Project Documentation

Abstract |

Oak Tree Passivhaus – Whickham, Gateshead, Tyneside, England

Data of building |

Year of construction Baujahr	2019	**Space heating** **Heizwärmebedarf**	**13.2** **kWh/(m²a)**
U-value external wall U-Wert Außenwand	0,116 W/(m²K)		
U-value basement U-Wert Kellerdecke	0,131 W/(m²K)	Primary Energy Renewable (PER) Erneuerbare Primärenergie (PER)	- kWh/(m²a)
U-value roof U-Wert Dach	0,092 W/(m²K)		
U-value window U-Wert Fenster	0,75 W/(m²K)	Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE)	85 kWh/(m²a)
Heat recovery Wärmerückgewinnung	91.8 %	Pressurization test n_{50} Drucktest n_{50}	0,36 h^{-1}

Brief Description

Oak Tree Passivhaus

This project is a single-family house, built beside an oak tree on a large rear garden plot in Whickham, Tyneside. The external walls and roof are built with vapour permeable materials to allow the twin timber frame to breathe.

The house is cut into the slope of the site with the living spaces on the upper floor to utilise the views across the valley with large windows to the South and West. Passive measures control solar gains, such as the balcony overhang, timber louvres and the deep window reveals all reduce summer overheating, whilst allowing beneficial solar gains in the winter months.

The project minimises the use of steel, the balcony cantilever uses glulam timber and bespoke plywood beams. The only steel on the project is in the timber connections and the fins from which the balcony deck is hung. Locally sourced materials such as the timber cladding and stone from the site are used within the project.

The project is the first Certified Passivhaus in Tyneside.

Responsible project participants

Architect	MawsonKerr Architects Daniel Kerr (Certified Passivhaus Designer 2010-2015) evidence submitted to renew certification
Structural engineering	JCC engineers
Building physics	Green Building Store
Passive House project planning	MawsonKerr Architects Daniel Kerr (Certified Passivhaus Designer 2010-2015) evidence submitted to renew certification
Construction management	Shawm Ltd
Certification	Warm: Low Energy Building Practice
Energy Consultant	Warm: Low Energy Building Practice

Certifying body

UK: Warm: Low Energy Building Practice
Passivhaus Institut Darmstadt
www.passiv.de

Certification ID

6094	Project-ID (www.passivehouse-database.org) Projekt-ID (www.passivhausprojekte.de)

Author of project documentation

MawsonKerr Architects Signed: Daniel Kerr

Date Datum	Signature Unterschrift
10.10.2019	

1. External Photos

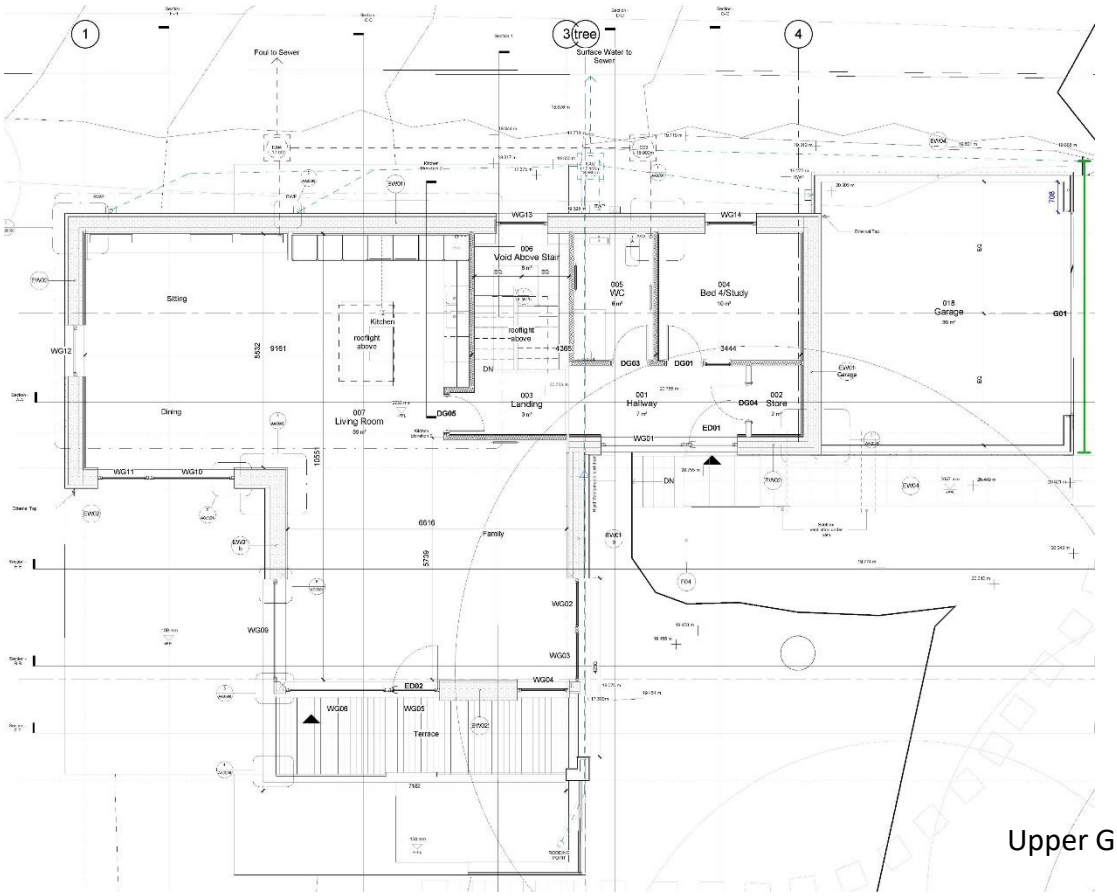
South East Elevation

South West Elevation

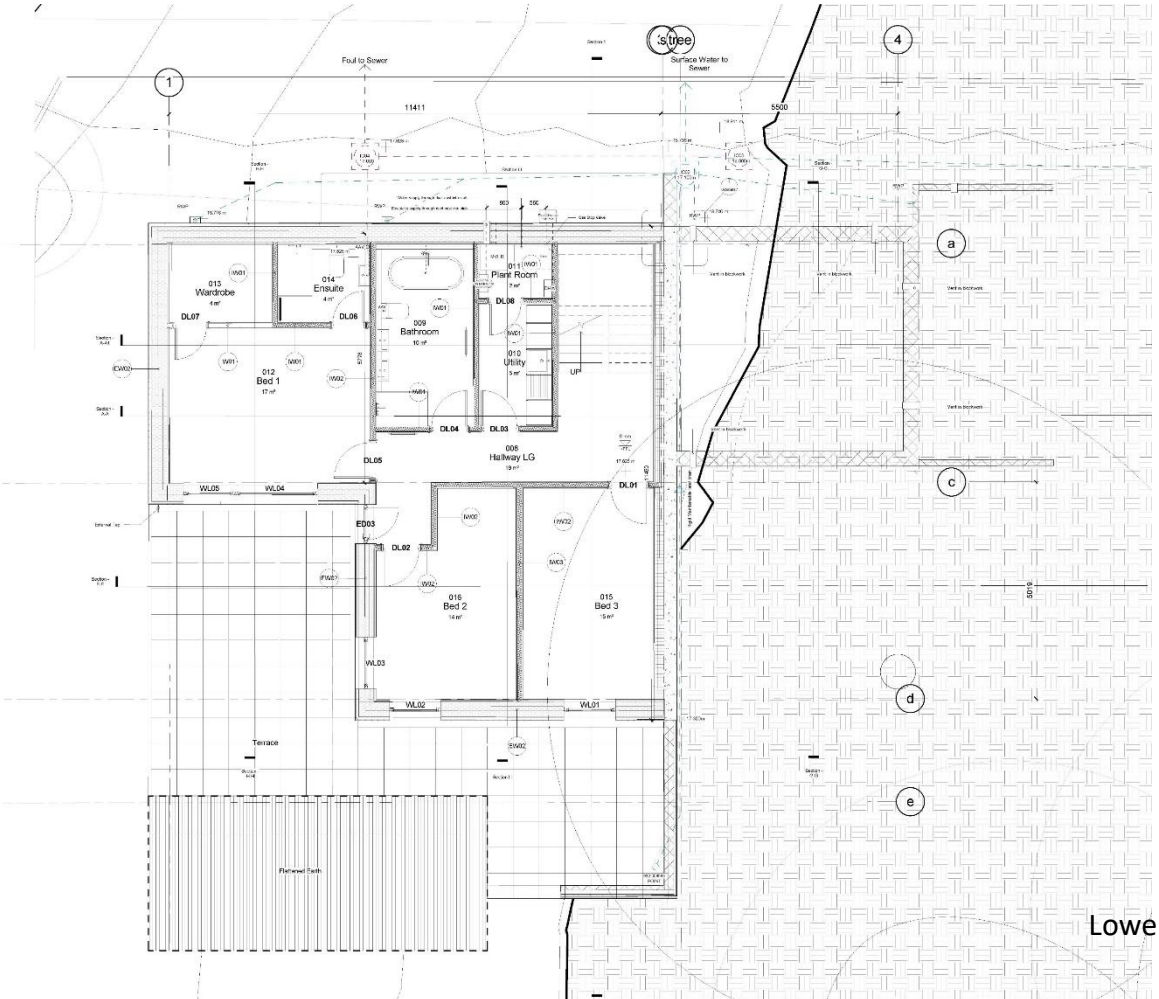
2. Internal Photo

Interior photo of kitchen/dining/living space

3. Plans

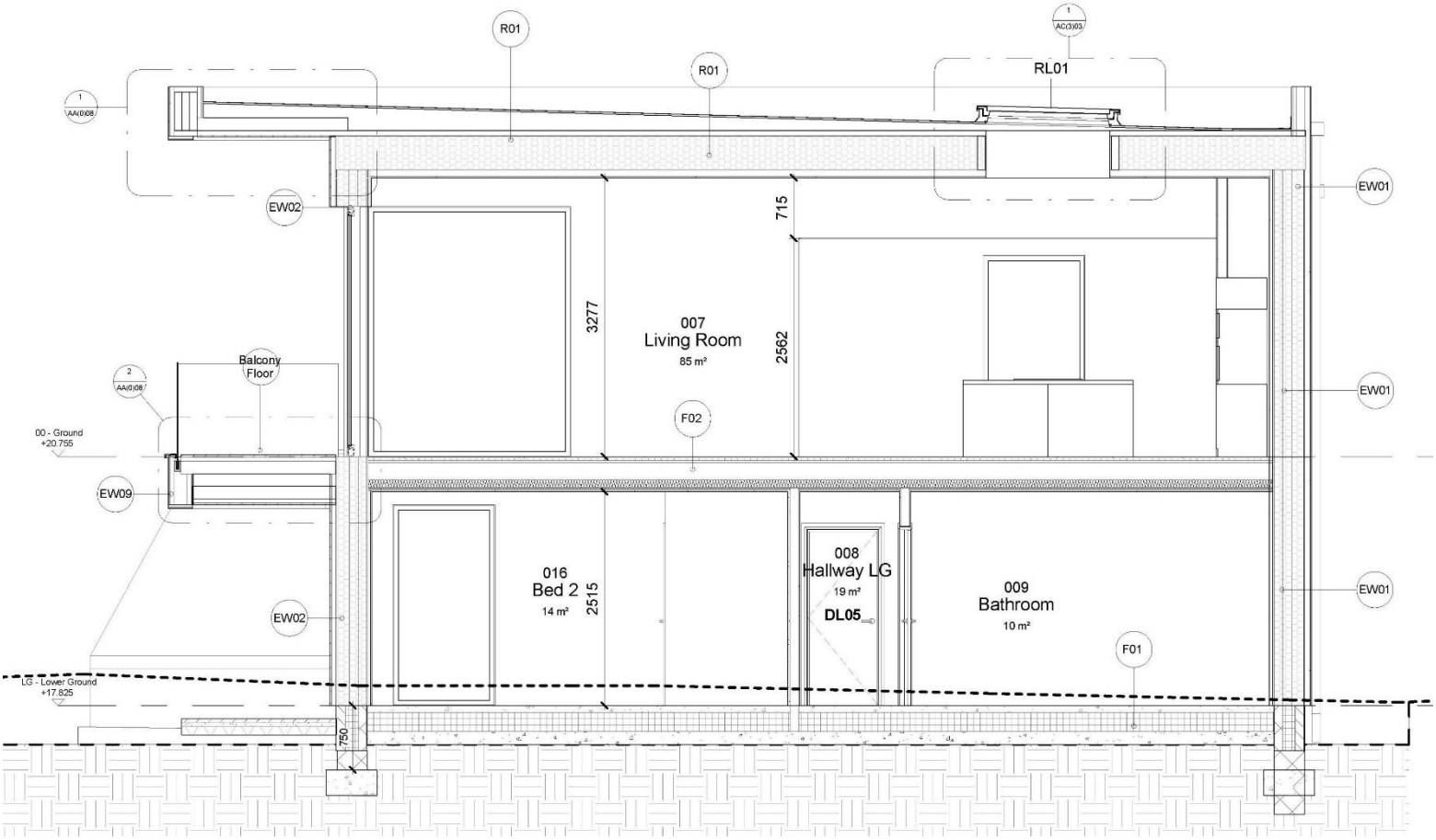


Upper Ground Floor

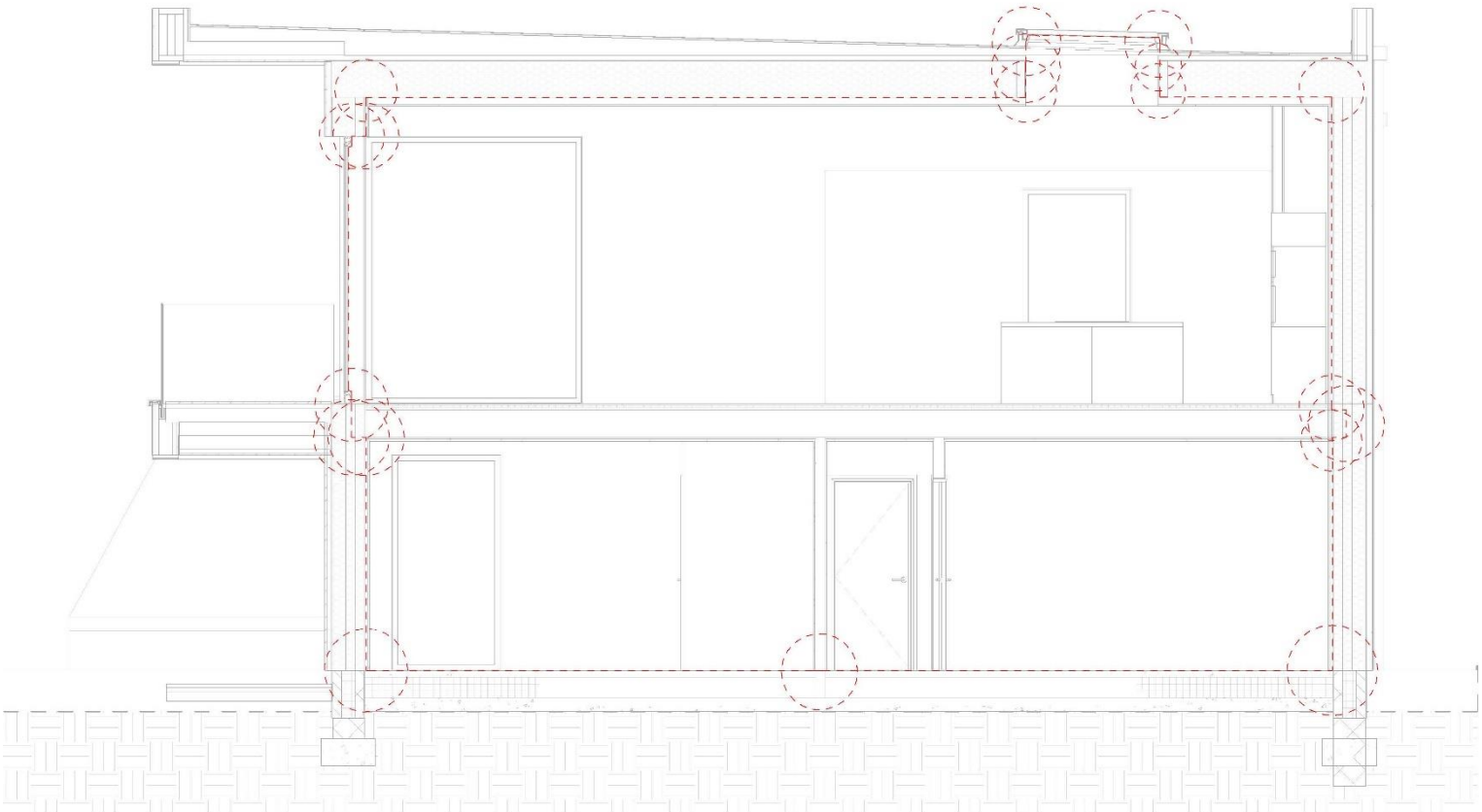


Lower Ground Floor

4. Section

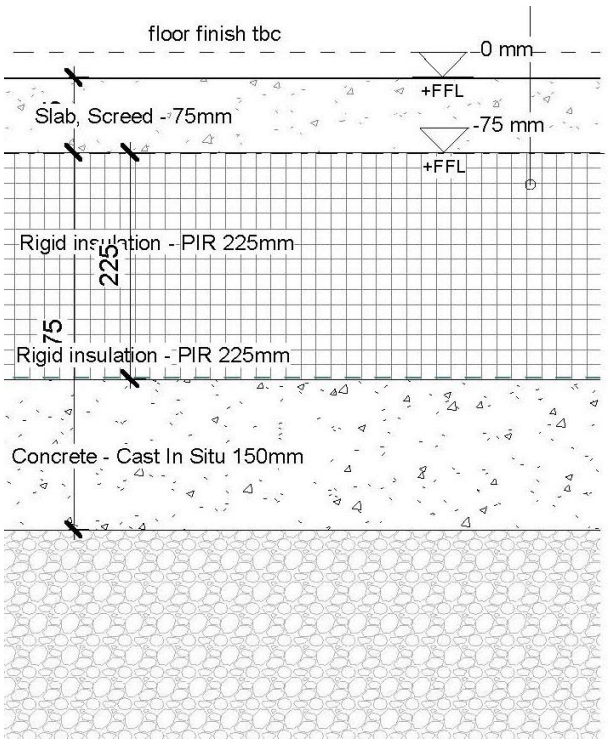


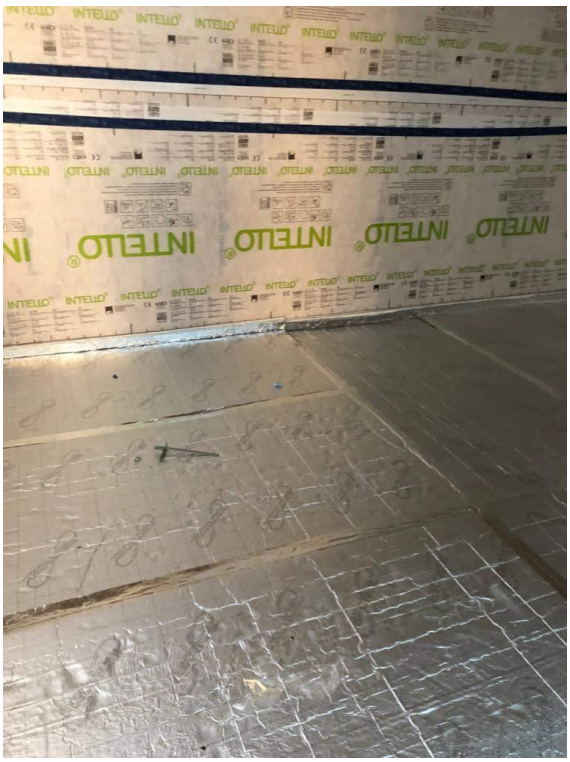
Cross Section



Air tightness Identification Section

5. Floor Construction





The floor construction is generally on grade with a concrete slab and a large thickness of PIR insulation. Thermal bridges have been carefully designed out at junctions and upstand with perimeter insulation and insulative blocks.

Assembly no.						Interior insulation?
04ud	Ground Floor - Slab F01					

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

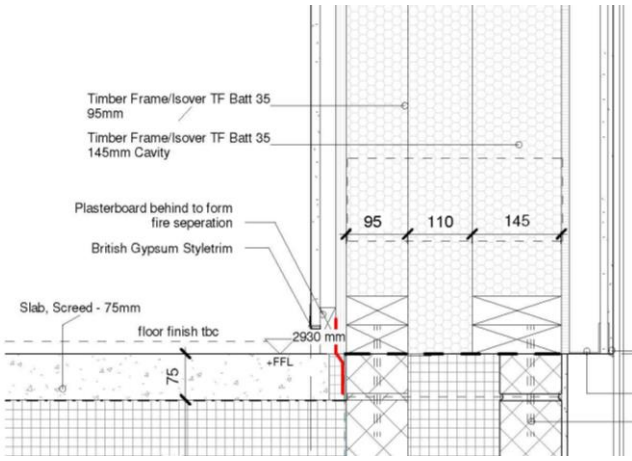
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
RC Concrete	2.100					150
Recticel Urathane GP	0.022					125
Recticel Urathane GP	0.022					100
Screed	1.400					70

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			44.5 cm

U-value supplement: W/(m²K)

U-value: 0.095 W/(m²K)

6. Wall Construction



The construction of the wall is a twim timber frame to reduce thermal bridging and achieve a good u value. We modelled the timber frame ourselves in order to maintain quality and design out any potential issues with airtightness and junctions. The walls are breathable construction with PanelVent as the external sheathing board

Assembly no.						Interior insulation?
02ud	External Wall (timber frame) EW01					

Heat transmission resistance [m²K/W]

Orientation of building element: 2-Wall — interior R_{si}: 0.13

Adjacent to: 2-Ground — exterior R_{se}: 0.00

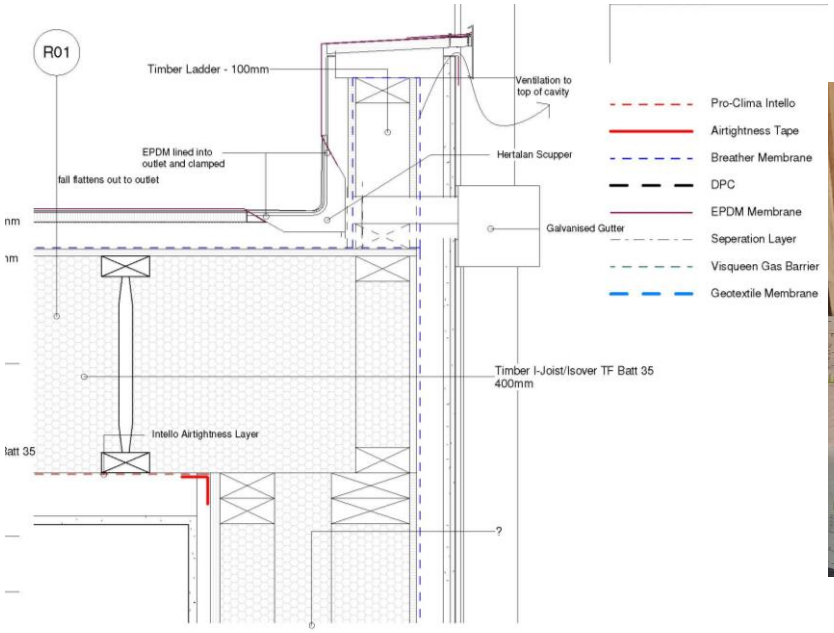
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Panelvent	0.100					13
Isover Timber Frame Batt 35	0.035	Stud	0.130	Stud	0.130	145
Isover Timber Frame Batt 35	0.035			Timber fin	0.130	110
Isover Timber Frame Batt 35	0.035	Stud	0.130	Stud	0.130	95
OSB	0.130					18
Service void	0.140					25
plasterboard	0.250					15

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
82%	17.5%	1.0%	42.1 cm

U-value supplement: W/(m²K)

U-value: 0.116 W/(m²K)

7. Roof Construction



The roof construction has the airtighness layer internally with a fully insulated I joist construction. The waterproof layer is EPDM on a deck which is ventilated.

Assembly no.	Building assembly description					Interior insulation?
01ud	Roof R01					

Heat transmission resistance [m²K/W]

Orientation of building element: 1-Roof — interior R_{si}: 0.10

Adjacent to: 1-Outdoor air — 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]
Panelvent	0.100					13
Isover Timber Frame Batt 35	0.035	ibeam flange	0.130	ibeam flange	0.130	45
Isover Timber Frame Batt 35	0.035			ibeam web	0.130	310
Isover Timber Frame Batt 35	0.035	ibeam flange	0.130	ibeam flange	0.130	45
void	0.490	batten	0.130			80
plasterboard	0.250					15

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
83%	15.0%	2.0%	50.8 cm

U-value supplement: W/(m²K)

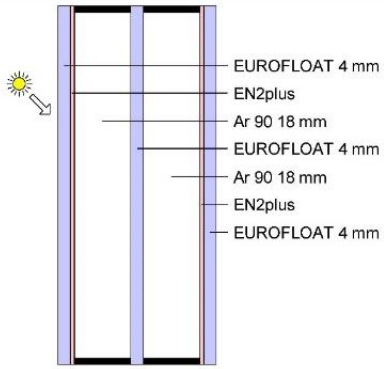
U-value: 0.092 W/(m²K)

8. Windows and installation

Product:	SWS 0-5XL/34 Platin
Date:	13.09.2018

Glazing:

Window tilt angle: 90 °



Comments:

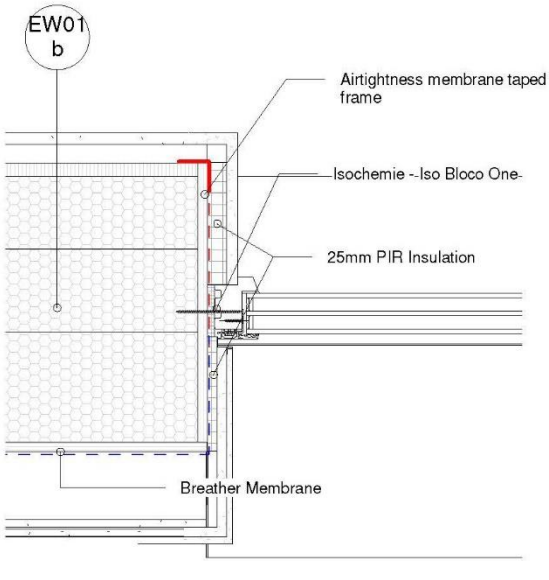
Calculated glazing characteristics:

Thermal transmittance Ug:	0.528 W/m²K	EN 673:2011

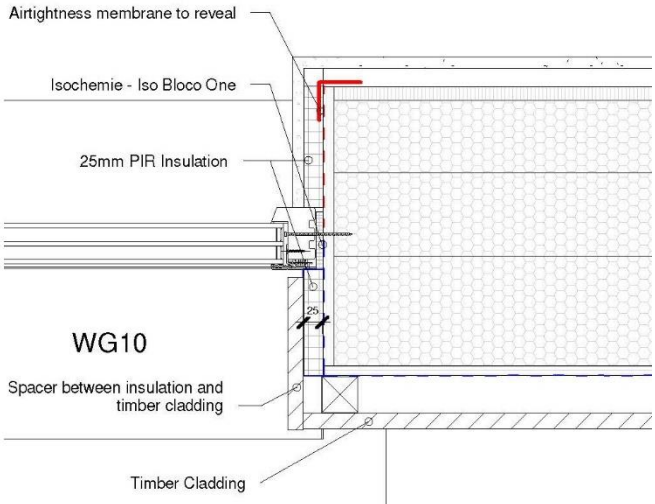
The Windows are by Josko and great care has been taken to detail the junctions and fit these neatly to enhance the airtightness and eliminate thermal bridging

Glazing **Glazing**

	Recommended glazing type to start planning: Triple thermally insulated glazing (Please consider the comfort criterion!)		
ID	Description	g-Value	U_g-Value
			W/(m²K)
01ud	SWS 0-5XL/34 Platin 4/4/4	0.53	0.53
02ud	TSG6 TSG6 LSG8	0.48	0.55
03ud	SWS 0-5XL/34 Platin Blue 6/6/6	0.51	0.53
04ud	SWS 0-5XL/34 Platin Blue 8/6/8	0.50	0.57
05ud	TSG4 TSG4 LSG8	0.48	0.64
06ud			
07ud			
08ud			
09ud			
10ud	Fakro DXF DU8 - 6H-Tg10Kr-4HT-Tg12Kr-4HT-Tg12Kr33.2T	0.48	0.67



6 Plan Detail - Typical Window BLUE Jamb (rendered)
1 : 10



7 Plan Detail - Typical Window BLUE Jamb (timber cladding)
1 : 10

9. Airtightness and Testing

Air test by Apex Acoustics and Air Testing

Initial air test carried out prior to finishes being installed and the Average Air Changes was 0.38/h @ 50Pa.

A summary of the final air test is below.

Air tightness was achieved by a combination of detail design and on site attention to qulaity. The air tightness layer was generally a Proclima Intello membrane.

Table 1: Summary of air leakage test results				
Test No.	**Unit**	**Air changes n_{50} / h @ 50 Pa**	**Average Air changes n_{50} / h @ 50 Pa**	**Date**
1	*Woodmans Way* Depressurise	0.40	0.36	24-07-19
2	*Woodmans Way* Pressurise	0.31		24-07-19

10. MVHR

Section showing MVHR layout (by GBS based on our initial MVHR layout

Location of ventilation unit	1-Inside thermal envelope					
	Go to ventilation units list 1-Sorting: LIKE LIST	Heat recovery efficiency	Humidity recovery efficiency	Specific efficiency [Wh/m³]	Application [m³/h]	Frost power input
Ventilation unit selection	01ud-PAUL - novus 300	0.93	0.00	0.24	121 - 231	yes
				Implementation of frost protection		2-Elec.
				Limit temperature [°C]		0
				Useful energy [kWh/a]		84

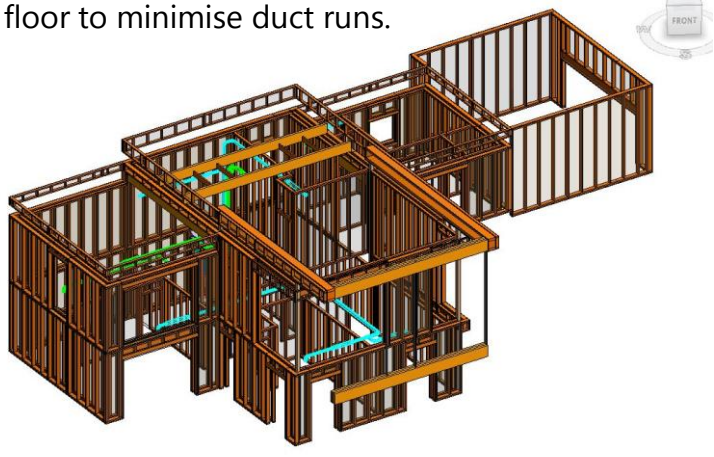
Conductivity outdoor air duct	Ψ	W/(mK)	0.449
Length of outdoor air duct		m	0.98
Conductivity exhaust air duct	Ψ	W/(mK)	0.449
Length of exhaust air duct		m	0.86
Temperature of mechanical services room (Enter only if the central unit is outside of the thermal envelope)		°C	

Room temperature (°C)	20
Avg. ambient temp. heat. period (°C	5.9
Avg. ground temp (°C)	9.4

Effective heat recovery efficiency $\eta_{HR,eff}$ **91.8%**

We worked closely with Green Building Store and submitted an initial MVHR and duct layout in order for them to fully design the system.

A Paul Novus 300 (inside the thermal envelope) was specified and installed in the plant room with the supply air and extract located on the North facing wall. The plant room which centrally located on the lower ground floor to minimise duct runs.



Timber frame model with duct runs overlaid to prevent clashes

Paul Novus 300 in the plant room

11. PHPP

Passive House Verification

Building:	Oak Tree House		
Street:	Weston Avenue		
Postcode/City:	NE165TR		
Province/Country:	Tyne and Wear	GB-United Kingdom/ Britain	
Building type:	Single detached house		
Climate data set:	GB0010a-Eskdalemuir		
Climate zone:	3: Cool-temperate	Altitude of location:	115 m
Home owner / Client:	John and Anne Rundle		
Street:	10 Woodsman's Way		
Postcode/City:	NE165TR		
Province/Country:	Tyne and Wear	GB-United Kingdom/ Britain	

Architecture:	Mawson Kerr Architect		
Street:	1 Charlotte Sq		
Postcode/City:	NE1 4XF		
Province/Country:	UK		
Energy consultancy:	WARM: Low Energy Building Practice		
Street:	3 Admirals Hard		
Postcode/City:	PL1 3RJ	Plymouth	
Province/Country:	Devon	GB-United Kingdom/ Britain	
Mechanical engineer:	Green Building Store		
Street:	Heath House Mill		
Postcode/City:	HD7 4JW	Huddersfield	
Province/Country:	West Yorkshire	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:	2019	Interior temperature winter [°C]:	20.0	Interior temp. summer [°C]:	25.0
No. of dwelling units:	1	Internal heat gains (IHG) heating case [W/m²]:	2.3	IHG cooling case [W/m²]:	2.3
No. of occupants:	3.1	Specific capacity [Wh/K per m² TFA]:	78	Mechanical cooling:	

Specific building characteristics with reference to the treated floor area

				Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area m²	204.8				
Space heating	Heating demand kWh/(m²a)	13.2	≤	15	-	yes
	Heating load W/m²	10	≤	-	10	
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	0.4	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	87	≤	135		yes
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	62	≤	-	-	-
	Generation of renewable energy (in relation to pro-jected building footprint area) kWh/(m²a)	-	≥	-	-	

[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.

Passive House Classic? yes

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

Certificate ID	Issued on:	City:
	01/08/19	Plymouth