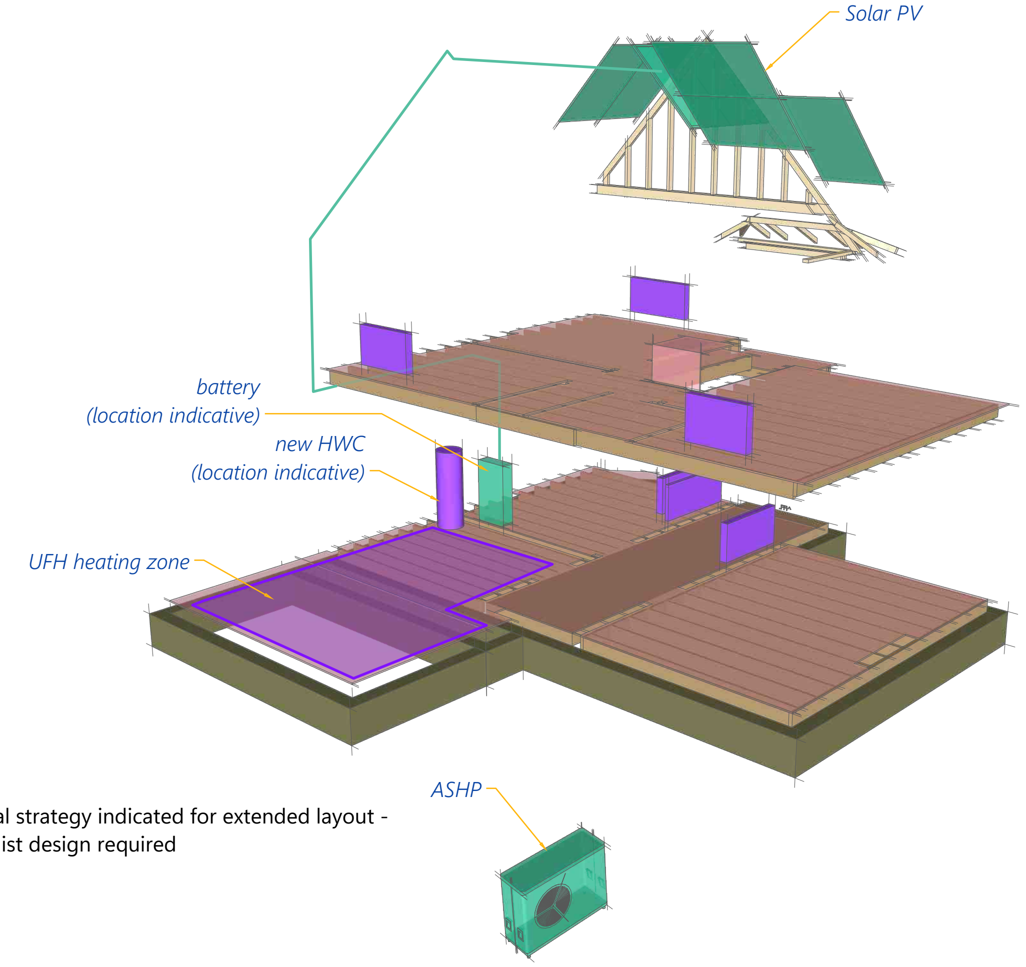
Specialist design and advice for energy microgeneration systems should be sought.

NOTE: Conservation area constraints may affect feasibility and system design options





General strategy indicated for existing layout - specialist design required



General strategy indicated for extended layout - specialist design required

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VENTILATION

EXISTING

Passive Ventilation
Utilising the opportunities for cross ventilation and stack ventilation will allow fresh air to be brought in and stale air to be expelled but this requires regular actions of opening and closing windows throughout the house. Shock ventilation is an effective method where all windows are opened for several minutes to fully 'air' the internal environment a couple of times a day. However this can be labour intensive and potentially challenging in later life or when mobility is impaired.

Stack ventilation can be effective at managing fresh air ventilation through certain areas of the house but is hard to control and manage consistently through all rooms. Passive strategies can be enhanced using selected automated controls on upper floor windows requiring only ground floor windows to be opened in order to generate a stack effect when required. This can be an effective strategy to prevent overheating in hotter weather too.

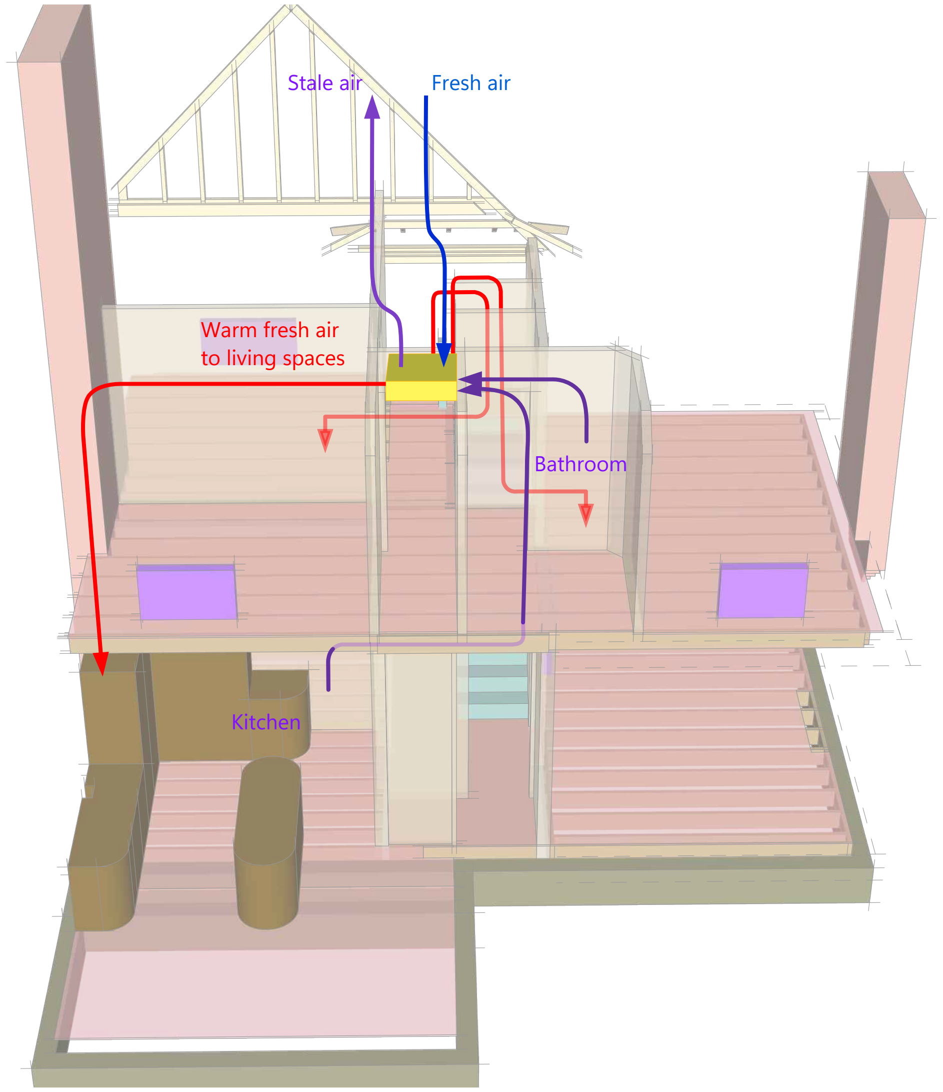
All internal doors should have, according to building regulations, a minimum of 10mm under-cut - meaning the gap between the bottom edge of the door and the floor finish. Higher undercut distance may be recommended by specialist designer for some of the options below.

Cross ventilation opportunities are presented with the current plan layout. Ground floor internal remodelling and a rear extension design can help improve passive ventilation strategies for improved air quality, reduced risk of condensation and improved cooling.

Uncontrolled Ventilation
Existing chimney flues should be blocked seasonally (cold months) or permanently. Temporary measures such as chimney balloons are a simple and effective solution. Permanent sealing could be considered and specialist advice should be sought.

As noted earlier additional uncontrolled ventilation finds its way through small gaps all around the house. There are various ways to identify these weak points. The most obvious can be felt by human senses when in a space. Specialist airtightness testing surveys can be costly and invasive but might be worth considering. Using an infrared thermographic camera during colder months when there is a breeze is cheaper and extremely effective at identifying patterns of cold spots of thermal bridging and weak points of airtightness.

infrared thermography shows draft at failed door seals as a feathering pattern



Illustrative centralised MVHR concept - Whole house system ducting warmed filtered fresh air to living spaces (and bedrooms if required) - specialist design required. indicative extension shown

UPGRADE OPTION TO CONSIDER

Intermittent Mechanical Extract Ventilation - iMEV
This is the current strategy incorporated into the house. Independent extractor fans are fitted in the kitchen and bathroom only. This is the most common and basic form of mechanical ventilation. Activation is either manually switched, linked to the light switch and often has an adjustable overrun timer. At the very least, existing fans should be updated and set up correctly. Consider humidity controlled unit in the bathroom that activates when sensors detect increased humidity in the room.

These can, if operating correctly, extract sufficient moisture and odour to prevent excess humidity and particulates form circulating elsewhere. However, they indiscriminately extract and expel heat to the outside.

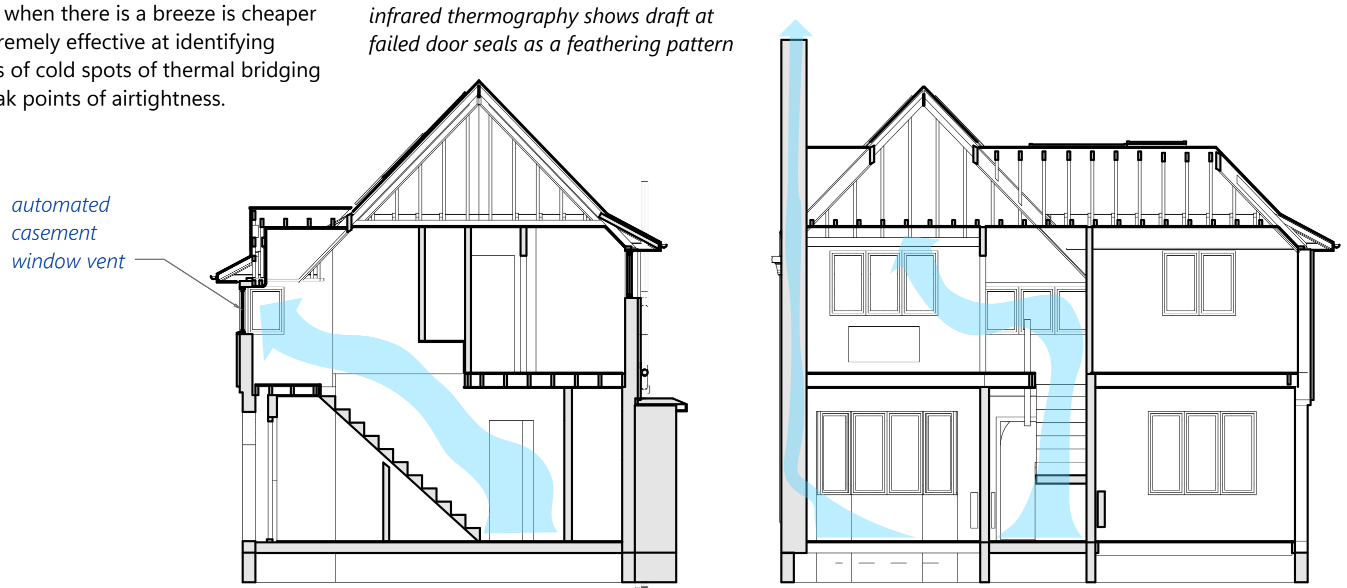
Continuous Mechanical Extract Ventilation - cMEV
Continuous air flow is ducted from kitchens and bathrooms via a centralised fan unit often located in a loft. As with iMEV, heat is expelled also.

Decentralised Mechanical Ventilation with Heat Recovery - dMVHR
Like iMEV solutions these are room by room installation that effectively extract toxic and humid air but as they extract, they are able to capture around 90% of the heat passing through within a heat exchanger. This rescued heat is then used to warm fresh air brought from outside back into the room when the fan reverses. They have sophisticated sensor technology and control systems that allow them to be fully automated.

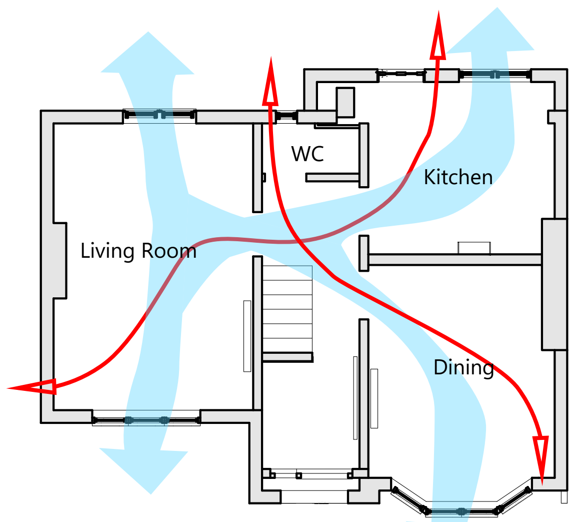
Some systems allow two units to operate in tandem across a single floor to create more efficient fresh air change whilst recycling interior heat back into the house. Specialist advice should be sought to specify appropriate linked systems.

Centralised Mechanical Ventilation with Heat Recovery - cMVHR
The same heat recovery principle as dMVHR but on a whole house system ducted into a centrally coordinated unit, like a cMEV. A 'summer bypass' mode can be used to help move air around and expel warm air when desirable.

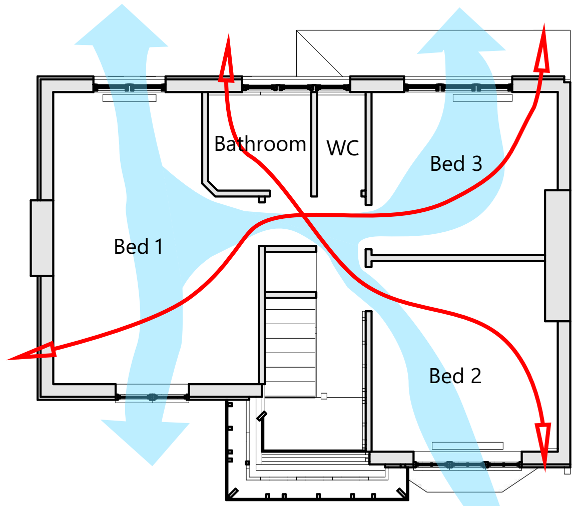
These systems are the most sophisticated and efficient but require space for a central manifold and filtration unit and the installation of ductwork between floors. Specialist design and specification of cMVHR is essential and careful design integration of ductwork routes will be necessary. Regular maintenance will also be required.



Stack ventilation concept utilising windows and chimney flues



Cross ventilation and tandem dMVHR concept - Ground Floor



Cross ventilation and tandem dMVHR concept - First Floor

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SCHEDULE of proposed plan of works to upgrade areas of the house as identified in the HUG.
Works listed below are in addition to scope of works to construct the proposed rear extension as detailed in architectural and structural design provided separately

AREA	REPAIR & MAINTAINANECE	PRIORITY	WORKS	DELIVERY	PREPARATION	COMPLETED
ROOF	EXTERNAL - Clear gutters. Inspect flashings to chimneys. Repair valley gutter over part wall	HIGH		Builder		
		HIGH	INTERNAL - Insulate main roof as specified.	Builder or DIY	Relocate roof access hatch with enlarged sealed insulated unit and improve ladder access gradient	
WALLS	Inspect and repair damaged render to front where indicated.	HIGH	Front bay - investigate structure and upgrade with insulation infil where appropriate	Builder	RVI invasive investigation required Discuss access requirements with builder	
	REAR Strip off all paint and cement render. Repair or replace render coat with suitable lime-based render. Limewash.	MED				
FLOORS		HIGH	Install Airex controlled ventilation system throughout ground floor.	Builder with Airex accreditation.	Discuss access requirements with builder	
		MED	Insulate underfloor - method TBC	Builder	To suit homeowner implementation phasing	
WINDOWS	Front - repair timber frames and shashes where required, redecorate.	MED	Front - re-glaze existing timber windows with slimlite or vacuum units. Add robust draughtproofing.	Builder/Glazier/window specialist	To suit homeowner implementation phasing	
	Rear - repair original timber frames where retained for reuse - subject to planning consent		Rear - Fit new opening shashes and glazed sections where required, redecorate. - subject to planning consent	Builder/Glazier/window specialist	To suit homeowner implementation phasing	
VENTILATION		HIGH	Replace Bathroom and bedroom 1 extractors with SOLUS dMVHR units. Install GEMINI dMVHR unit to new kitchen	Builder / Electrician	To suit homeowner implementation phasing	
HEATING	Boiler service. Powerflush CH circuit.	MED	Add weather compensation control to boiler. See an explanation of weather compensation control here: https://heatable.co.uk/boiler-advice/weather-compensation	Heating engineer / Specialist	To suit homeowner implementation phasing	

1 Your Street, UK

DESCRIPTION:
DRAWING No:
REVISION:

DRAWING TITLE: Schedule of Works

SCALE

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DATE February 26, 2026

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