Project Documentation

Abstract |

Godwit House – Passivhaus - Warkworth

Data of building

Year of construction	2021	**Space heating**	**14 kWh/(m²a)**
U-value external wall	0,115 W/(m²K)		
U-value basement	- W/(m²K)	Primary Energy Renewable (PER)	38 kWh/(m²a)
U-value roof	0,072 W/(m²K)	Generation of renewable Energy	15 kWh/(m²a)
U-value window	0,82 W/(m²K)		
Heat recovery	91,8 %	Pressurization test n_{50}	0,2 h^{-1}
Special features	Solar panels for electricity, rainwater harvesting, green roof		

Brief Description

Passive House Godwit House

Godwit House is a one-off house on the edge of Warkworth, built for a retired vicar looking for a low-energy and comfortable house to live in. The home seeks to make the most of the dramatic views on all sides, for this reason, living spaces are on the first floor, and bedrooms are on the ground floor.

The structure is an i-stud timber frame, with cellulose insulation, there is no structural steel in the frame. The concrete raft foundation sits on prefabricated insulating formwork which reduces the depth of slab and reduces thermal bridges around the foundation system.

The house also uses renewable heating, with ground source heat pumps powered by solar PV on the roof. This renewable energy can also be used to charge a car, or bike within the garage.

Responsible project participants
Verantwortliche Projektbeteiligte

Architect	Mr Daniel Dyer ARB RIBA www.mawsonkerr.co.uk
Implementation planning	Mr Daniel Dyer ARB RIBA www.mawsonkerr.co.uk
Building systems	Mr Daniel Dyer ARB RIBA www.mawsonkerr.co.uk
Structural Engineering	JC Consulting https://jc-consulting.net/
Building physics	Mr Daniel Dyer ARB RIBA www.mawsonkerr.co.uk
Passive House Project planning	Mr Daniel Dyer ARB RIBA www.mawsonkerr.co.uk
Construction management	True North Construction https://truenorthconstruction.co.uk/

Certifying body
Zertifizierungsstelle

Passivhaus Institut Darmstadt
www.passiv.de

Certification ID
Zertifizierungs ID

7164	Project-ID (www.passivehouse-database.org) Projekt-ID (www.passivhausprojekte.de)

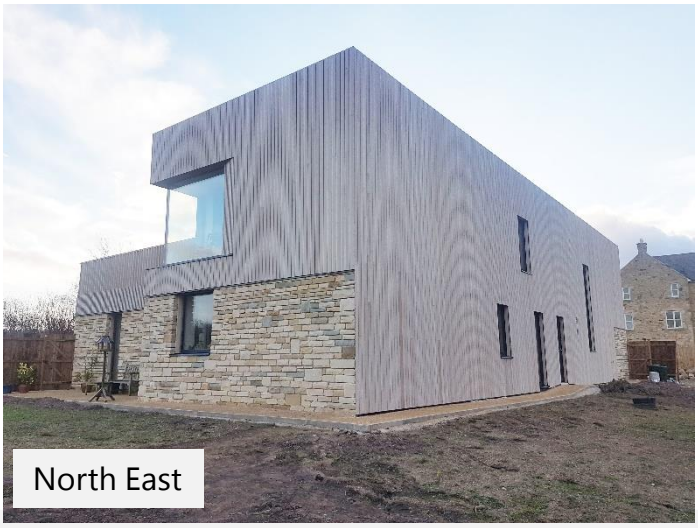
Author of project documentation

Passivhaus Institut Darmstadt
www.passiv.de

Date	Signature
03/03/2023	

1. External Photograph

South West

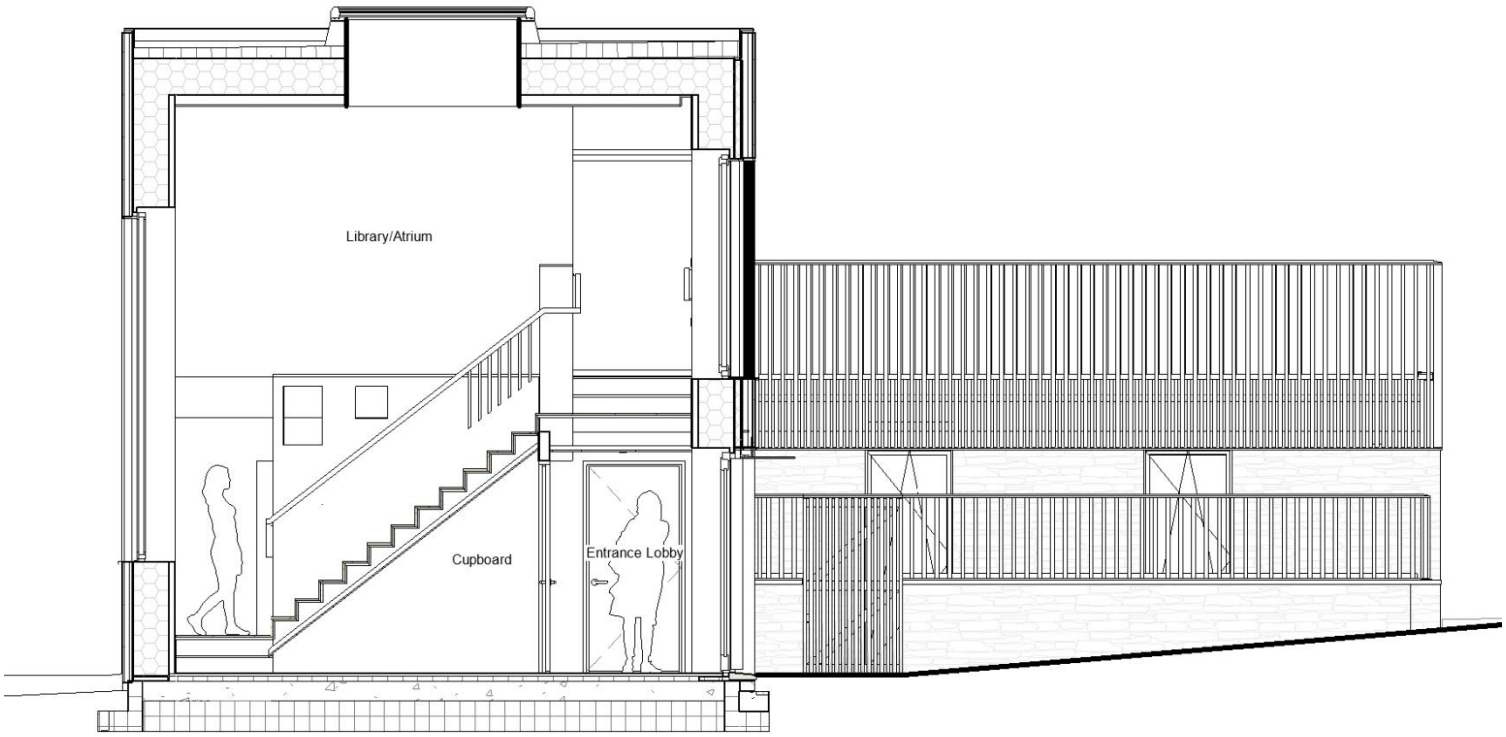


North East

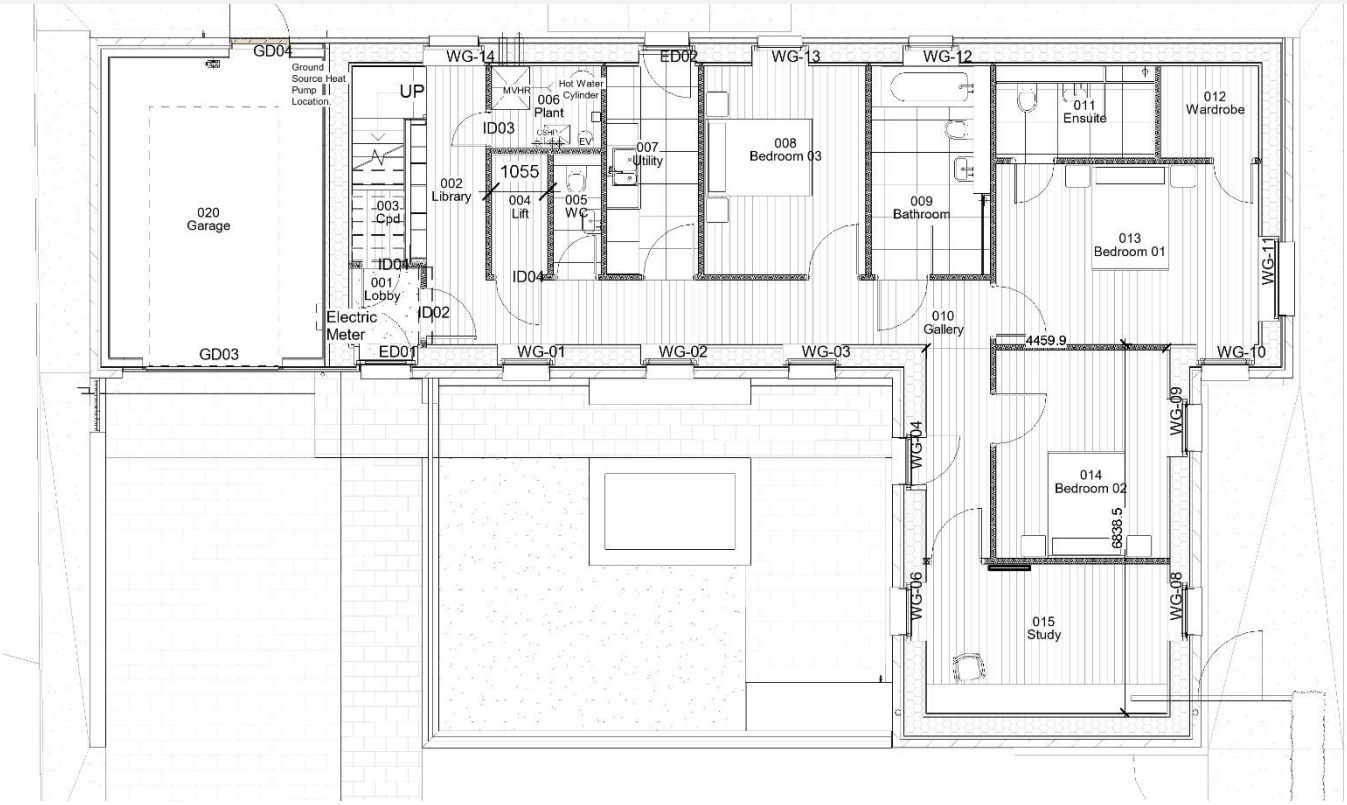
South East

2. Interior photograph

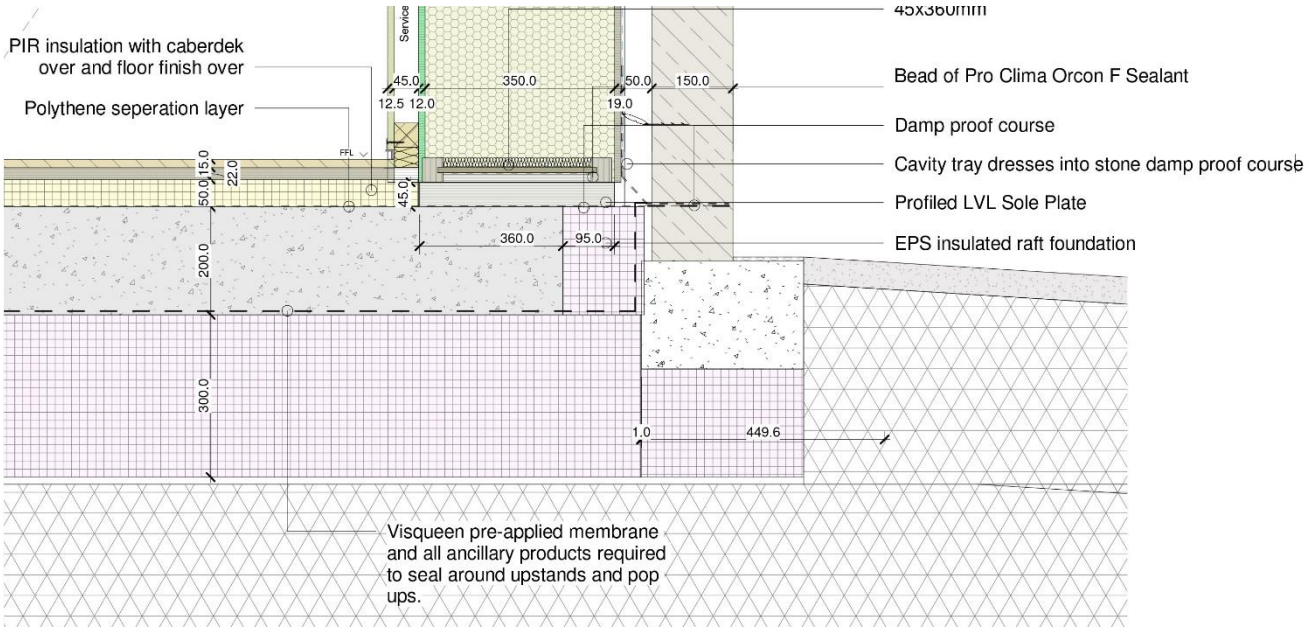
3. Cross Section



4. Ground Floor Plan



Construction of the ground Floor



Insulation below the slab reduces thermal bridges around the connection between the timber frame and the foundations. "Floating Floor" insulation over the slab further reduced any losses through the sole plate.

Assembly no.						Interior insulation?
03ud	Raft - Hybrid					

Heat transmission resistance [m²K/W]

Orientation of building element	3-Floor	interior R_{si}:	0.17
Adjacent to	2-Ground	exterior R_{se}:	0.00

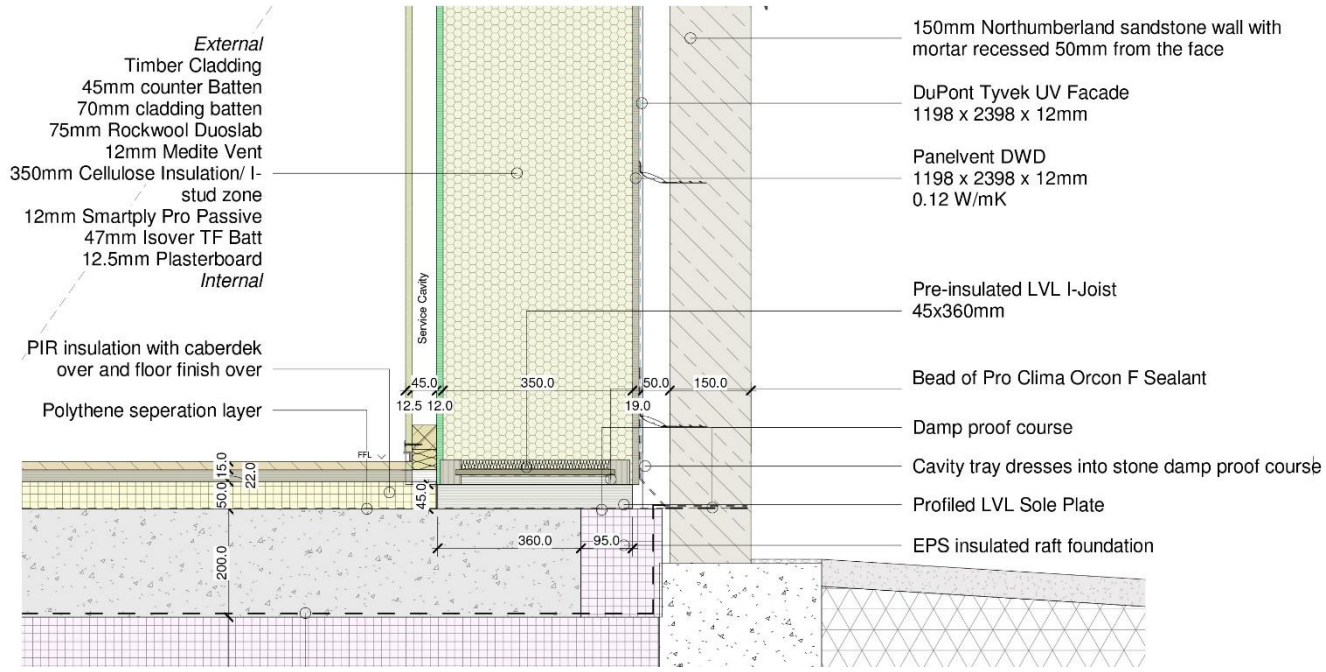
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Engineered Timber Floor	0.120					15
Caberdek	0.120					22
PIR Insulation	0.022					50
RC Slab	2.100					200
EPS Insulation	0.033					300

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			58.7 cm

U-value supplement: W/(m²K)

U-value: 0.084 W/(m²K)

6. Construction of the External Wall



External walls built off-site and craned into place. There is full fill bllown cellulose insulation between studs, and airtight board on the inside and a vent board on the inside and a vent board on the outside.

Assembly no.		Interior insulation?
02ud	PYC WALL	

Heat transmission resistance [m²K/W]

Orientation of building element	2-Wall	interior R_{si}:	0.13
Adjacent to	1-Outdoor ai	exterior R_{se}:	0.04

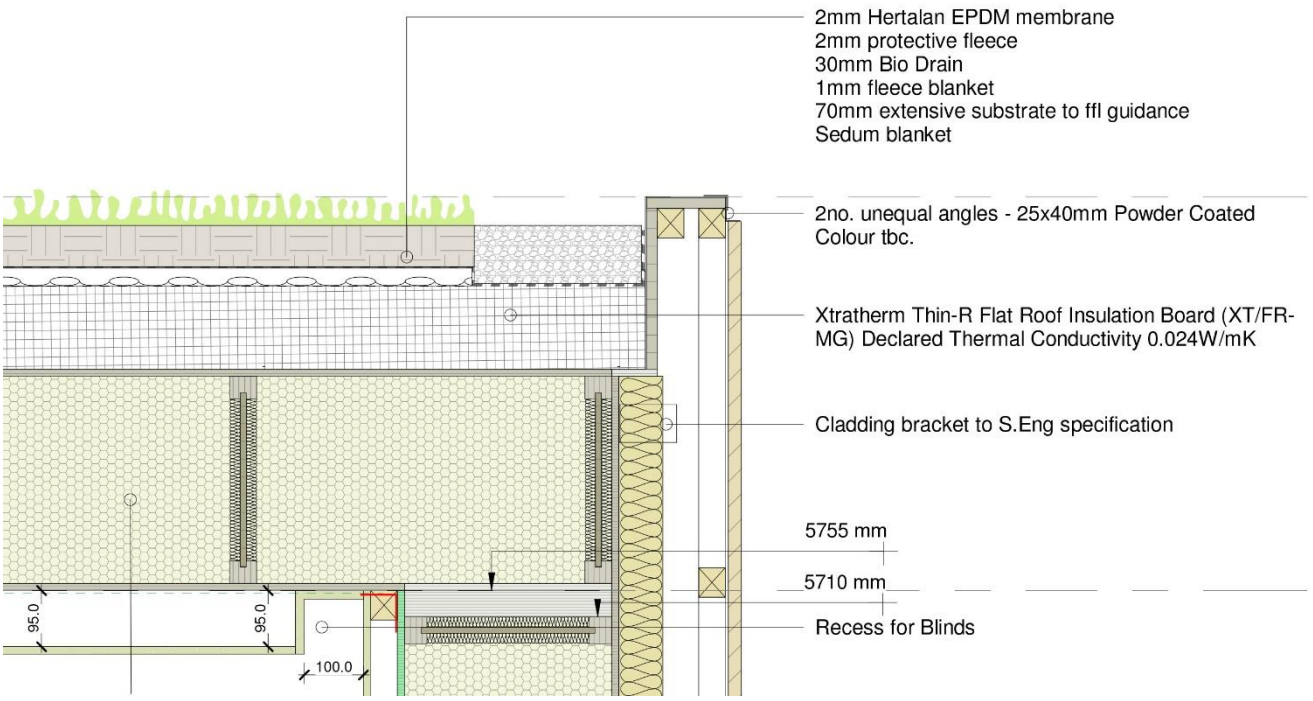
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Medite Vent	0.100					12
Warmcell Thermal ETA	0.038	I-stud flange	0.130	I-stud flange	0.130	47
Warmcell Thermal ETA	0.038			I-stud web	0.130	256
Warmcell Thermal ETA	0.038	I-stud flange	0.130	I-stud flange	0.130	47
Pro-Passive	0.100					13
Void	0.240	Batten	0.130			45
Plasterboard	0.250					13

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
78%	18.4%	3.7%	43.2 cm

U-value supplement: W/(m²K)

U-value: 0.115 W/(m²K)

7. Roof Construction



The Roof has full fill timber frame with rigid insulation on top, to provide a super insulated roof structure. There is then a green roof over the EPDM membrane.

Assembly no.	Building assembly description	Interior insulation?
01ud	PYC ROOF	

Heat transmission resistance [m²K/W]

Orientation of building element	1-Roof	interior R_{si}:	0.10
Adjacent to	1-Outdoor ai	exterior R_{se}:	0.04

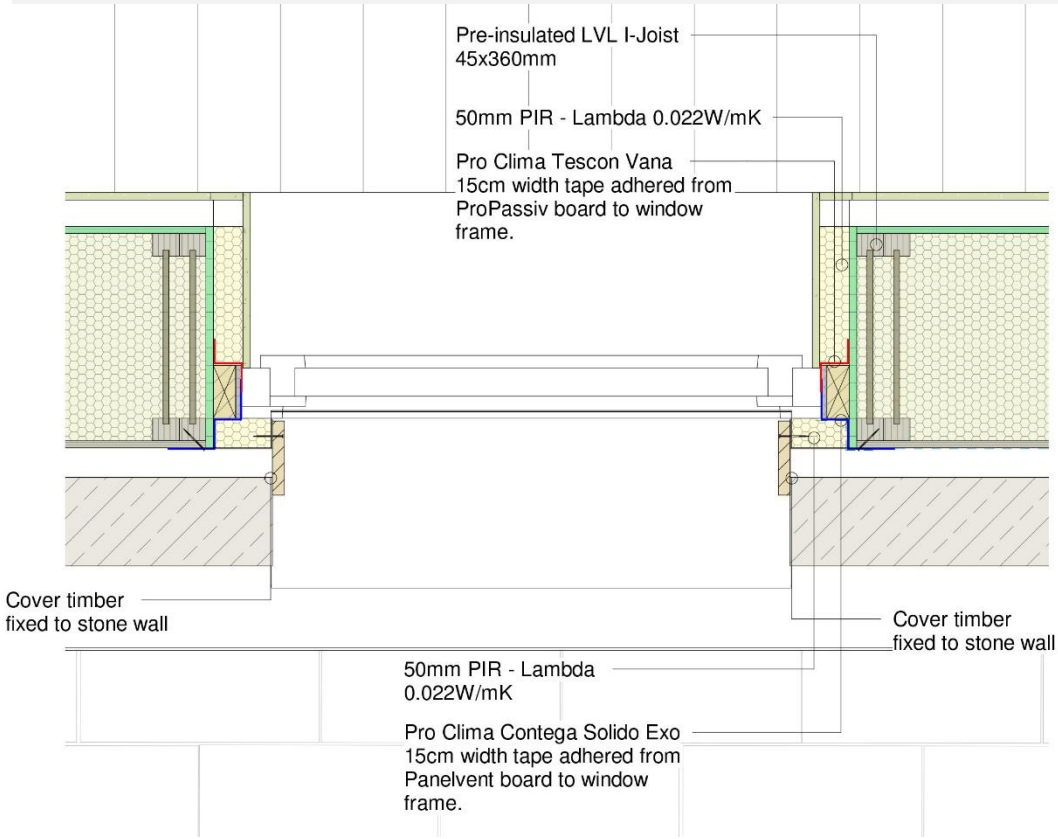
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
PU Insulation	0.025					130
OSB	0.130					18
Warmcell Thermal ETA	0.038	I-stud flange	0.130	I-stud flange	0.130	47
Warmcell Thermal ETA	0.038			I-stud web	0.130	256
Warmcell Thermal ETA	0.038	I-stud flange	0.130	I-stud flange	0.130	47
Air	0.410	Batten	0.130			90
Plasterboard	0.250					13

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
78%	18.4%	3.7%	60.1 cm

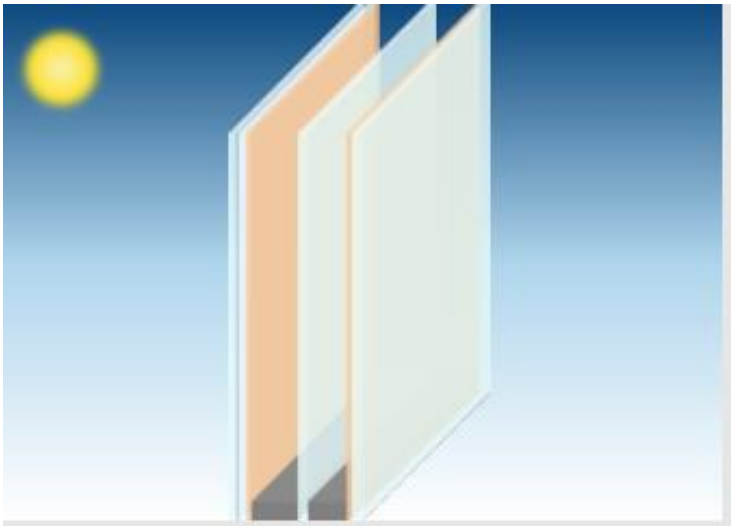
U-value supplement W/(m²K)

U-value: 0.072 W/(m²K)

8. Window and window installation



Description of the window (frame) construction, manufacturer	**Internorm HF310 timber aluminium composite window**
Make of window	Internorm
Frame U-Value	0,86 W/(m²K)
Type of Glazing	Argon filled 7(laminate) 18 4 15 4
Glass U-value	0,572 W/(m²K)
G-Value of Glass	0,50



9. Description of the airtight envelope

There where three airtightness tests, the first after the frame and windows had been installed, the seconds after services penetrations had been installed, the third upon completion.

Measurement	50 Pa pressure test air exchange n50 h-1
Test 1	0.17
Test 2	0.16
Test 3 (Completion)	0.15

Airtightness Strategy
Walls: Smartply Pro Passive
Ground Floor: Concrete Raft
Window Connection: Pro Clima Air Tightness Test
Roof: Pro-Clima Intello Membrane
Connections: Airtight tape and paint (pro-clima)

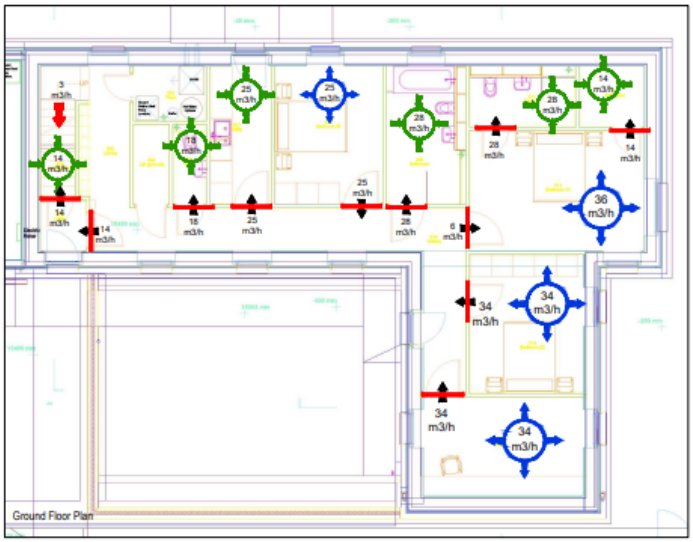
Connection from|against	Ground Floor	Casement Frame	Frame	Outer Wall	Roof
Roof				Pro Clima airtight tape	Pro Clima airtight tape
Outer Wall	Airtight paint		Pro Clima airtight tape	Pro Clima airtight tape	
Frame	Pro Clima airtight tape, airtight pain where necessary.	Rubber Weatherseal			

10. Ventilation Unit

A balanced supply/exhaust air system with a highly efficient counterflow air-to-air heat exchanger was used to greatly reduce ventilation losses.

Manufacturer of Ventilation System	**Paul Novus 300**
Heat Recovery Efficiency	91,8 %
Electric Efficiency	0,24 Wh/m³

11. Ventilation Planning Duct Network



Supply Rooms: Study, bedrooms, living rooms and dining rooms

Exhaust Rooms: Bathroom, toilets and the kitchen.

Doors are undercut to allow transfer of air.

12. Heat Supply

The entire domestic hot water and heating provision is from a ground source heat pump, with a ground loop set into a 120 meter borehole in the rear garden. Electricity is generated by the photovoltaic cells on the roof, this energy can be use to power the heat pump, converting the sun energy to heat energy, which can be stored in the thermal store.

The actual electricity usage in the house is 19kWh/m2/yr, this includes the imported and generated electricity (from the PVs) that was used in the house. In addition 1555kWh was exported in the year to the grid from the PVs. It may be worth noting that the owner has had people to stay with her the equivalent of a 1/3 of the year.

13. Building Cost

The construction cost was roughly £3100m2. This is a relatively high cost for the time of construction, but this reflect a specification of high quality material throughout. Only a small proportion of the costs relate specifically to the demands of Passivhaus construction.

14. Literature

- Passivhaus Trust article [https://www.passivhaustrust.org.uk/news/detail/?nId=1132]
- RIBA Journal article [https://www.ribaj.com/intelligence/energy-efficiency-passivhaus-godwit-house-warkworth-northumberland-timber-frame-cassettes]
- Architects Journal [https://www.architectsjournal.co.uk/buildings/mawsonkerr-completes-timber-cassette-passivhaus-in-northumberland]
- Passivhaus Data Base [https://passivehouse-database.org/index.php?lang=en#d_7164]

15. PHPP- Results

Passive House Verification

Building:	Godwit House
Street:	13 The Steadings Maudlin Farm
Postcode/City:	NE65 0WR Warkworth
Province/Country:	Northumberland GB-United Kingdom/ Britain
Building type:	Dwelling
Climate data set:	GB0010a-Eskdalemuir
Climate zone:	3: Cool-temperate Altitude of location: 16 m
Home owner / Client:	Gillian Maude
Street:	13 The Steadings Maudlin Farm
Postcode/City:	NE65 0WR Warkworth
Province/Country:	Northumberland GB-United Kingdom/ Britain
Architecture:	MawsonKerr Architects
Street:	1 Charlotte Sq
Postcode/City:	NE1 4XF Newcastle upon Tyne
Province/Country:	United Kingdom
Mechanical engineer:	Green Building Store (Ventilation)
Street:	Heat House Mill
Postcode/City:	HD7 4JW Huddersfield
Province/Country:	GB-United Kingdom/ Britain
Energy consultancy:	MawsonKerr Architects
Street:	1 Charlotte Sq
Postcode/City:	NE1 4XF Newcastle upon Tyne
Province/Country:	GB-United Kingdom/ Britain
Certification:	WARM: Low Energy Building Practice
Street:	3 Admirals Hard
Postcode/City:	PL1 3RJ Plymouth
Province/Country:	Devon GB-United Kingdom/ Britain

Year of construction:	2020	Interior temperature winter [°C]:	20.0
No. of dwelling units:	1	Internal heat gains (IHG) heating case [W/m²]:	2.4
No. of occupants:	3.1	Specific capacity [Wh/K per m² TFA]:	60
		Interior temp. summer [°C]:	25.0
		IHG cooling case [W/m²]:	2.8
		Mechanical cooling:	

Specific building characteristics with reference to the treated floor area

				Criteria	Alternative criteria	Fullfilled?[1]
	Treated floor area m²	185.5				
Space heating	Heating demand kWh/(m²a)	14	≤	15	-	yes
	Heating load W/m²	9	≤	-	10	
	Frequency of overheating (> 25 °C) %	1	≤	10		yes
	Frequency of excessively high humidity (> 12 g/kg) %	0	≤	20		yes
Airtightness	Pressurization test result n_{50} 1/h	0.2	≤	0.6		yes
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	38	≤	60	60	yes
	Generation of renewable energy (in relation to projected building footprint area) kWh/(m²a)	15	≥	-	-	

[1] 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.

Passive House Classic? yes

Task:	First name:	Surname:	Signature:
2-Certifier	Mike	Roe	

Certificate ID	Issued on:	City:
34504_WARM_PH_20220614_MR	21/06/22	Plymouth

16. User's Experience

Client Endorsement: Building Owner - Gillian Maude

"I have been very conscious of MawsonKerr's attention to detail both in the planning, design and execution of the project. From sorting out the thermal bridges and running PHPP to working out the details of the bookcases, I could see the benefit of clarifying so many of the details in advance, thus giving the builders, True North Construction, very clear instructions. Once on site it was obvious that the very detailed communication between MawsonKerr and the engineers, the suppliers of timber frame, windows and MVHR respectively contributed to the very smooth construction process, which also exemplified good attention to detail. As a user, the house is a pleasure to live in. I'm still learning how to make best use of the energy the house is producing, but confident this winter my entire energy bill will be taken care of by the winter fuel allowance."