Template project documentation

Project Documentation
Gebäude-Dokumentation

1 Abstract / Zusammenfassung

Detached house Enerphit, Sheffield England

1.1 Data of building / Gebäudedaten

Year of construction/ Baujahr	2017	**Space heating / Heizwärmebedarf**	**18 kWh/(m²a)**
U-value external wall/ U-Wert Außenwand	0.11 W/(m²K)		
U-value ground floor/ U-Wert Kellerdecke	0.31 W/(m²K)	**Primary Energy Renewable (PER) / Erneuerbare Primärenergie (PER)**	69kWh/(m²a)
U-value roof/ U-Wert Dach	0.108 W/(m²K)	**Generation of renewable energy / Erzeugung erneuerb. Energie**	33kWh/(m²a)
U-value window/ U-Wert Fenster	0.9 W/(m²K)	**Non-renewable Primary Energy (PE) / Nicht erneuerbare Primärenergie (PE)**	73kWh/(m²a)
Heat recovery/ Wärmerückgewinnung	82%	Pressure test n_{50} / Drucktest n_{50}	0.3 h-1
Special features/ Besonderheiten	4Kv Solar PV array		

1.2 Brief Description ...

Enerphit - Sheffield

This 4 bedroom detached house is the first Passive House retrofit building to be completed in Sheffield and the wider area. It has a treated floor area of 158m² . It was originally the vicarage to St Bartholemews church located on the same street. The building is a south east facing to the living accommodation and of solid construction with a raft foundation. The loft space is used for ventilation equipment and a mezzanine play area serving the children's bedrooms.

The original building was largely unchanged other than slight reduction in north facing window area and demolition of external concrete canopy and adjoining out house to simplify external insulation.

The existing masonry structure was externally insulated and overclad in Siberian larch. The roof was also overlaid with insulation creating a warm roof. The floor was overlaid with insulation requiring door openings to be raised.

New triple glazed windows were installed in projecting timber boxings

Air tightness was achieved through a mixture of air tight tapes and liquid applied air tightness paint and internal plaster finish.

The main entrance canopy was replaced with a free standing canopy to omit cold bridges.

1.3 Responsible project participants / Verantwortliche Projektbeteiligte

Architect/ Entwurfsverfasser	Daniel Bilton, Bilton Design Ltd https://www.biltondesign.uk
Implementation planning/ Ausführungsplanung	Daniel Bilton, Bilton Design Ltd https://www.biltondesign.uk
Building systems/ Haustechnik	Daniel Bilton, Bilton Design Ltd https://www.biltondesign.uk
Structural engineering/	Chris Simm
Baustatik	Peak engineers
Building physics/ Bauphysik	Daniel Bilton, Bilton Design Ltd https://www.biltondesign.uk
Passive House project planning/ Passivhaus-Projektierung	Daniel Bilton, Bilton Design Ltd https://www.biltondesign.uk
Construction management/ Bauleitung	Daniel Bilton, Bilton Design Ltd https://www.biltondesign.uk

Certifying body/ Zertifizierungsstelle	Mead Consulting http://www.meadconsulting.co.uk/
Certification ID/ Zertifizierungs ID	Project-ID (www.passivehouse-database.org) Projekt-ID (www.passivehouse-database .org) 6357

Author of project documentation / Verfasser der Gebäude-Dokumentation	Daniel Bilton, Bilton Design Ltd https://www.biltondesign.uk
Date, Signature/ Datum, Unterschrift	16/10/20 

2 Views

South West elevation

North East Elevation

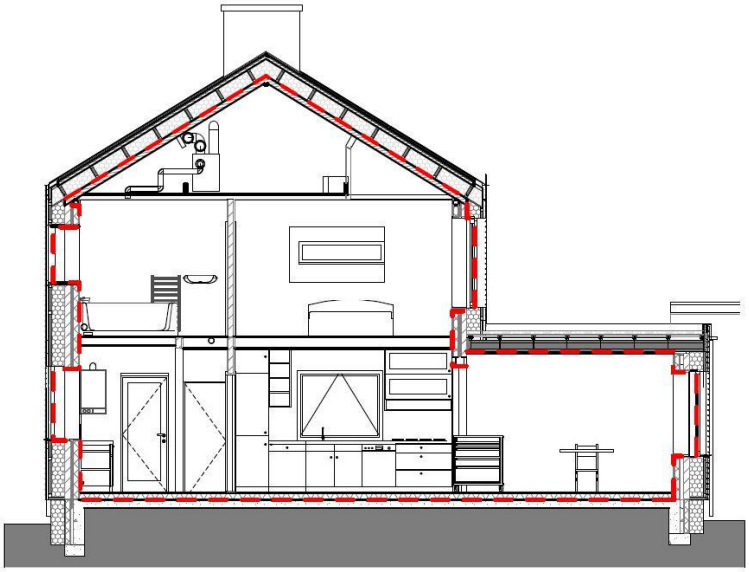
South East (rear) elevation

North west elevation

Hallway - the internal masonry walls form cold bridges, so the stair wall support was replaced with a hanging detail, removing the cold bridge and opening up the hallway. Air tightness tapes and paint can be seen in the background around the front door frame and projecting boxings.

3 - Sectional Drawing

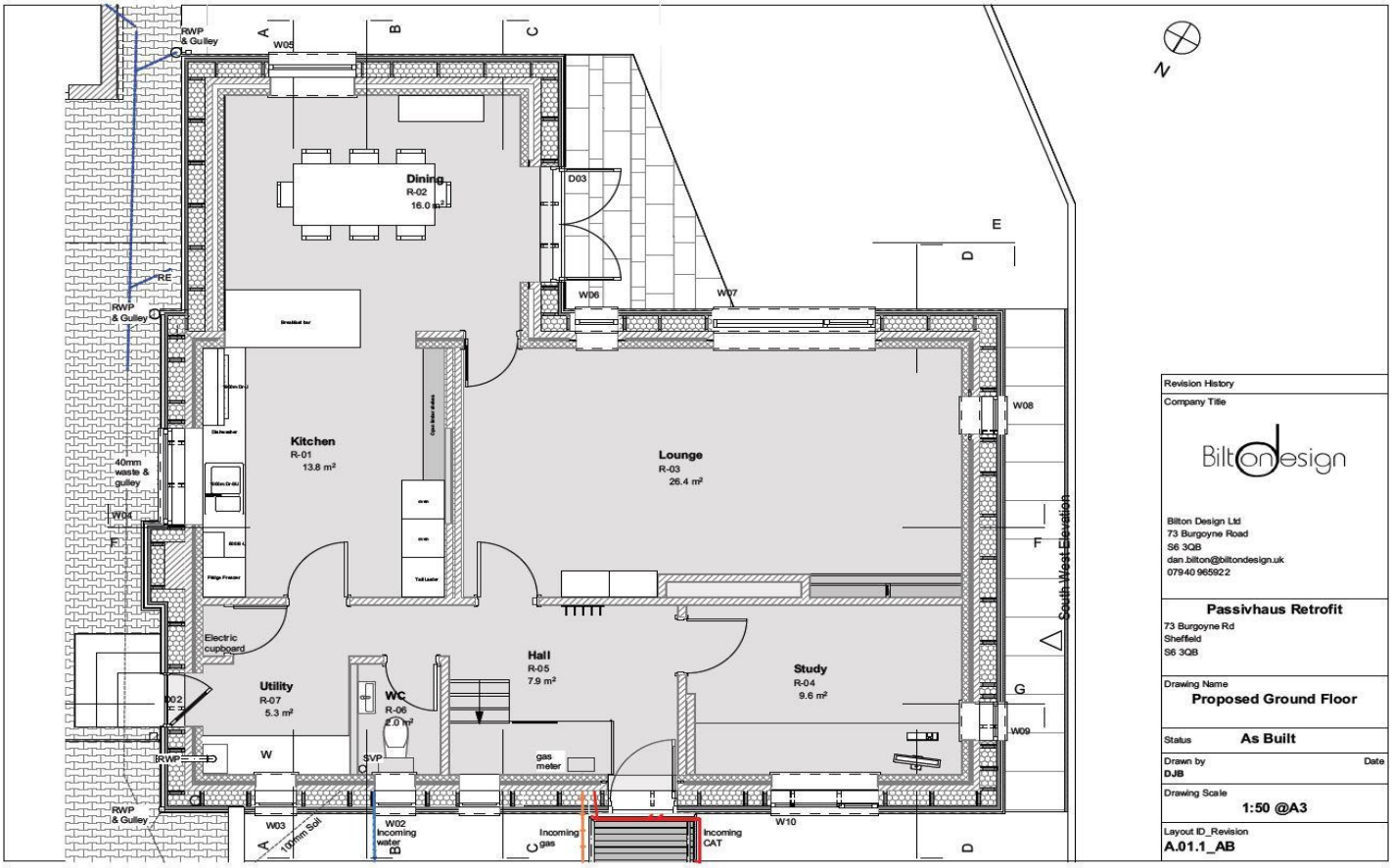
Cutaway showing overall strategy



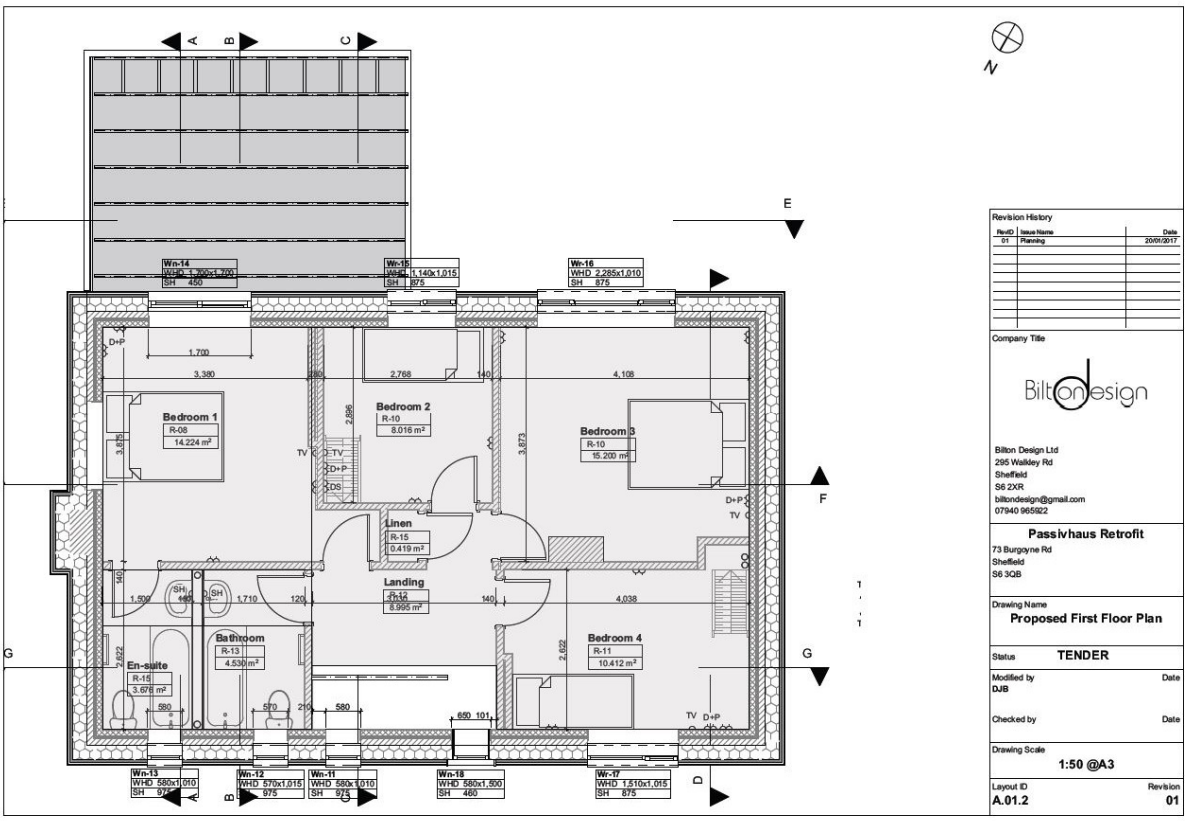
A Utility/Kitchen/Dining 1:100

Section showing air tight line and continuous insulation line which wraps externally around the building. The perimeter insulation extends from 600-900mm below ground floor level. The existing raft foundation slab was over laid with a 100mm PIR insulation and floating T&G timber floor over.

4 .Floor Plans



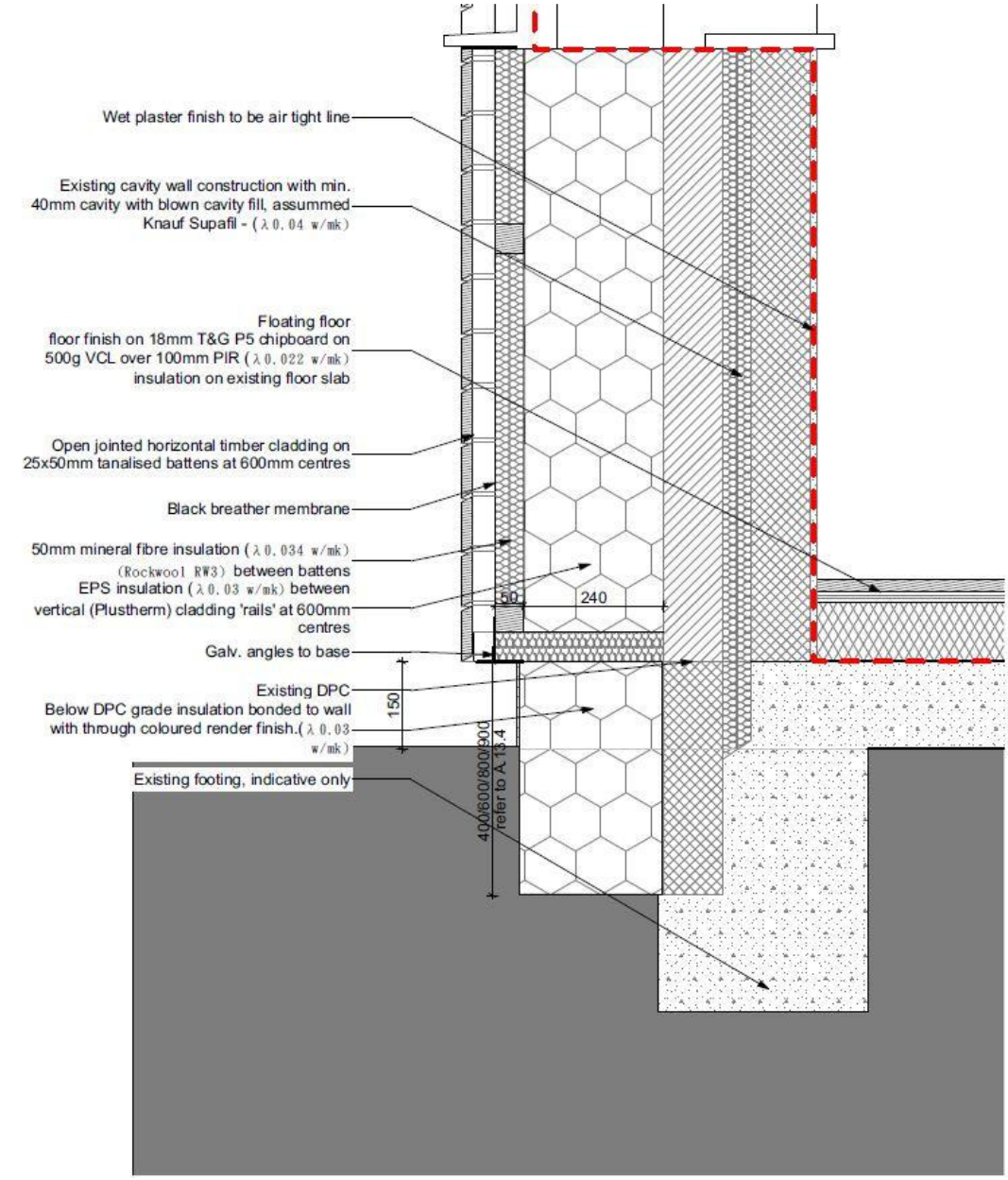
Ground floor plan, which shows the external insulation and cladding wrapping around the existing masonry structure. The existing plan suited an enerphit conversion as the living spaces faced SSE and the stairs/wc & utility to the north side.



First Floor plan – the main change to this plan was moving of a window from the east side to the south (W14). The original pitched roof to the dining room was roofed to facilitate this, and replaced with a flat roof with a sedum/biodiverse covering.

External insulation being installed

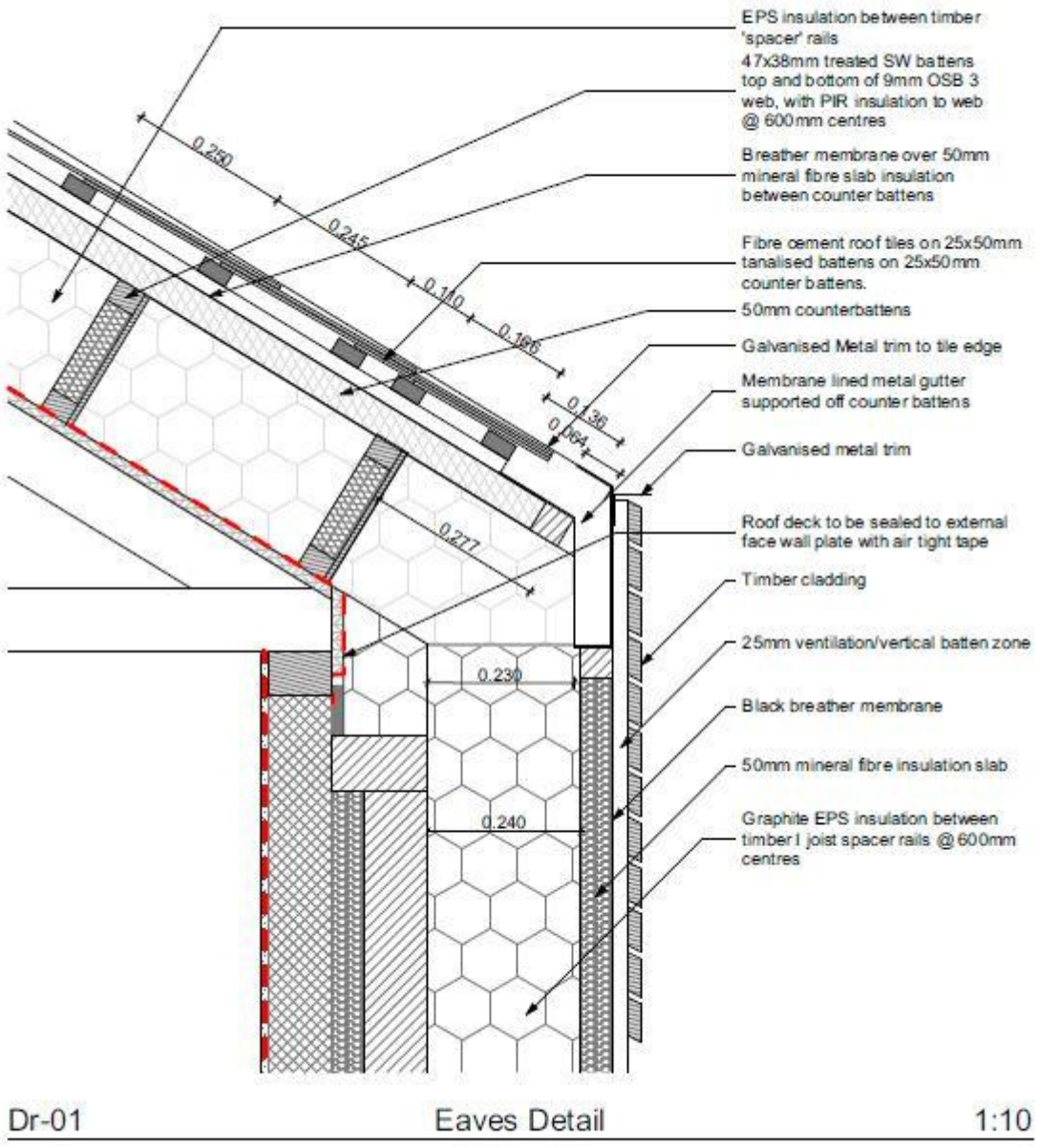
5.1 - Wall/slab junction



D-p01 Typical GF perimeter 1:10

The existing walls were over clad with 240mm EPS and 50mm Rockwool slab between Larsen trusses supporting the outer layers of battens to which horizontal Larch rainscreen cladding was fixed.
Higher density EPS was used to the building perimeter, extending between 400-900mm below DPC to mitigate the external wall cold bridge.

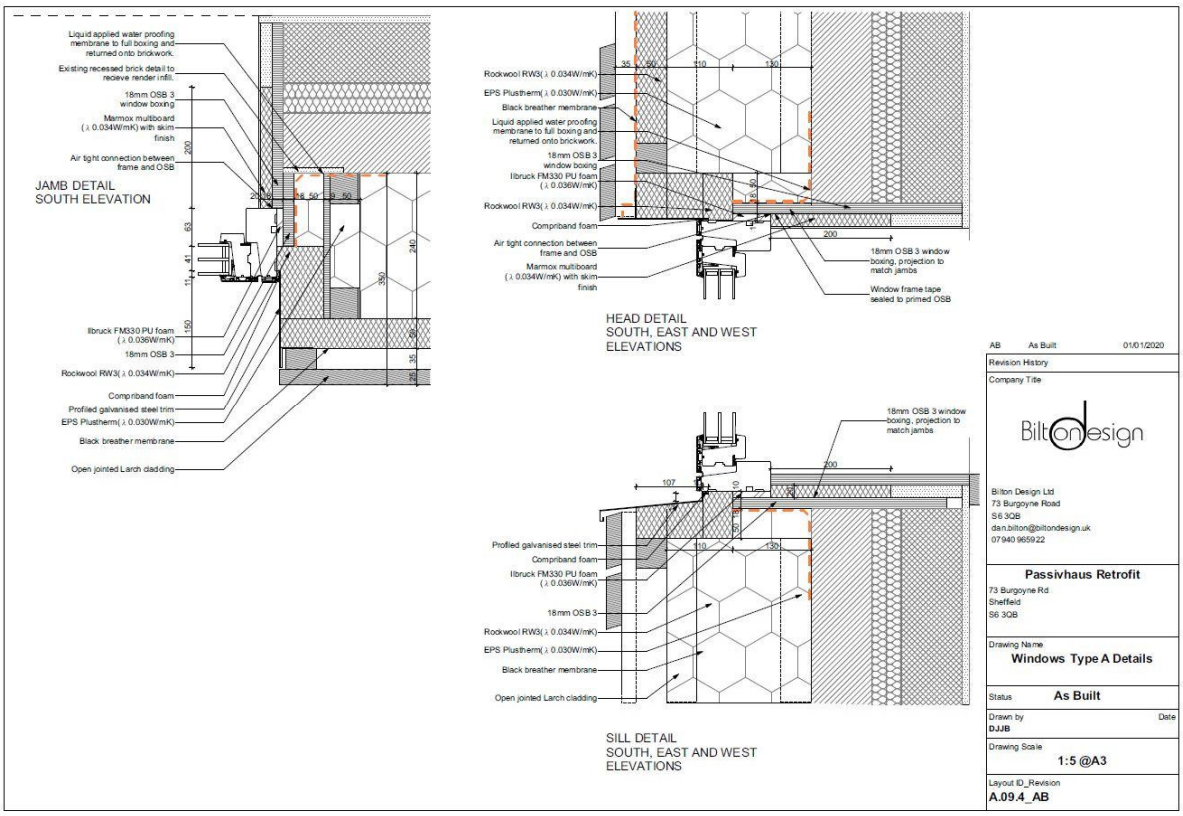
5.2 - Wall/roof junction



Roof Eaves detail - Note the mineral fibre insulation providing fire resistant layer over the wall and roof EPS insulation
The existing roof was overlaid with 18mm melamine faced P5 T&G chipboard, jointed glued and taped (3M sheathing tape) and perimeter taped to rendered and primed masonry walls (proclima tapes)

Air tight roof deck in place being over laid with 240mm EPS

5.4 - Window details

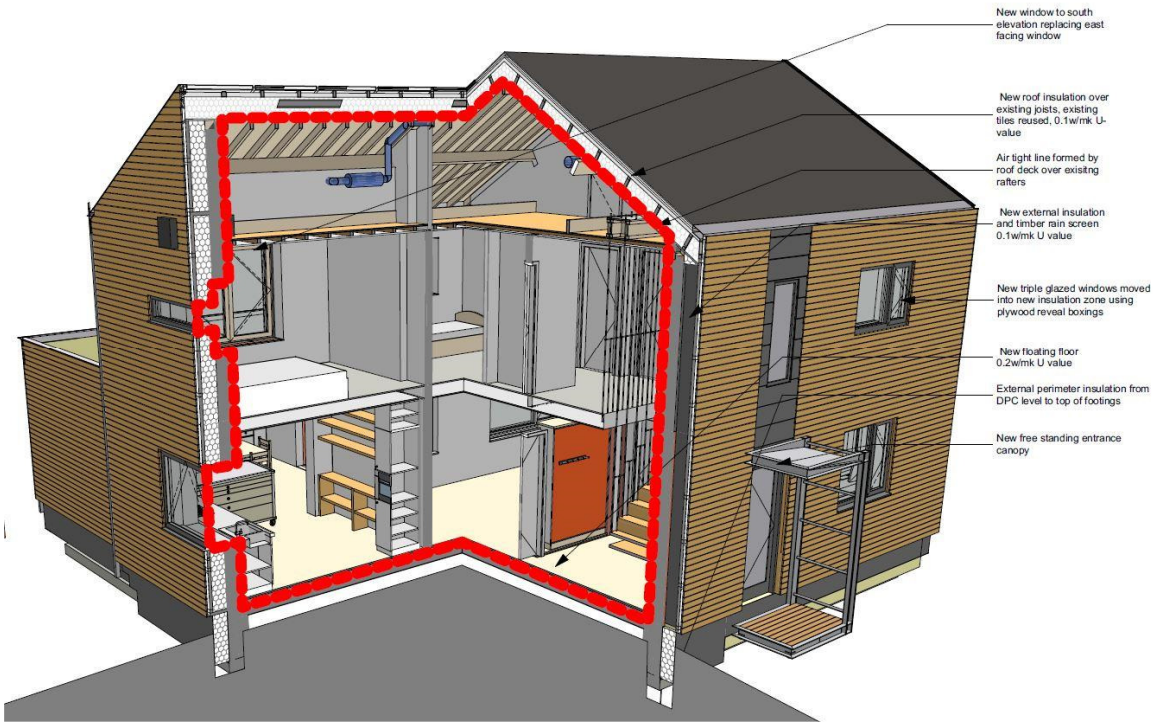


Window details -
Rationell Aura Plus windows - triple glazed windows with composite timber/aluminium frames. Centre pane U-value of 0.52W/M^{2}K, G-value 0.53 o/a U-value 0.83-0.84W/M^{2}K.
Note the mineral fibre insulation layer is returned around the window reveals to encapsulate the EPS in fire resistant material

The window reveals internally were lined with Marmox insulated board with skim finish to reduce cold bridging.

Weather proof membrane installed over mineral fibre insulation, returned into window reveals.
At least one opening light was provided to living spaces

6 - Air tight envelope



Roof - Melamine faced particle board deck with glued T&G joints, taped externally, perimeter taped to primed rendered masonry
using Proclima tapes.
Walls - wet plastered internally, junctions with window boxings sealed with Blower proof paint, windows frames taped to boxings with Proclima tapes.
Floor - reinforced concrete raft - junction with walls - Blower proof paint.
Joist ends - Blower proof paint.

6.1 - Pressure test

STROMA
BUILT ENVIRONMENT

DETAILS OF TESTED BUILDING

Dwelling Tested:	73, Burgoyne Road, Sheffield, South Yorkshire, S6 2XR	**Nett Floor Area, A_f:**	88.3 m^2
		Volume, V:	429.0 m^3
		Geometry Prepared By:	Mr Dan Bilton of Bilton Design
Est. Year Built:	2019	**Geometry Verified By:**	Marc Cowlin
Test Date:	16th September 2019		of Stroma Built Environment
Building Heating:	Gas	**Test Method:**	B (Building envelope)
Building Ventilation:	System 4 - Continuous mechanical supply and extract ventilation with heat recovery	**Test Engineer:**	David Tetchner (ATTMA Level 2)

INTERPRETATION OF RESULTS

The airflow rate through the envelope of the building/zone was determined at a pressure differential of 50Pa; this result is expressed as an airflow rate per m^3 of useable building volume (i.e. excluding floor and wall voids). For more information on the calculations used to determine the air change rate please visit:

http://www.stroma.com/downloads/air_permeability_calculation_v3.pdf

RESULTS AND SUMMARY

The dwelling's air change rate was determined by means of averaging the results from both a pressurisation test. The initial normalised air flow at a pressure differential of 50 Pascals (Q_{50}) was established in accordance with the required test methodology of ATTMA TSL1, in conjunction with the methodology for the volume calculation of the building as outlined within "Passivhaus primer: Airtightness Guide Airtightness and air pressure testing in accordance with the Passivhaus standard". The results attained from the tests were:-

Depressurisation:	Air Change Rate, n_{50}:	$0.33h^{-1}$ @ 50 Pa
Pressurisation:	Air Change Rate, n_{50}:	$0.28h^{-1}$ @ 50 Pa
Average:	**Air Change Rate, n_{50}:**	**$0.31h^{-1}$ @ 50 Pa**

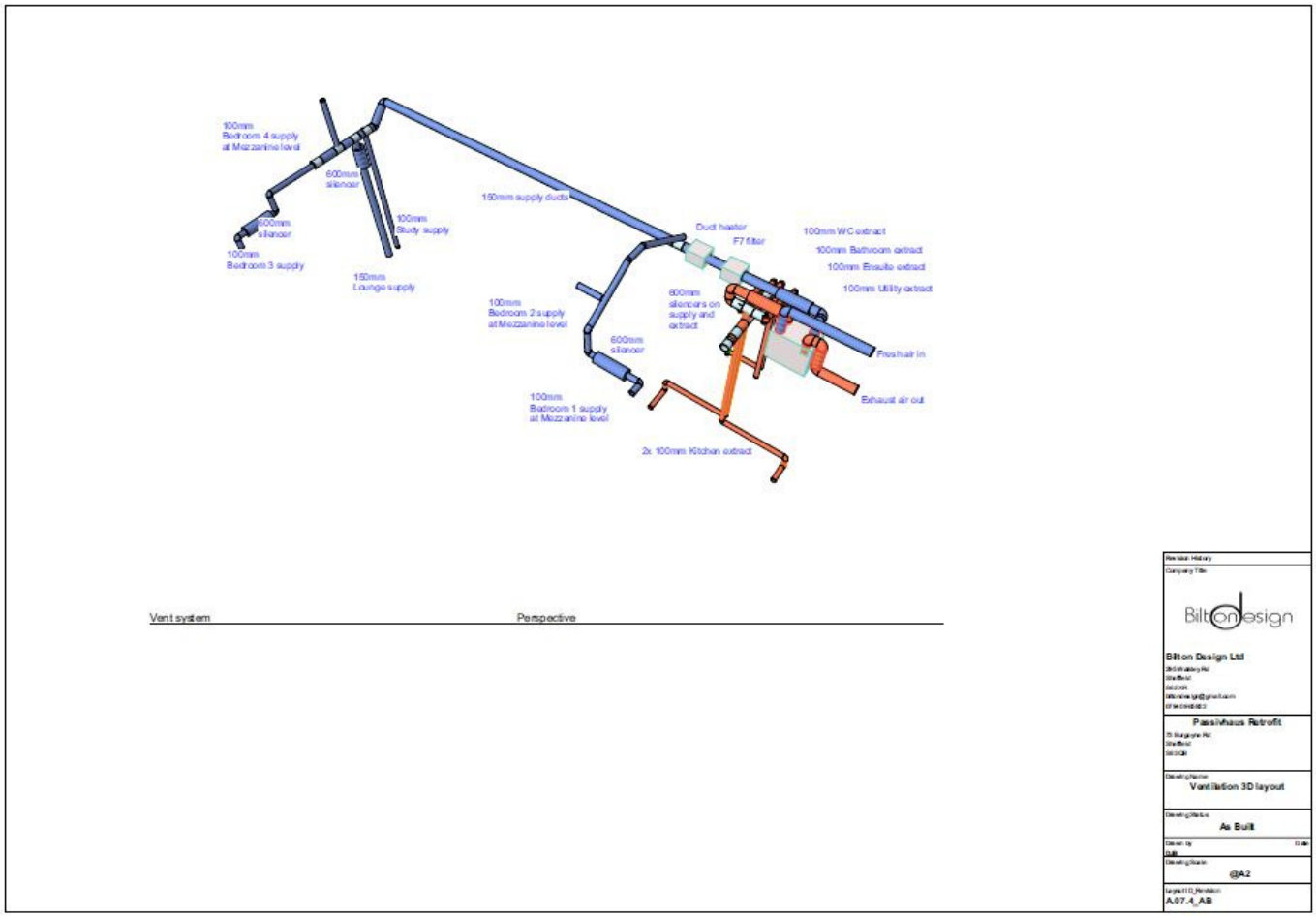
This is below the target level of $0.60h^{-1}$ at 50 Pa specified, therefore passing the criteria, providing this test was completed at the final state of completion.

Stroma Built Environment is a UKAS accredited testing laboratory No. 2731, and ATTMA registered company.

7 - Vent System
Glen Dimplex ZL400VF

Heat recovery rate - 84%
Specific fan power - 0.35Wh/m^3

3D layout - Supply pipework shown Blue, Extract Red



FINAL PROTOCOL WORKSHEET for Ventilation Systems: Initial Start-up
Supply- / Extract-Air Ventilation System with Heat Recovery

Project		**Initial Start-up**		**Ventilation System**	
Object:	0	Company:	Bilton Design Ltd	Manufacturer:	Glen Dimplex
Location Street, No.:	73	Person in Charge:	D Bilton	Product Name:	Xpelair Xcell400
Location Postcode, Town:	S6 3QB	Street, No.:	73 Burgoyne rd	Unit No.:	ZL400vf
Building Owner Name:	D Bilton	Postcode, City:	Sheffield S6 3QB	Control No.:	
Building Owner Phone No.:	07940 965922	Phone No.:	07940 965922		
Year of Construction:	1970	Date:	16/03/2020		

1. Record of the air flow volumes, supply and extract air

Nr.	Room	Design			Measurement 1		Measurment 2		Measurement 3		Type of Valve	Adjustment	Flow-Through	Noise	Filter	Filter
		V_{SU}	V_{EX}	$V_{THROUGH}$	V_{SU}	V_{EX}	V_{SU}	V_{EX}	V_{SU}	V_{EX}			$V_{THROUGH}$		Grade	Clean?
		m³/h	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h			m/s	dB(A)		
1	Kitchen		32			82		46		31	Air disk extrac	2x10mm	1.5	27.3	G4	yes / no
2	Dining			32												yes / no
3	Lounge	41			63		50		43		Air disk supply	17mm	1.5	33.9		yes / no
4	Study	15			28		24		15		Air disk supply	12mm	1.2	33.7		yes / no
5	Hall			24												yes / no
6	WC		14			24		10		15	Air disk extrac	12mm	1.2	28.8		yes / no
7	Utility		20			26		16		19	Air disk extrac	13mm	1.4	27.3	G4	yes / no
8	Bedroom 1	20			25		8		17		Air disk supply	15mm	1.1	25.4		yes / no
9	Bedroom 2	12			21		15		11		Air disk supply	11mm	1.0	27.6		yes / no
10	Bedroom 3	16			28		14		15		Air disk supply	11mm	1.3	26.9		yes / no
11	Bedroom 4	16			32		15		16		Air disk supply	10mm	1.5	25.6		yes / no
12	Landing			44												yes / no
13	Bathroom		34			17		20		28	Air disk extrac	18mm	1.5	25.1		yes / no
14	Ensuite		20			22		16		24	Air disk extrac	17mm	1.4	28.3		yes / no
15																yes / no
16																yes / no
17																yes / no
18																yes / no
19																yes / no
20																yes / no
	sum:	120.00	120.00	100.00	197.00	171.00	126.00	108.00	117.00	117.00			---	---	---	---

2. Balance of airflow volume

		Measurement 1		Measurement 2		Measurement 3		Disbalance	Type of Control	Adjustment	Noise	Filter	Filter
		V_{AUL}	V_{FOL}	V_{AUL}	V_{FOL}	V_{AUL}	V_{FOL}				Measurement	Grade	Clean?
		m³/h	m³/h	m³/h	m³/h	m³/h	m³/h				dB(A)		
1	fresh air inlet	187	---	127	---	121	---	2%	Digital	na	na	G1	yes
2	exhaust air outlet	---	168	---	120	---	119		Digital	na	na	-	yes / no

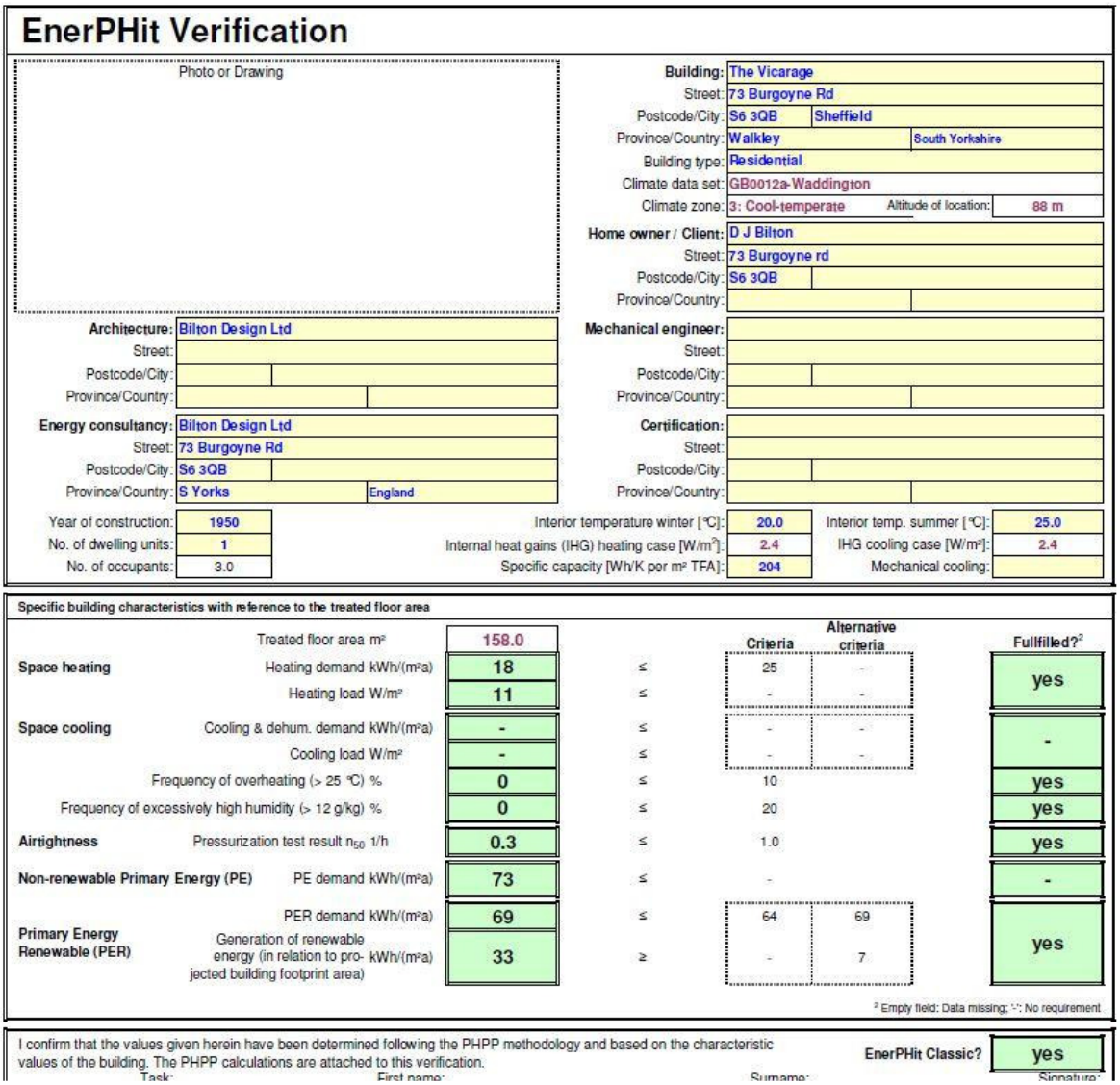
3. Initial start-up accomplished according to manufacturer's specifications: yes

Signature: .....

7 - Heat Supply

The house was originally fitted with a condensing combi boiler which was re-used to supply hot water and heating. Space heating is provided via towel radiators in bathrooms, one radiator in the hallway and the rest of the house is heated via a wet heater battery on the ventilation supply ductwork, positioned after the pollen filter.

Duct heater fed from Condensing Combi Boiler



EnerPHit Verification

Photo or Drawing

Building:	The Vicarage
Street:	73 Burgoyne Rd
Postcode/City:	S6 3QB / Sheffield
Province/Country:	Walkley / South Yorkshire
Building type:	Residential
Climate data set:	GB0012a-Waddington
Climate zone:	3: Cool-temperate — Altitude of location: 88 m
Home owner / Client:	D J Bilton
Street:	73 Burgoyne rd
Postcode/City:	S6 3QB
Province/Country:	

Architecture:	Bilton Design Ltd
Street:	
Postcode/City:	
Province/Country:	
Mechanical engineer:	
Street:	
Postcode/City:	
Province/Country:	
Energy consultancy:	Bilton Design Ltd
Street:	73 Burgoyne Rd
Postcode/City:	S6 3QB
Province/Country:	S Yorks / England
Certification:	
Street:	
Postcode/City:	
Province/Country:	

Year of construction:	1950	Interior temperature winter [°C]:	20.0
No. of dwelling units:	1	Internal heat gains (IHG) heating case [W/m²]:	2.4
No. of occupants:	3.0	Specific capacity [Wh/K per m² TFA]:	204
		Interior temp. summer [°C]:	25.0
		IHG cooling case [W/m²]:	2.4
		Mechanical cooling:	

Specific building characteristics with reference to the treated floor area

				Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area m²	158.0				
Space heating	Heating demand kWh/(m²a)	18	≤	25	-	yes
	Heating load W/m²	11	≤	-	-	
Space cooling	Cooling & dehum. demand kWh/(m²a)	-	≤	-	-	-
	Cooling load W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C) %	0	≤	10		yes
	Frequency of excessively high humidity (> 12 g/kg) %	0	≤	20		yes
Airtightness	Pressurization test result n_{50} 1/h	0.3	≤	1.0		yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	73	≤	-		-
	PER demand kWh/(m²a)	69	≤	64	69	yes
Primary Energy Renewable (PER)	Generation of renewable energy (in relation to projected building footprint area) kWh/(m²a)	33	≥	-	7	

[2] Empty field: Data missing; '-': No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

EnerPHit Classic? yes

Task: First name: Surname: Signature:

PHPP Verification sheet. Due to the good U-values, minimal cold bridging and good air test result this wasn't far of a Passivhaus new build performance