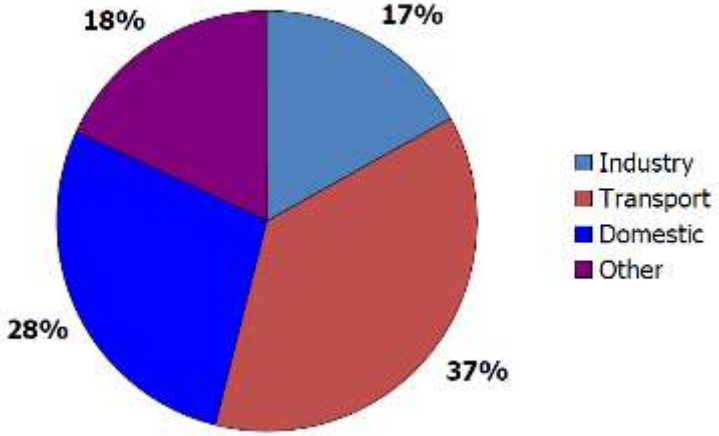
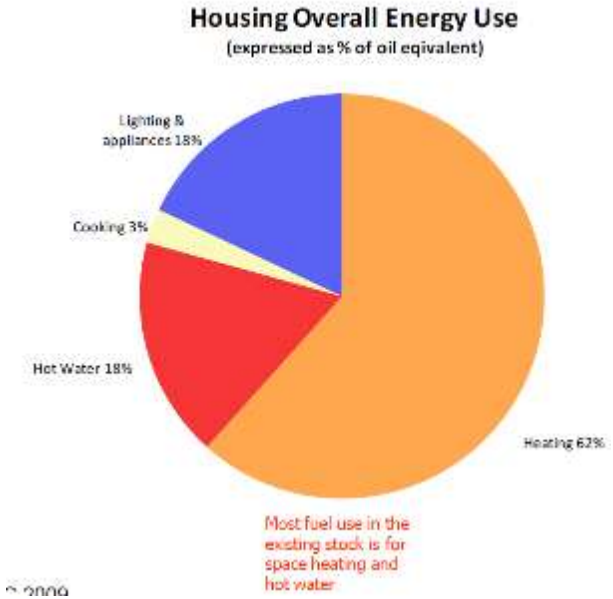
prewett
bizley
architects

Retrofit – how far to go?



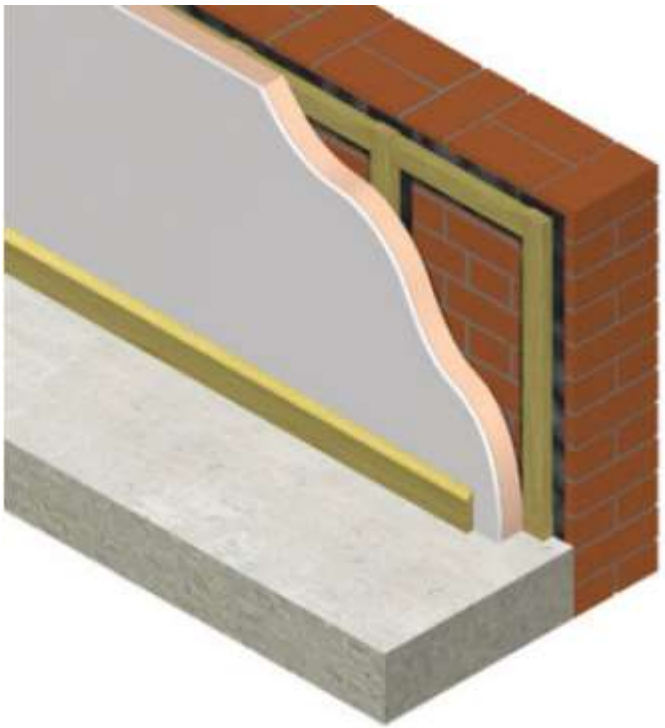


Retrofit – why?

Retrofit – how far to go?
(should we always aim for EnerPHit?)

- Not going to focus on cost
- Am going to focus on performance
- The one line answer is ‘it depends….’

Early rush for very low heat demand may bring risks….



The standards

Criteria	New Build	EnerPHit	
		Heating Demand	*Component*
Q_H Specific Space Heat Demand	max. 15kWh/(m^2a)	max. 25kWh/(m^2a)	
U values	$U_{window} \leq 0.85$ W/(mK)		$U_{window} \leq 0.85$ W/(mK)
	$U_{fabric} \leq 0.15$ W/(mK)		$U_{fabric} \leq 0.15$ W/(mK)
			$U_{fabric} \leq 0.35$ W/(mK) (for internal insulation)
Pressurisation test result n_{50}	0.6 ach	1.0 ach	
Q_p Entire Specific Primary Energy Demand	max. 120kWh/(m^2a)	120 + ((Q_H - 15) x 1.2)	
Frequency of Overheating (over 25 degrees)	10%	10%	
Water activity of interior surfacees a_w		max. 80%	

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How well do the standards fit?

For new build PH a no brainer:

- All design decisions still open
- Standard rewards sensible decision making

For existing buildings :

- Many decisions closed
- Options may be restricted – cultural and physical

How well do the standards fit?

While the appearance of PH projects can be highly varied, the underlying constructions is similar and designed around low energy.

How well do the standards fit?

In retrofit the underlying existing construction is varied and was not ‘designed’ with insulation and air tightness in mind.

How well do the standards fit?

For existing buildings, can the existing construction :

- Cope with the additional weight
- Loss of space
- Effects on moisture balance
- Cultural

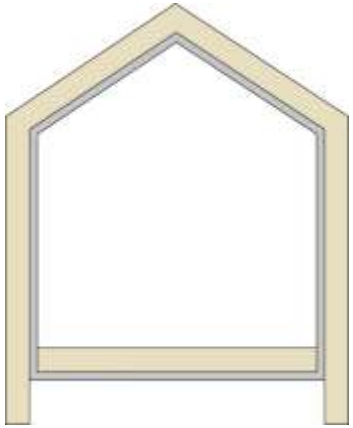
How well do the standards fit?

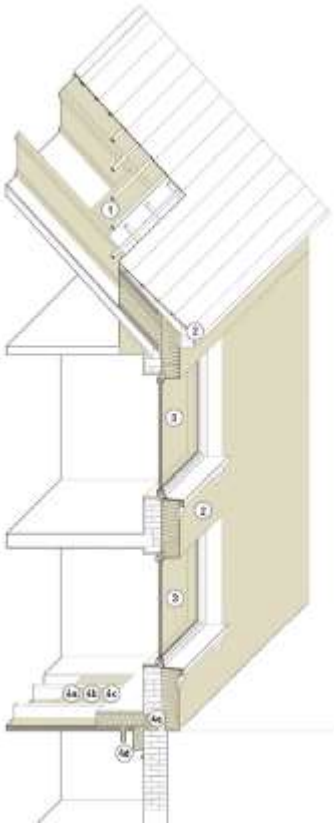
In retrofit, can the existing construction cope with :

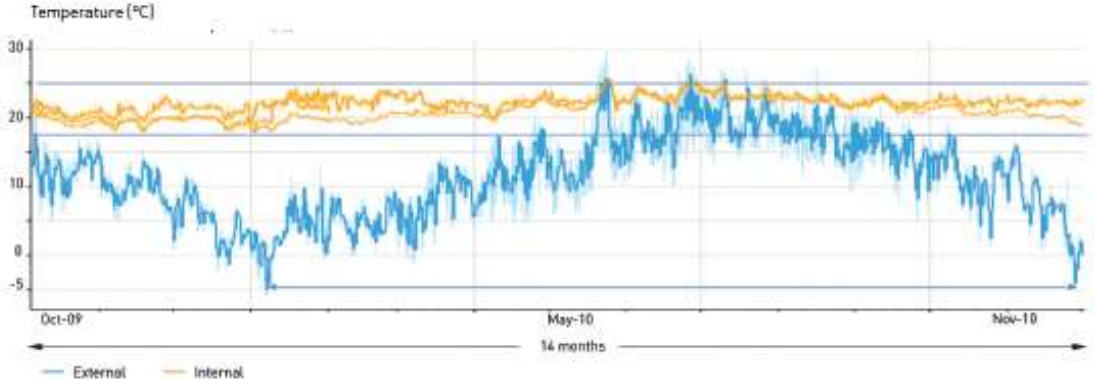
- Additional/altered loads
- Loss of space
- Effects on moisture balance
- Cultural impacts

Sometimes the answer is yes…….

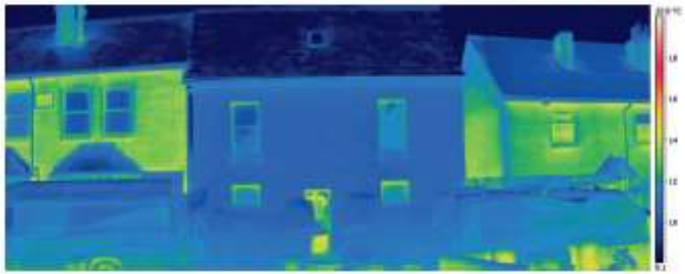
The Full Wrap





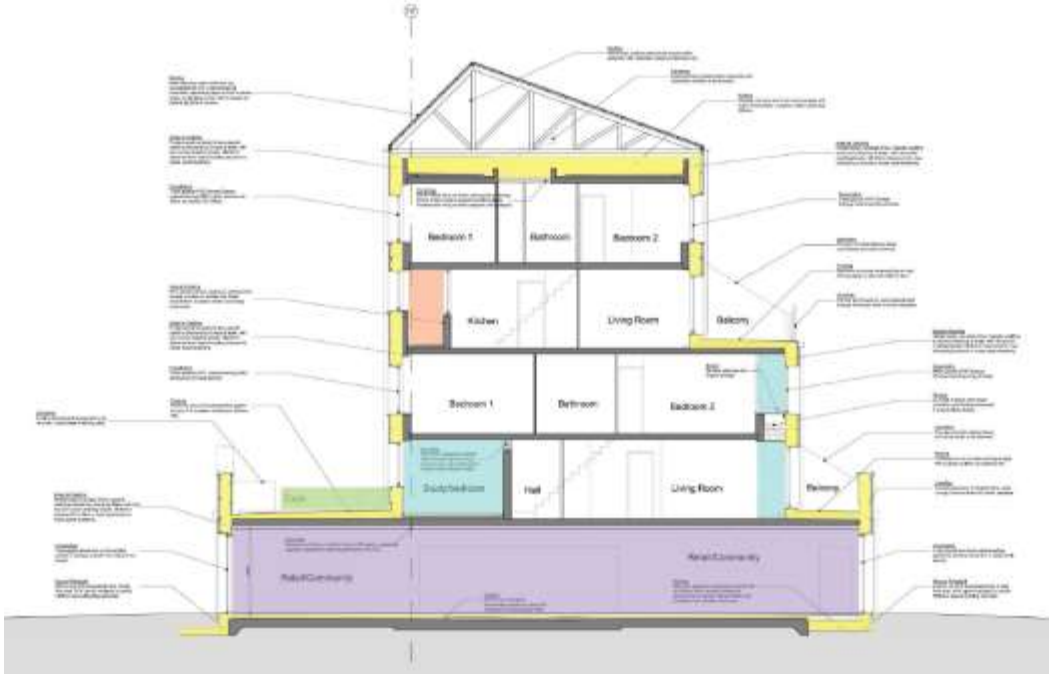


Thermal image of the front elevation

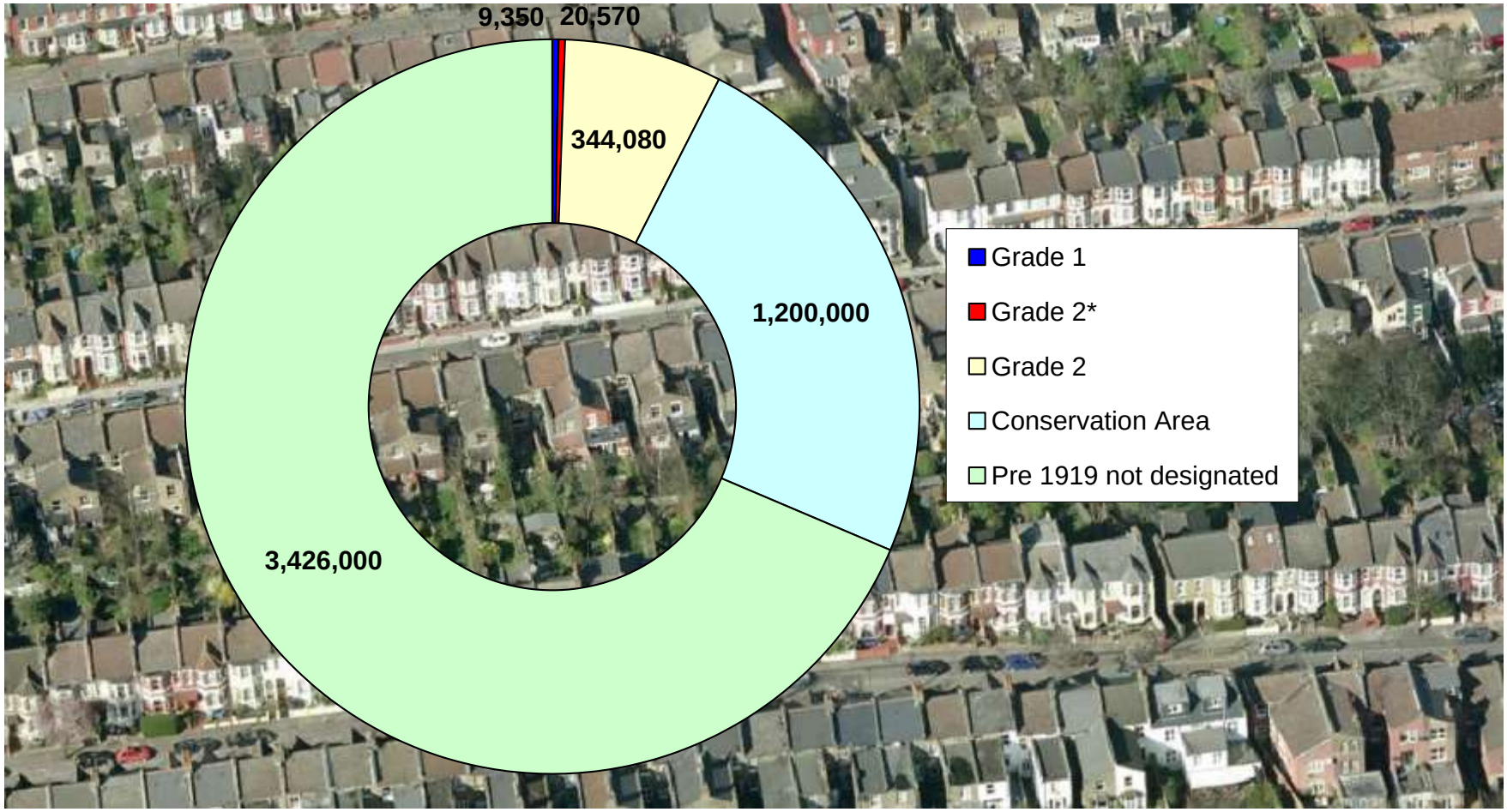


Front elevation post-retrofit

The Full Wrap



The other extreme?



Why these are important?

- Sheer number
- Worst performing – most damaging – 30% of problem
- Often owned by the richest (can afford to be pioneers)
- Often owned by RSL's (can't afford not to be pioneers)
- Its will take time to develop robust approaches
- Risk that these homes become unusable

Also the most challenging

- Full wrap may not be possible/desirable
- Vulnerable fragile construction
- IWI likely (and associated risks)
- Windows – cultural challenges

Approaching IWI

- Assess building, construction, location other context
- Remediate existing building defects
- Manage moisture (air tightness, ventilation)
- Consider hydrothermal issues (WUFI)

Approaching IWI

- Assess building, construction, location other context
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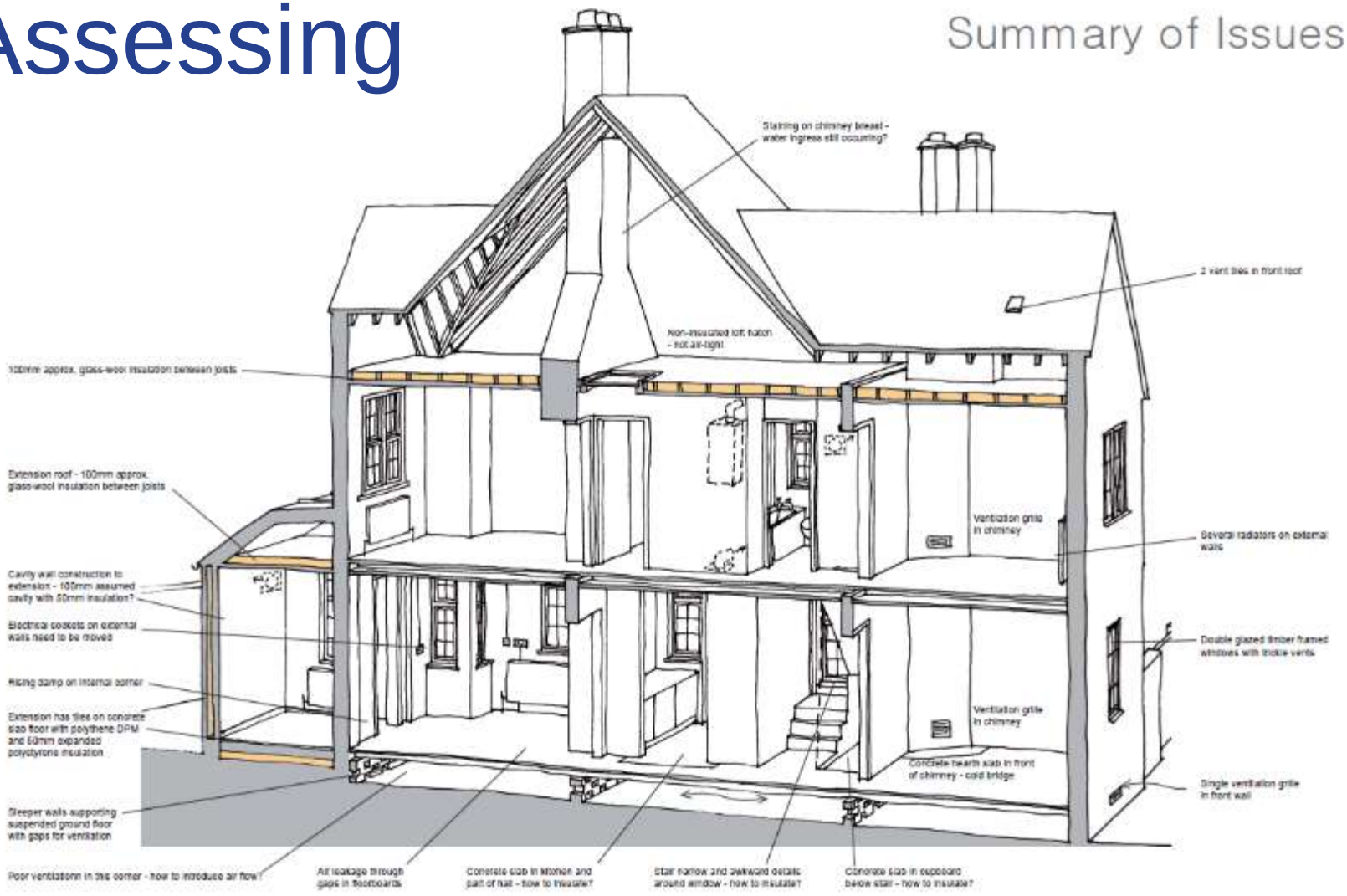
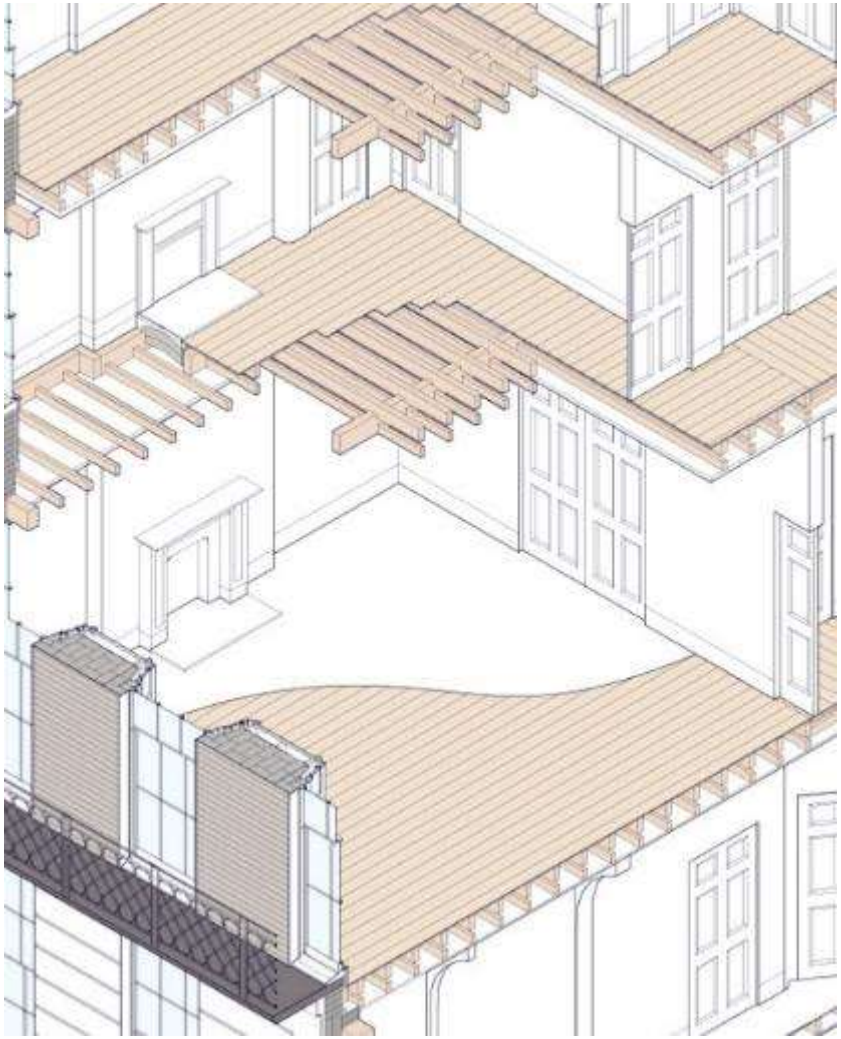
The emphasis then shifts from absolute energy use to what is appropriate in terms of wall insulation

Assessing


Summary of Issues
Staining on chimney breast - water ingress still occurring?
2 vent tiles in front roof
Non-insulated loft hatch - not air-tight
100mm approx. glass-wool insulation between joists
Extension roof - 100mm approx. glass-wool insulation between joists
Ventilation grille in chimney
Several radiators on external walls
Cavity wall construction to extension - 100mm assumed cavity with 50mm insulation?
Electrical sockets on external walls need to be moved
Double glazed timber framed windows with trickle vents
Rising damp on internal corner
Extension has tiles on concrete slab floor with polythene DPM and 50mm expanded polystyrene insulation
Ventilation grille in chimney
Concrete hearth slab in front of chimney - cold bridge
Single ventilation grille in front wall
Sleeper walls supporting suspended ground floor with gaps for ventilation
Poor ventilation in this corner - how to introduce air flow?
Air leakage through gaps in floorboards
Concrete slab in kitchen and part of hall - how to insulate?
Stair narrow and awkward details around window - how to insulate?
Concrete slab in cupboard below stair - how to insulate?

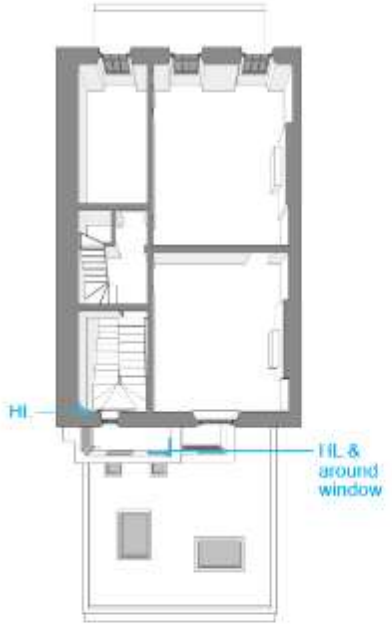
Assessing

Assessing



Assessing

Observations: Damp



Second Floor

Third Floor

Third Floor front room

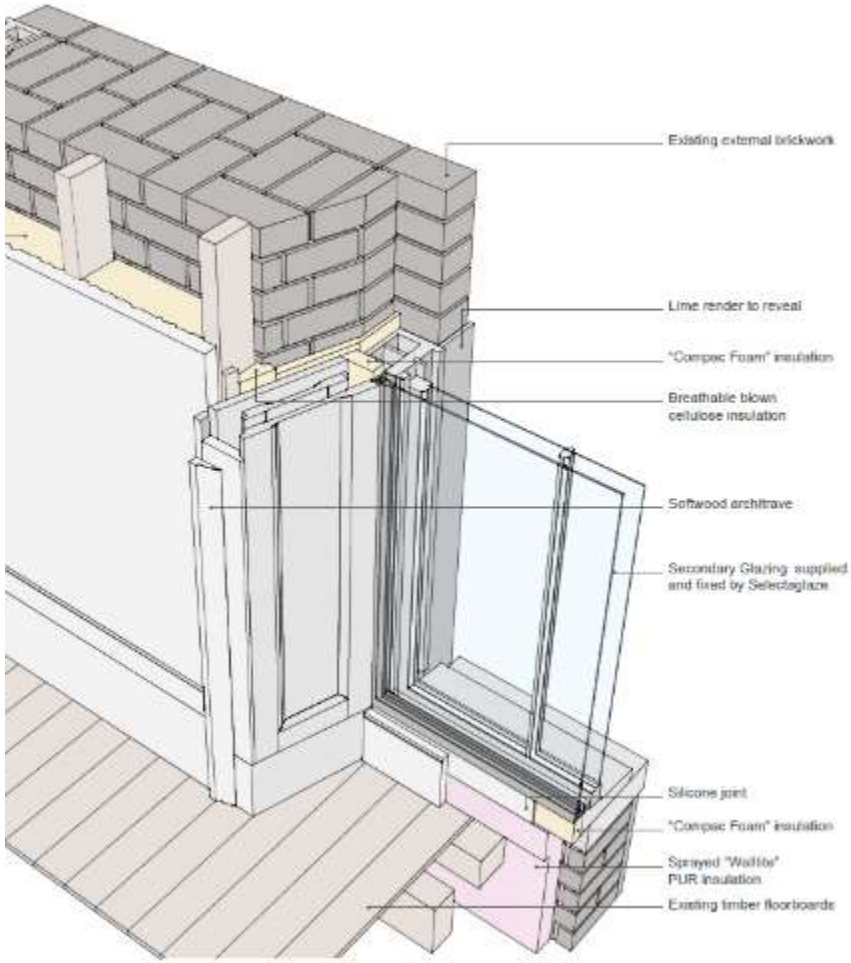
Third Floor rear WC

High level of main staircase

The above images show images taken on thermal imaging camera. What is being highlighted in these images are a mix of thermal bridges and ingress of moisture. These areas of damage are localised and we would therefore expect that such areas of acute damage can be fixed by resolving localised issues, such as leaking parapets or repointing brickwork.

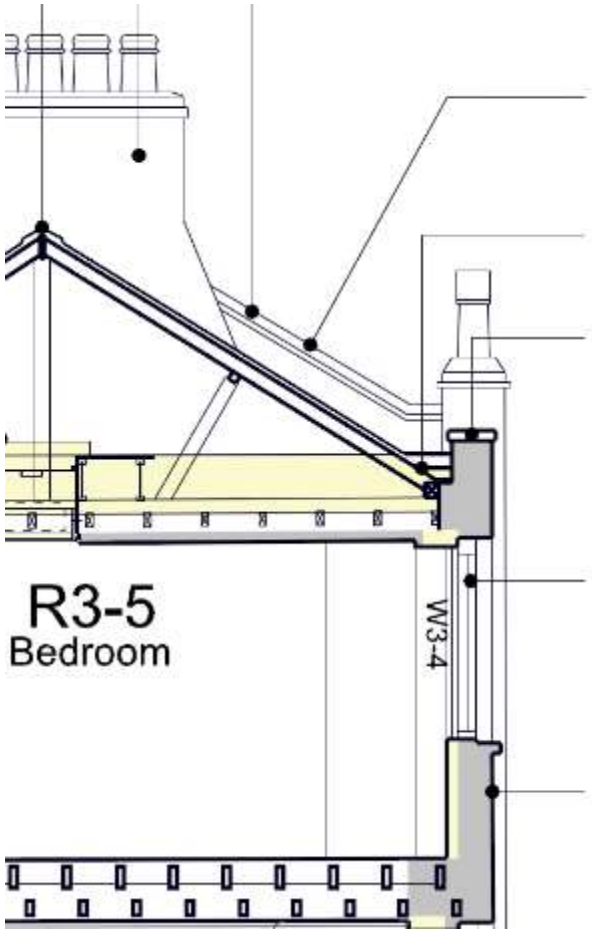
It is worth noting that areas of damp at high level can cause damage much further down the wall, especially with regards to timbers. Therefore where there are signs of damp, it should be considered that remedial work will be required to timbers below.

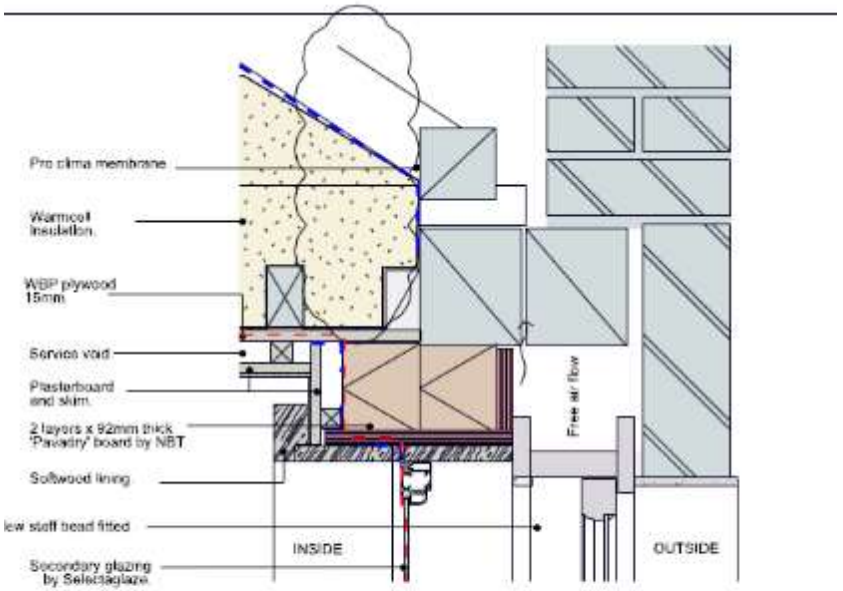
Detailed design



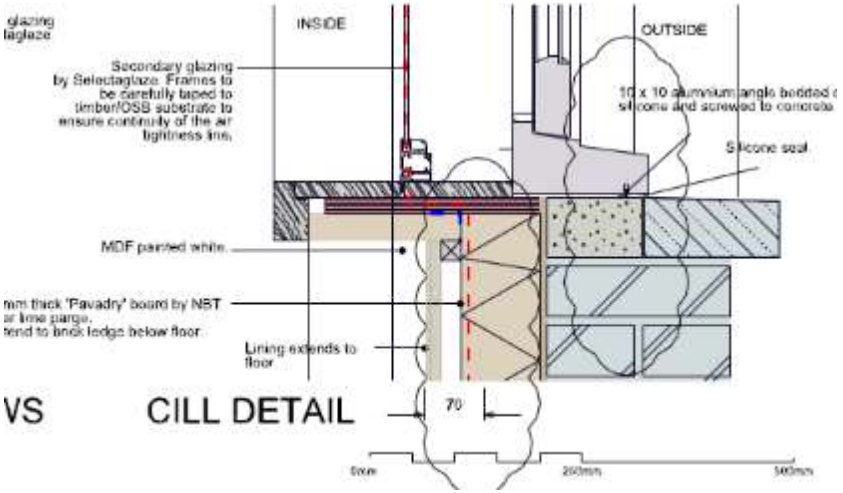
U = 0.3 - 0.4 W/m2K

Detailed design





HEAD DETAIL



VS CILL DETAIL

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bre

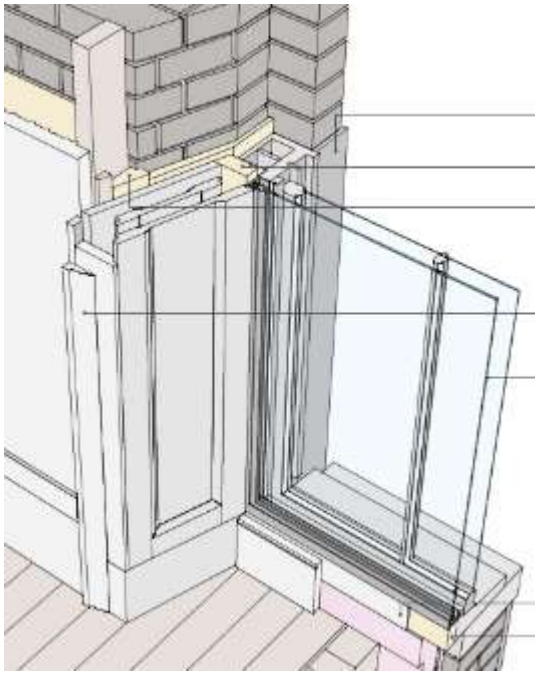
Get back to the bones

Get back to the bones

Remediate

Windows

Secondary with evacuated?



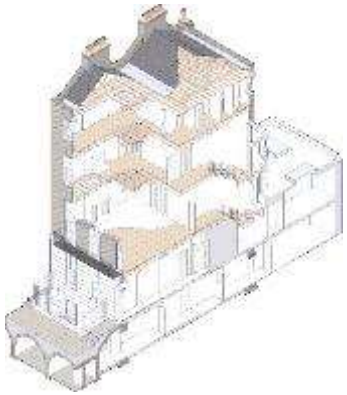
Range of heating demand.

20

Sydenham - Private

26-30

Balham - PBa



25-40

Bloomsbury - PBa

15

Holland Park -PDP

30

Hackney - PBa

40

Clapham - Arboreal

Conclusion

- Understand the building and its context
- Let building performance dictate energy target
- Consider comfort of building fabric as much as the occupant – don’t push to far
- Pay particular attention to moisture
- Get ‘back to bones’ for internal works
- Avoid risks of half measures as well
- Thinking about a bandwidth of 15-40 might be more useful