Project Documentation

Abstract

No. 19 Passmore Street, London, UK

Data of building | Gebäudedaten

Year of construction	2015	**Space heating Heizwärmebedarf**	**24.8 kWh/(m²a)**
U-value external wall (new/ existing)	0.099/0.193 W/(m²K)		
U-value ground (new/ existing)	0.121/0.168 W/(m²K)	Primary Energy Renewable (PER)	- kWh/(m²a)
U-value roof (new/ existing)	0.101/0.111 W/(m²K)	Generation of renewable Energy	- kWh/(m²a)
U-value window	0.90 W/(m²K)	Non-renewable Primary Energy (PE)	128 kWh/(m²a)
Heat recovery	87 %	Pressurization test n_{50}	0,90 h^{-1}
Special features	Use of permeable Aerogel internal wall insulation to prevent moisture build up & save space in this high market rental property; EPS external wall insulation with brick slips & triple glazed mock-sash window used for the first time in conservatopn area of Westminster (setting prescedence for Planning).		

Brief Description

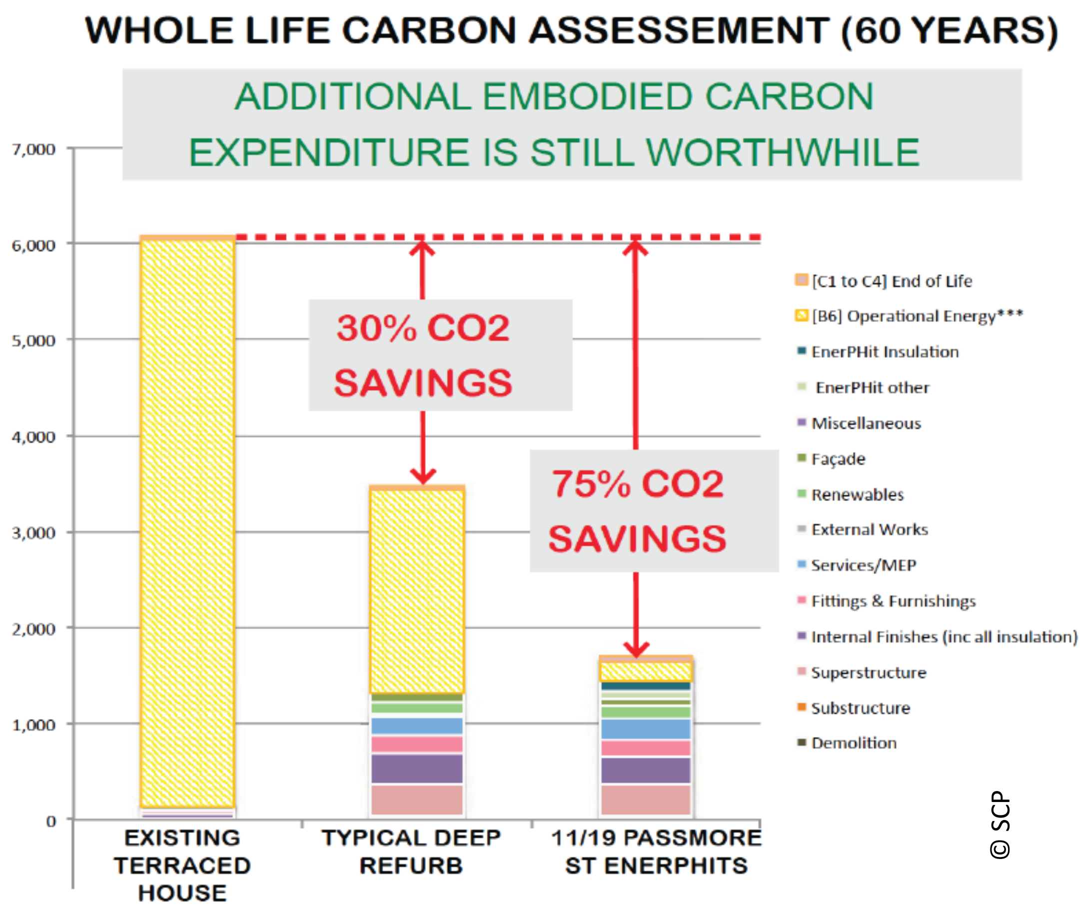
Background and description

First development of its type completed by Grosvenor Britain & Ireland (private landlord with portfolio of over 6,000 houses in Central London). This project was identified as 'pilot', as part of the company's commitment to reduce their carbon emissions by 50% across their directly managed property portfolio by 2024.

The historic fabric of the building was carefully preserved while being reinforced and insulated, using super-efficient breathable aerogel internal insulation to front, and external EPS wall insulation with brick slips to rear (applied to the whole street of 12 terraced houses). Two houses on the street no.11 and no.19 were identified for EnerPHits as were vacated at the time and undergone deep retrofit.

Whole Life Carbon Assessment showed that compared to existing, the two EnerPHit buildings achieve 95% operational CO2 reductions and 75% whole life CO2 reductions (including embodied emissions of materials), giving an overall saving of 840,000kg CO2e over buildings' life (60 years).

When completed it was only the second EnerPHit ever completed in the UK and the first rental property that was earmarked for PassivHaus certification.



Responsible project participants
Verantwortliche Projektbeteiligte

Architect	Maiia Williams of SCP
Implementation planning	Maiia Williams of SCP
Building systems	Edward Pearce
Structural engineering	Hurst Peirce & Malcolm
Building physics	Maiia Williams of SCP
Passive House project planning	Maiia Williams of SCP
Construction management	Grangewood

Certifying body

Will South of Co-Create

Certification ID

6362	Project-ID (www.passivehouse-database.org) Projekt-ID (www.passivhausprojekte.de)

Author of project documentation

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Date	Signature Maiia Williams
18/05/2020	M. Williams

1. Project photos

Rear

© GBI

2. Interior

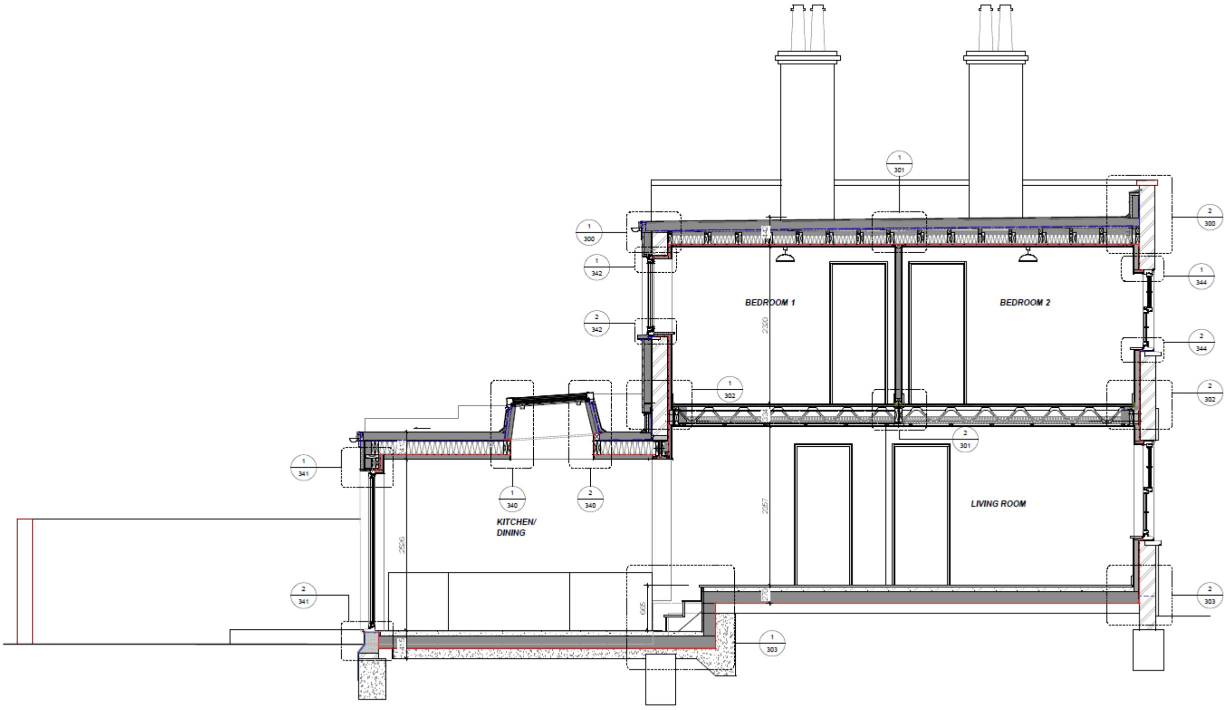
Living room

© GBI

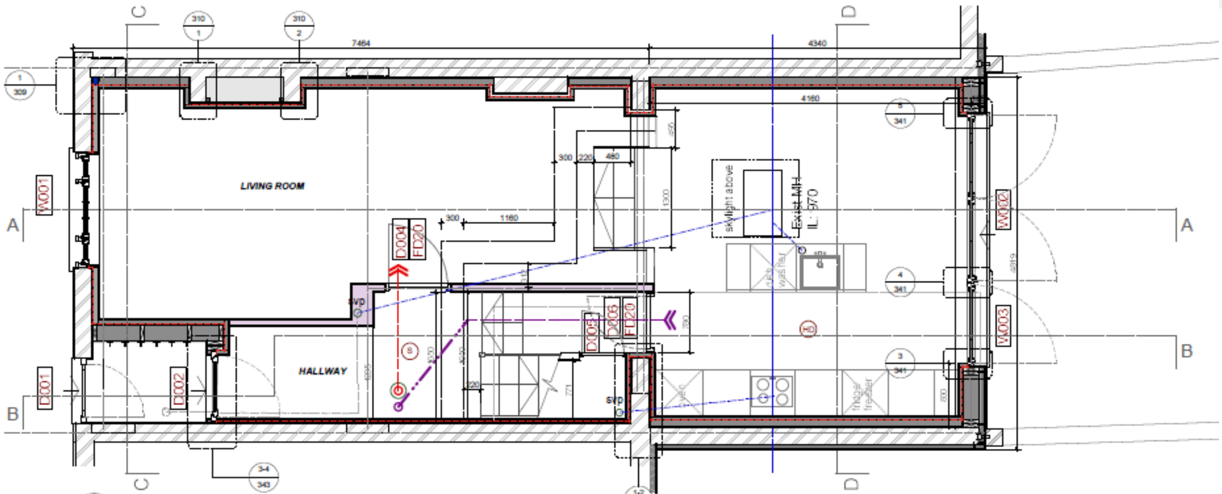
Kitchen/ dining

© GBI

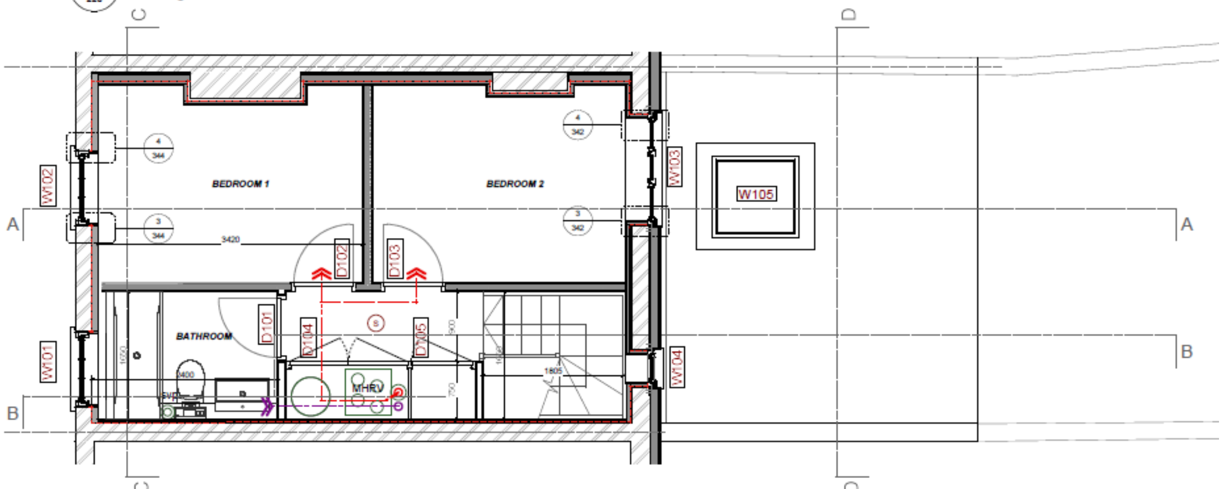
3. Section



4. Ground & First Floor Plans

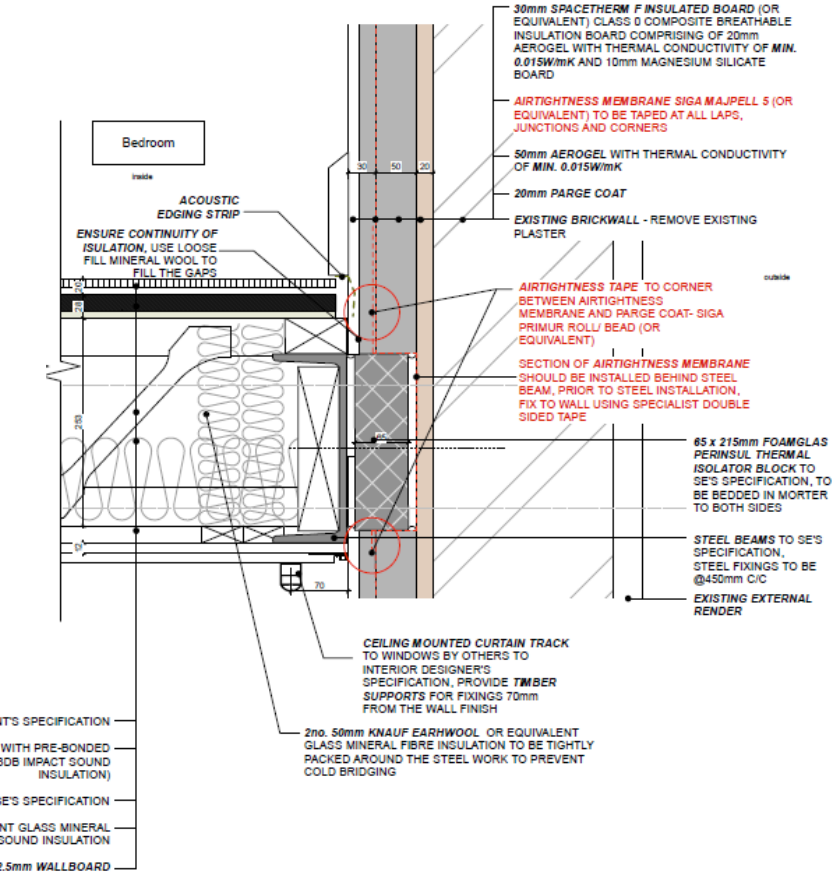


Proposed Ground Floor Plan
Scale 1:50@A3



Proposed First Floor Plan
Scale 1:50@A3

5. Internal insulation - rear



We have opted for a unique product to insulate external walls – vapour permeable Aerogel high performance insulation board sandwich with intellegent airtightness membrane in between. It was necessary to avoid problems with condensation and to save space internally. We opted for thinnest vapour permeable product on the market and were guided by the manufacturer on installation. The fixings were the trickiest part as you cannot drill aerogel because of its fibrous nature. It had to be punctured & only then masonry wall drilled inside protective hollow tube. Mastic had to be used during the application of fixings to ensure membrane was not leaking. Furthermore, the board had to be pre-drilled to countersink the mashroom fixing head which reduced the thermal bridging.

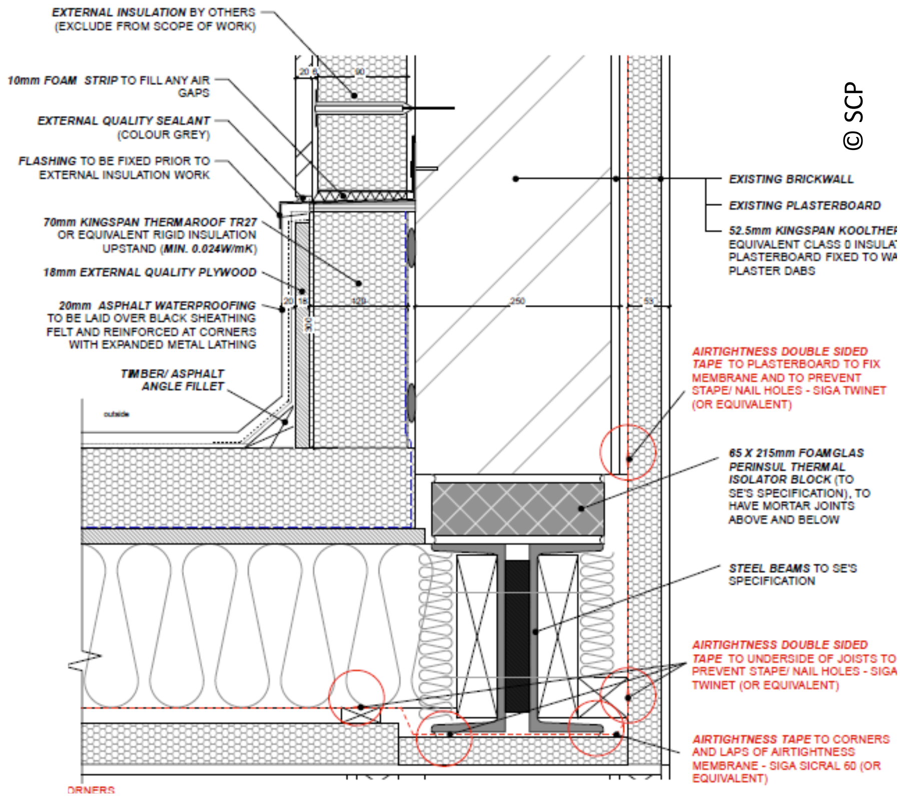
Assembly no.	Building assembly description						Interior insulation?
4	WL Front External						yes

Heat transfer resistance [m²K/W] interior R_{si} : 0.13 exterior R_{se} : 0.04

	Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
1.	FIN Plasterboard	0.250					13
2.	INS Spacetherm Aerogel	0.015					20
3.	INS Spacetherm Aerogel	0.015					50
4.	MAS Parge coat plaster	0.250					15
5.	MAS Existing brick exp	0.900					220
6.							
7.							
8.							
	Percentage of sec. 1	100%	Percentage of sec. 2		Percentage of sec. 3		Total 31.8 cm

U-value supplement W/(m²K) U-Value: 0.193 W/(m²K)

6. External insulation - rear



External insulation allowed us to save space internally but was difficult to get through Planning with the local authority. We had to install it with the brick slips over the top to match the existing exactly. It also had to be applied to the facade of all adjacent houses (12no.) and all historic details such as corbing had to be replicated which lost us some battles with cold bridging but won the Planning battle! We were still limited with the amount we had permission to install and had to resort to some internal insulation to improve the u-value.

Assembly no. 9 — Building assembly description: WL Rear FF external — Interior insulation?

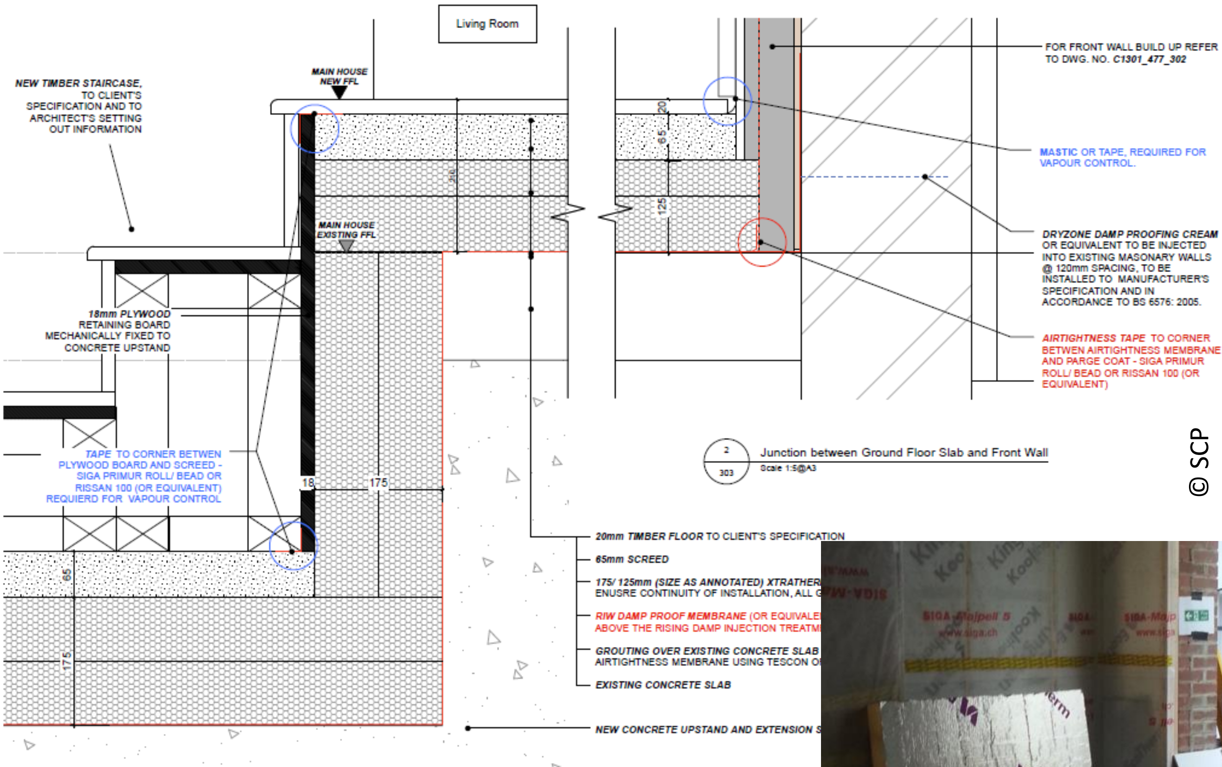
Heat transfer resistance [m²K/W]: interior R_{si}: 0.13; exterior R_{se}: 0.04

	Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
1.	FIN Plasterboard	0.250					13
2.	INS Kingspan Kooltherm	0.021					50
3.	MAS Existing brick	0.800					220
4.	MAS Plaster parge	0.600					10
5.	INS Baumit EPS-F Plus	0.031					90
6.	MAS Brick slips	1.000					30
7.							
8.							
	Percentage of sec. 1: 100%		Percentage of sec. 2		Percentage of sec. 3		Total: 41.3 cm

U-value supplement: W/(m²K)

U-Value: 0.172 W/(m²K)

7. Roof construction



This was an existing property with a sizable new extension on the back. We were limited with what we could do with existig floor because of the existing shallow foundations so the main house had only 125mm insulation and new slab installed, when the new part of the building which was at lower level compared to existing had 175mm insulation laid down (as per u-value calc below). It was a balancing act between what you can get away with in existing part and how far we could push the envelope with new elements.

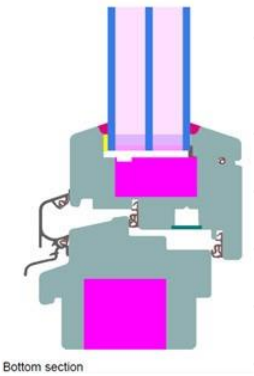
Assembly no.	Building assembly description						Interior insulation?
2	FL New extension slab						yes

Heat transfer resistance [m²K/W] interior R_{si}: 0.17 exterior R_{se}: 0.00

	Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
1.	MAS Concrete Screed	1.400					65
2.	INS Xtratherm Thin R	0.022					175
3.	MAS Concrete slab	2.100					150
4.							
5.							
6.							
7.							
8.							
	Percentage of sec. 1	100%	Percentage of sec. 2		Percentage of sec. 3		Total 39.0 cm

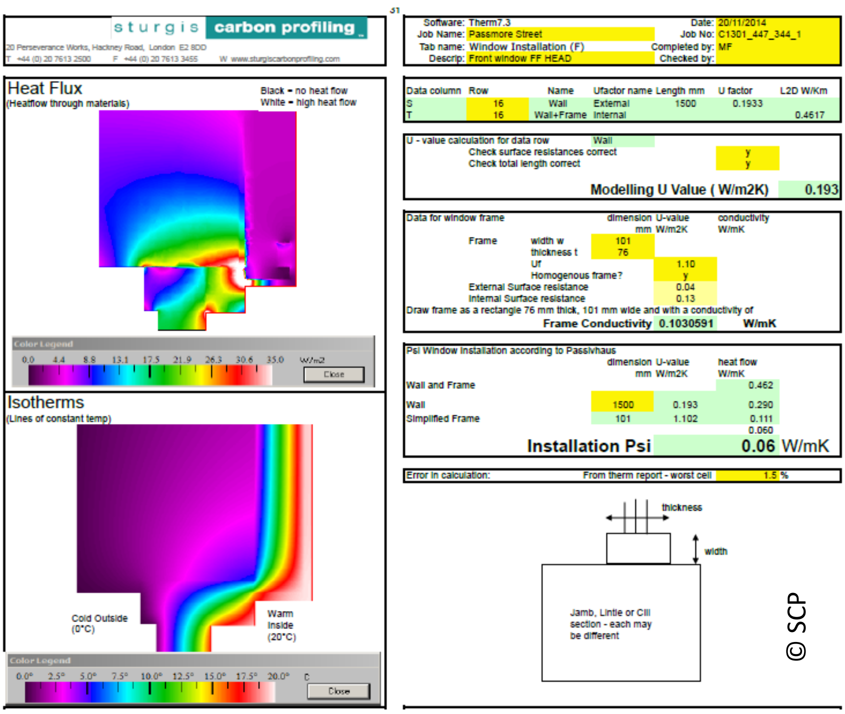
U-value supplement W/(m²K) U-Value: 0.121 W/(m²K)

8. Windows and window installation



© Livingwood

Manufacturer	**Front mock-sash from Green Tomato Energy/ Rear casements from Livingwood**
U-value, Uf	1.10/ 0.77 W/(m²K)
Glazing type	? Slimline triple/ Planitherm Ultra N triple
U-value glass Ug	0.60/ 0.50 W/(m²K)
g-value	0\0.61/ .50



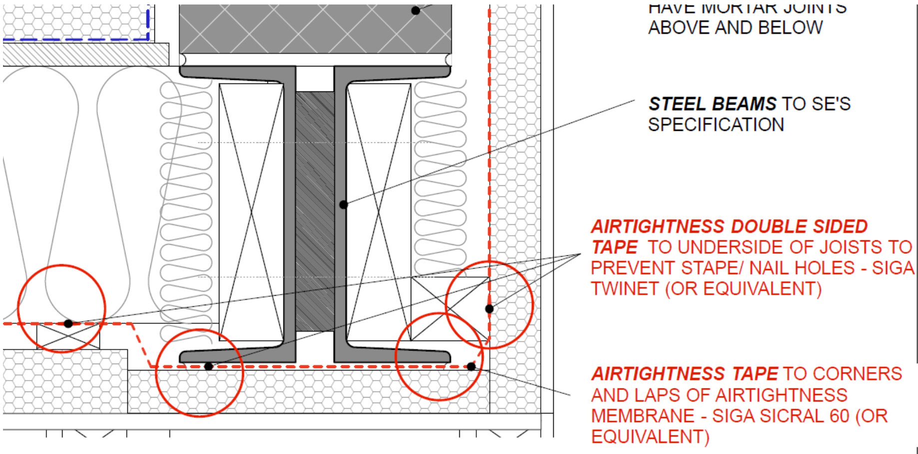
9. Airtightness

The airtightness n50 of 0.80 and 0.90 h-1@50Pa was achieved in the two tested properties with a fair amount of rectification measures.

Airtightness measures:

1. Walls – SIGA membrane
2. Floors – DPM membrane
3. Roof – SIGA membrane

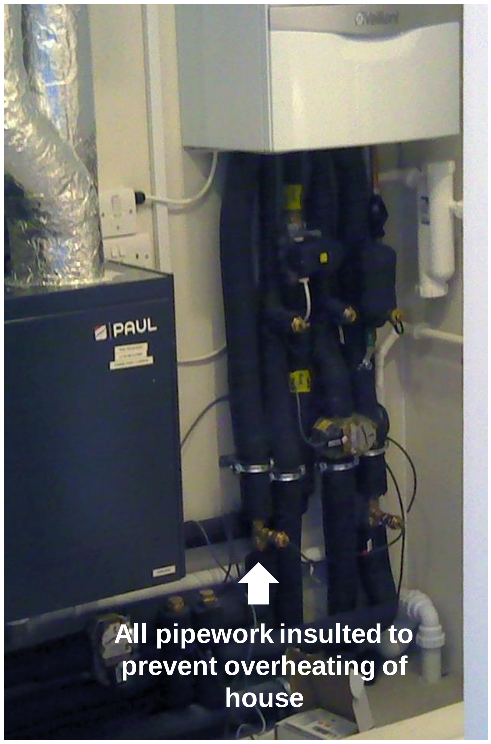
All taped at junctions with propriatry tape.



The airtightness was the hardest item on the contractor's list because of the luck of experience, and was only achived due to:

(1) Very clear approach where all drawings were marked with red for airtightness where membrane went and how it was taped (specialist tapes were used for different areas);
(2) Hands-on workshop from Siga held with the contractor;
(3) Second hand air testing equipemnt was purchased by the client to be used by contractor who had to learn to operate the machine to keep an eye on the airtightness throghout the build;
(4) Due dilegence of the PH designer/ Architect who came to every air test and helped to rectify the faults.

10. MVHR & heating



We used certifed MVHR unit to ensure that we comply with the PH requirements. Our system was designed by supplier, installed by professional and tested by third party. Air ducts info included on GA plans above.

Manufacturer	**Paul Focus 200**
Efficiency	91 %
Electric efficiency	0.31 Wh/m³

The heating was provided by Vaillant Combi boiler which was a familiar choice for the contractor and client who wanted a traditional suystem installed bearing in mind that this property required reqular servicing as it was a rented property.

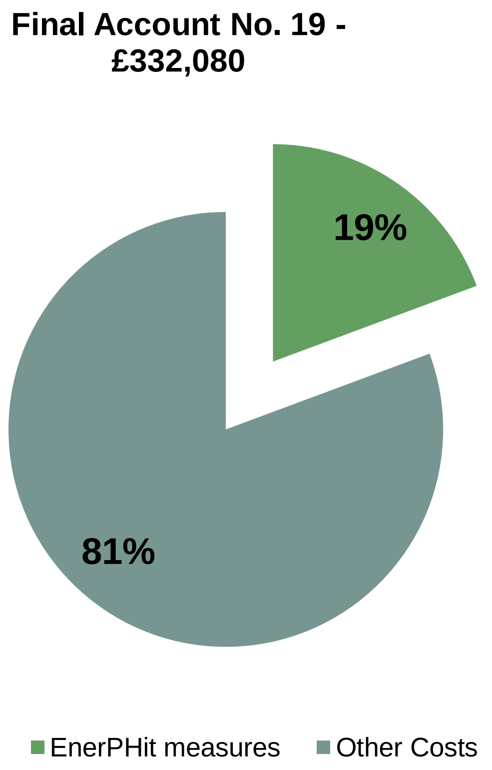
11. Monitoring

A number of monitoring devices were installed in the property to monitor in-use electric energy meter, hot water & heating flux meter, internal & external temperature sensors. The data was collected and analysed by SCP.

12. Renewables

PV panels were installed on the property but subsequent to the certification and were not included.

13. Construction cost



EnerPHit requirements where more onerous than the given budget resulting in the uplift in cost. The contractor did not make allowance for either extra time required to achieve desired airtightness and attention to detail that was required. Prelims went up to account for 4 week extension of time.

Extra Cost attributed to EnerPHit estimated = £60,350 (19%) N.B. This is one of the most expensive London addresses and the work budget and costs reflect this.

We considered this a very high uplift which will be negated in any consecutive projects providing the same team is used and lessons learned are taken forward.

15. PHPP-Results

EnerPHit verification

Building:	19 Passmore Street
Street:	Passmore Street
Postcode / City:	London
Country:	UK
Building type:	Single Existing Terrace Residential
Climate:	[UK] - London (Central) — Altitude of building site (in [m] above sea level): 18
Home owner / Client:	Grosvenor Estates
Street:	
Postcode/City:	
Architecture:	Sturgis Carbon Profiling
Street:	20 Perseverence Works
Postcode / City:	London E2 8DD
Mechanical system:	Edward Pearce Consulting Engineers
Street:	35 Ewell Road
Postcode / City:	Surbiton KT6 6AF

Year of construction:	2014	Interior temperature winter:	20.0	°C	Enclosed volume V_e m³:	270.0
No. of dwelling units:	1	Interior temperature summer:	25.0	°C	Mechanical cooling:	
No. of occupants:	1.9	Internal heat sources winter:	2.1	W/m²		
Spec. capacity:	60 Wh/K per m² TFA	Ditto summer:	3.2	W/m²		

Specific building demands with reference to the treated floor area

		Value	Unit	Requirements	Fulfilled?*
	Treated floor area	66.1	m²		
Space heating	Heating demand	24.8	kWh/(m²a)	25 kWh/(m²a)	yes
	Heating load	11	W/m²	-	-
Space cooling	Overall specif. space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	4.6	%	-	-
Primary energy	Heating, cooling, auxiliary electricity, dehumidification, DHW, lighting, electrical appliances	128	kWh/(m²a)	132 kWh/(m²a)	yes
	DHW, space heating and auxiliary electricity	63	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	0.9	1/h	1 1/h	yes

EnerPHit (retrofit): building characteristic values

		Value	Unit	Requirements	Fulfilled?*
Building envelope	Exterior insulation to ambient air	0.12	W/(m²K)	-	-
Average U-Values	Exterior insulation underground		W/(m²K)	-	-
	Interior insulation to ambient air	0.19	W/(m²K)	-	-
	Interior insulation underground	0.14	W/(m²K)	-	-
	Thermal bridges ΔU	0.00	W/(m²K)	-	-
	Windows	0.90	W/(m²K)	-	-
	External doors		W/(m²K)	-	-
Ventilation system	Effective heat recovery efficiency	87	%	-	-

* empty field: data missing; '-': no requirement

EnerPHit building retrofit (according to heating demand)?	yes

This was one of the first EnerPHit projects in the UK and the learning curve was steep for both PH designer and certifier. We had to allow for error in all calculations and assume worse performces for insulation & windows during design stage. The building was small and the client was concerned for every m2 of area lost to internal insulation. It was a real balancing act to get the insulation right!