Project Documentation
Gebäude-Dokumentation

Abstract | Zusammenfassung

North Elevation / Nordansicht

WHAKATŪ PASSIVHAUS – Nelson, New Zealand

Data of building | Gebäudedaten

Year of construction Baujahr	2022	**Space heating** **Heizwärmebedarf**	**10** **kWh/(m²a)**
U-value external wall U-Wert Außenwand	0.211 W/(m²K)		
U-value basement U-Wert Kellerdecke	0.205 W/(m²K)	Primary Energy Renewable (PER) Erneuerbare Primärenergie (PER)	44.43 kWh/(m²a)
U-value roof U-Wert Dach	0.197 W/(m²K)	Generation of renewable Energy Erzeugung erneuerb. Energie	7.12 kWh/(m²a)
U-value window U-Wert Fenster	1.06 W/(m²K)	Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE)	92.42 kWh/(m²a)
Heat recovery Wärmerückgewinnung	89 %	Pressurization test n Drucktest n_{50}	0.31 h^{-1}

Special features
Besonderheiten

Certified as a 10 Star Homestar building by the New Green Building Council (the highest possible rating).

50

Von Neuseeland als 10-Sterne-Homestar Gebäude zertifiziert
Green Building Council (die höchstmögliche Bewertung).

Brief Description

WHAKATŪ PASSIVHAUS

This house was designed with the intent to meet our obligations to keep global warming under 1.5 degrees. The passivhaus standard was adopted as a mechanism to ensure that operational carbon was kept to a minimum whilst maintaining a comfortable indoor environment.

The added challenge of this project was to intentionally reduce the amount of concrete used and demonstrate in the process that light weight timber construction can easily meeting the passivhaus standard without the need for thermal mass.

Kurzbeschreibung

WHAKATŪ PASSIVHAUS

Dieses Haus wurde mit der Absicht entworfen, unseren Verpflichtungen nachzukommen, die globale Erwärmung unter 1,5 Grad zu halten. Der Passivhaus-Standard wurde als Mechanismus übernommen, um sicherzustellen, dass der CO2-Ausstoß im Betrieb auf ein Minimum reduziert und gleichzeitig ein angenehmes Raumklima aufrechterhalten wird.

Die zusätzliche Herausforderung dieses Projekts bestand darin, den Betoneinsatz bewusst zu reduzieren und dabei zu zeigen, dass Holzleichtbauweise problemlos den Passivhausstandard erfüllen kann, ohne dass thermische Masse erforderlich ist.

Responsible project participants
Verantwortliche Projektbeteiligte

Architect Entwurfsverfasser	Nathan Edmondston
Implementation planning Ausführungsplanung	Nathan Edmondston
Building systems Haustechnik	Fantech NZ Ltd
Structural engineering Baustatik	Potius Building Systems
Building physics Bauphysik	Nathan Edmondston
Passive House project planning Passivhaus-Projektierung	Nathan Edmondston
Builder Bauherr	Basham Building Ltd www.bashambuilding.co.nz

Certifying body
Zertifizierungsstelle

Sustainable Engineering Ltd
www.sustainableengineering.co.nz

Certification ID
Zertifizierungs ID

7065

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

Author of project documentation
Verfasser der Gebäude-Dokumentation

Nathan Edmondston

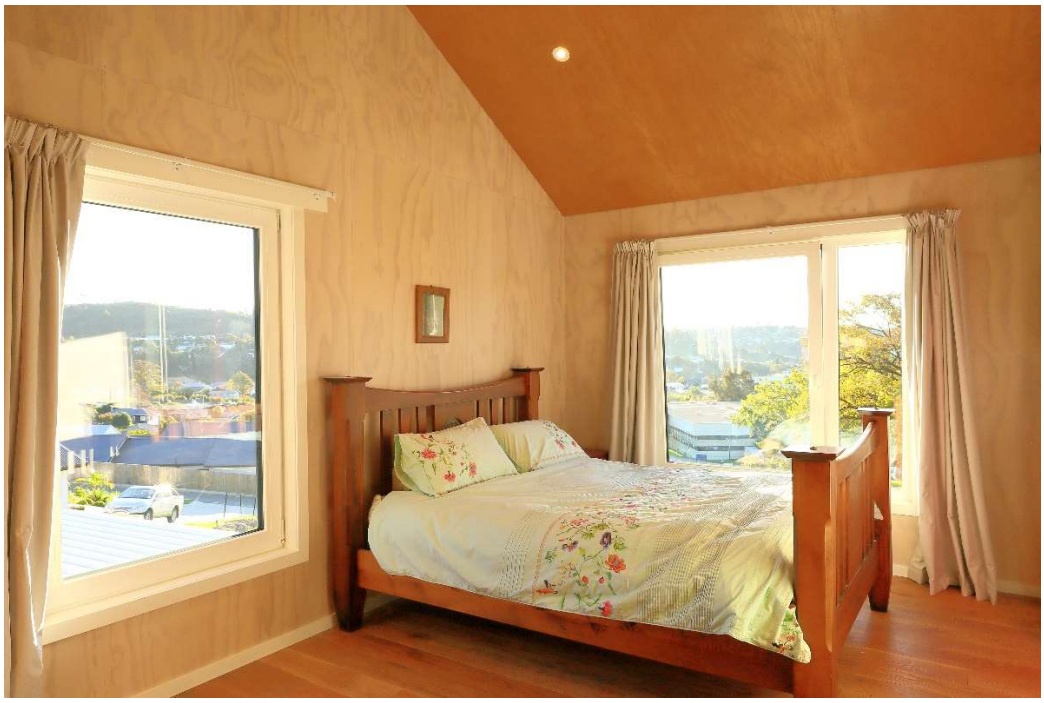
Date Datum	Signature Unterschrift
07 August 2023	

1. Exterior photos - Ansichtsfotos

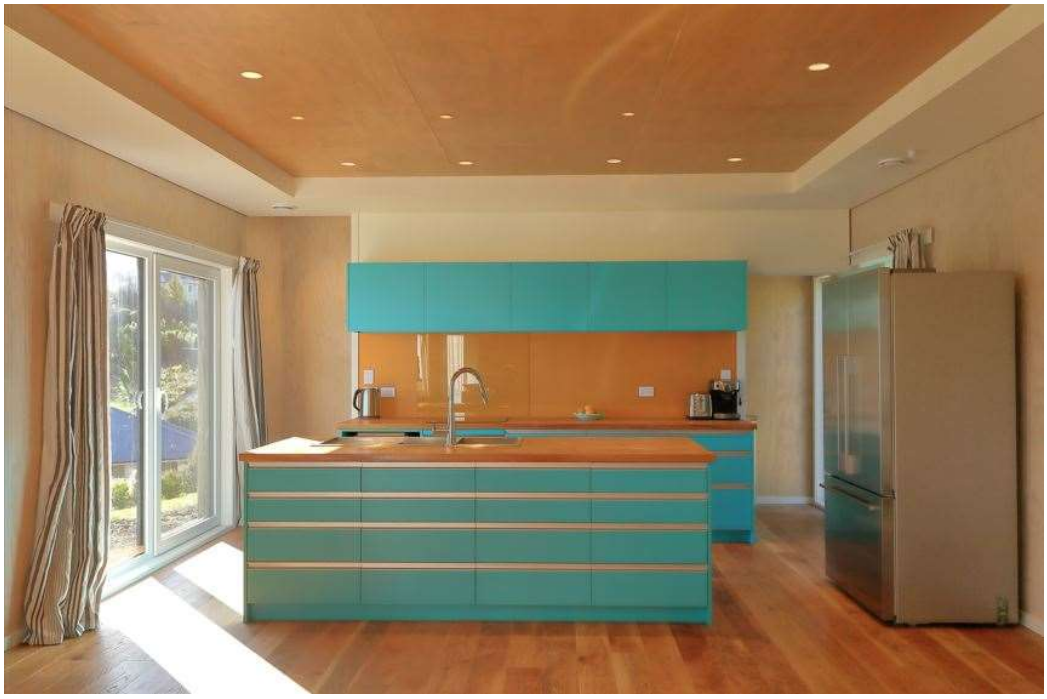
South Elevation

North Elevation looking West

2. Interior photos - Innenfoto exemplarisch

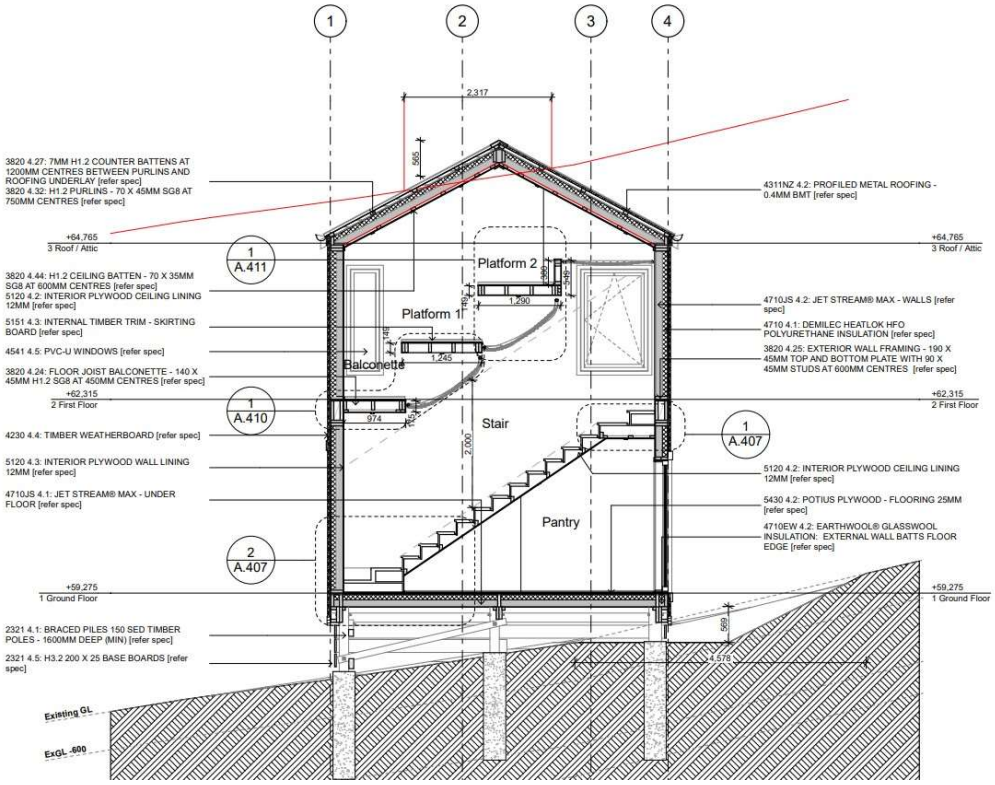


Main Bedroom

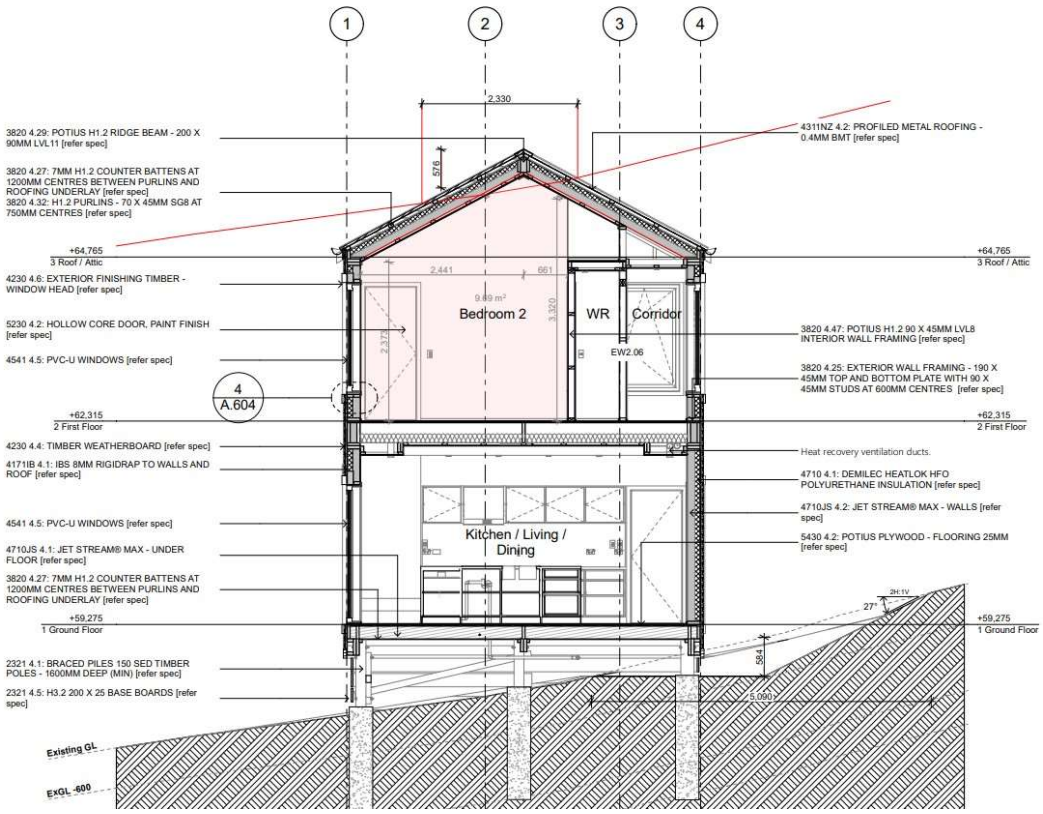


Kitchen

3. Sections - Schnittzeichnung

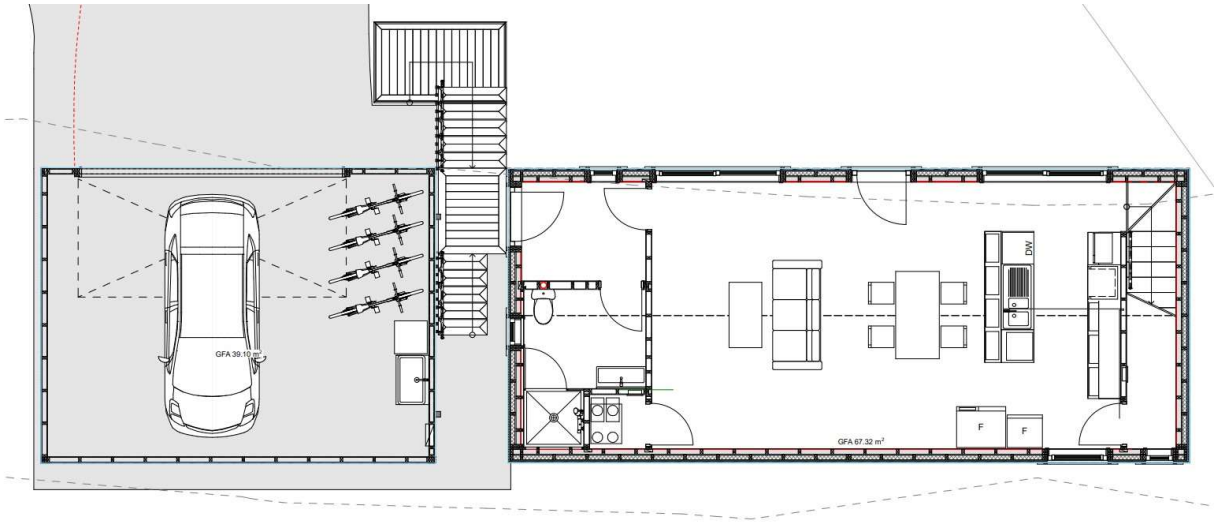


Section through the stairs

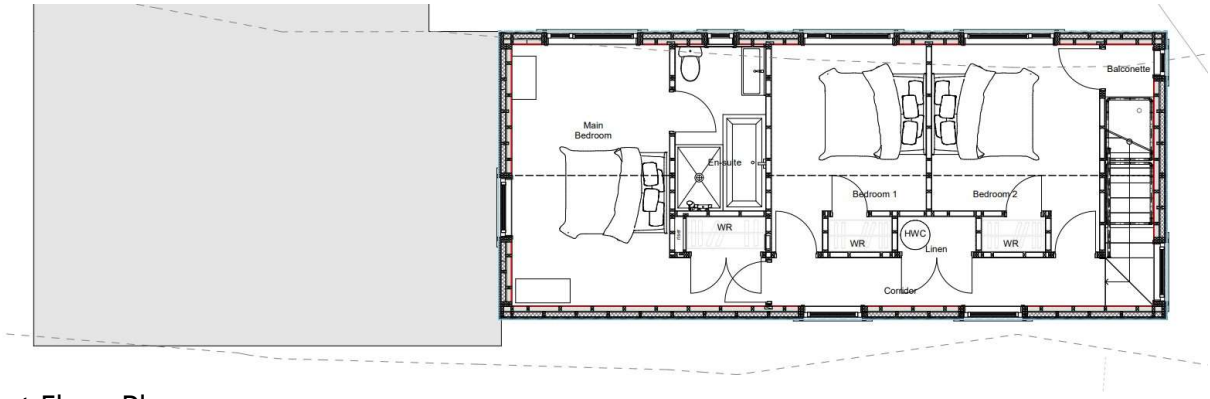


Section through bedroom

4. Floor plans - Grundrisse

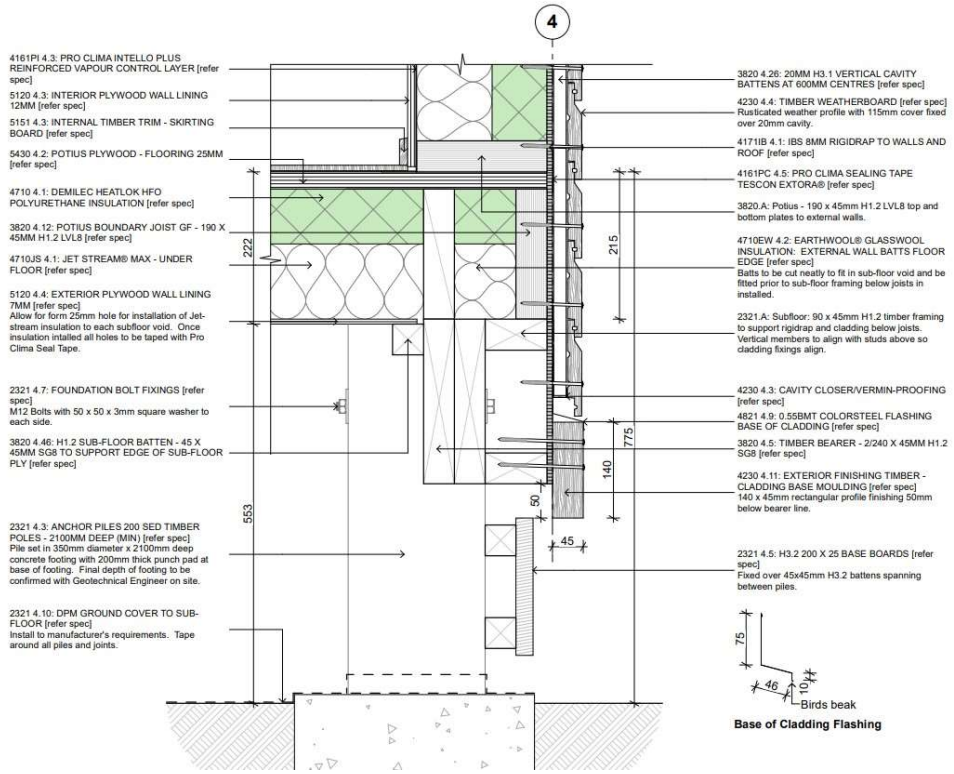


Ground Floor Plan



First Floor Plan

5. Floor slab/ basement ceiling construction including insulation
Konstruktion der Bodenplatte



Typical Footing Detail

Suspended timber floors were used for this project to reduce the need for excavations and the use of concrete. The floor was constructed as 4 prefabricated panels and delivered to site with the PUR insulation sprayed onto the underside of the 25mm plywood floor. Floor joist are 190mm deep. Once on site, a ply lining was installed to the underside of the joists and the remaining floor cavity was filled with Jet Stream Max blown-in insulation.

The insulation to the edge between the boundary joist and the packer was installed separately before final wall underlays were installed.

Assembly no. 03ud — Suspended Floors — Interior insulation?

Heat transmission resistance [m²K/W]

Orientation of building element: 3-Floor — interior R_{si}: 0.17

Adjacent to: 1-Outdoor air — exterior R_{se}: 0.04

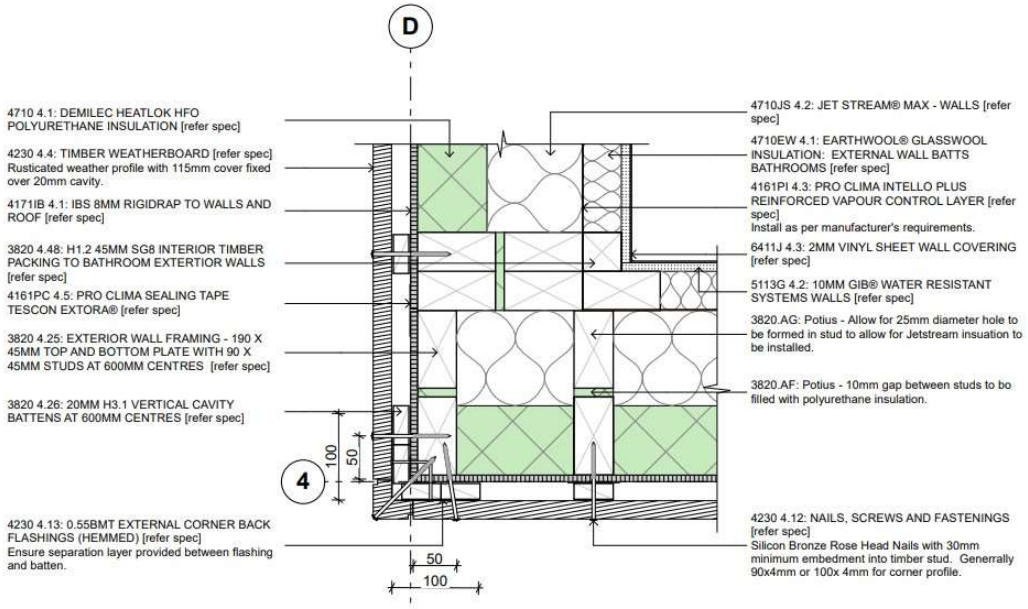
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Ply	0.130					7
Heatlok HFO PUR Insulation	0.023	Timber	0.130			50
GlassfibreKnaufJetStream MaxBlown28kg/m3	0.032	Timber	0.130			140
Ply	0.130					25

Percentage of sec. 1: 85% — Percentage of sec. 2: 15.0% — Percentage of sec. 3: — Total: 22.2 cm

U-value supplement: — W/(m²K)

U-value: 0.205 W/(m²K)

6. Wall construction including insulation - Konstruktion der Außenwände



Plan Detail – External Corner to Bathroom.

All external walls are at least 190mm thick – the detail above is through the bathroom on the exterior wall that is packed a further 45mm to allow for the installation of plasterboard. The walls were prefabricated off site with 190mm top and bottom plates and a double wall between. Studs were at 600mm centres with the internal studs being offset 300mm from the external stud to reduce thermal bridging.

Like the floor, the PUR insulation was sprayed onto the back of the rigid air barrier in the factory with the remainder of the Jet Stream Insulation being installed once the airtightness layer was installed.

Assembly no.	Building assembly description					Interior insulation?
01ud	**Exterior Walls Potius**					

Heat transmission resistance [m²K/W]

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

Adjacent to: 1-Outdoor air — exterior R_{se}: 0.04

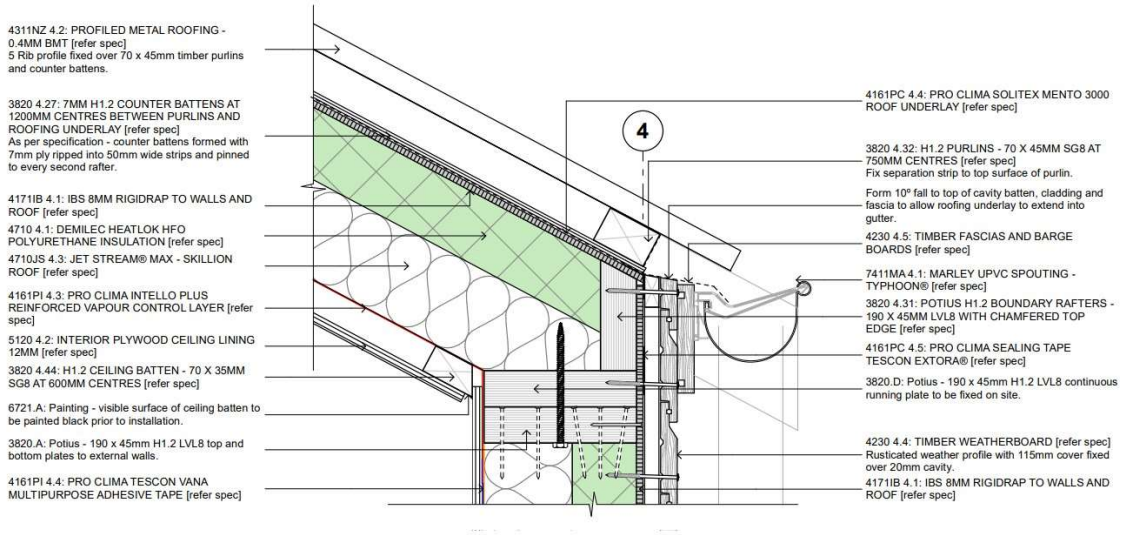
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Strandboard	0.130					8
Heatlok HFO PUR Insulation	0.023	Timber	0.130			40
GlassfibreKnaufJetStream MaxBlown28kg/m3	0.032	Timber	0.130			50
GlassfibreKnaufJetStream MaxBlown28kg/m3	0.032					10
GlassfibreKnaufJetStream MaxBlown28kg/m3	0.032	Timber	0.130			90
Ply	0.130					12

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
84%	16.0%	0.0%	21.0 cm

U-value supplement: W/(m²K)

U-value: 0.211 W/(m²K)

7. Roof construction including insulation - Konstruktion des Daches



The raking roof panels are made up of 190 x 45lvl rafters at 600mm centres with the same insulation build up in the walls and the floors.

Assembly no. 04ud — Potius Roof

Interior insulation?

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

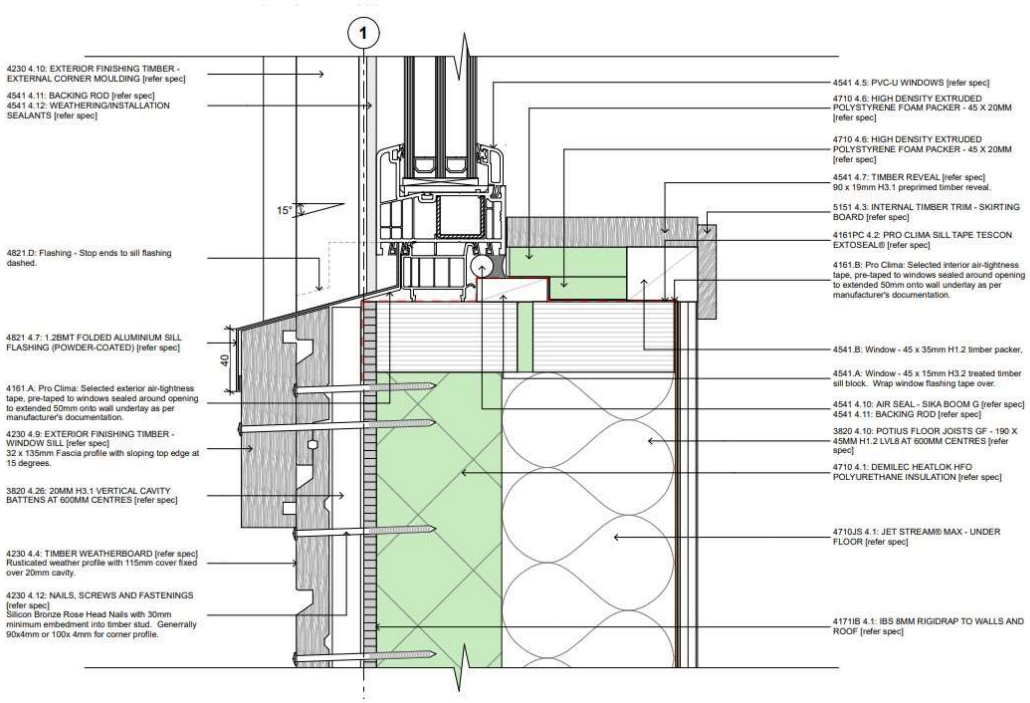
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Strandboard	0.130					8
Heatlok PUR Insulation	0.023	Timber	0.130			50
GlassfibreKnaufJetStream MaxBlown28kg/m3	0.032	Timber	0.130			140
Still Air Layer	0.210	Timber	0.130			35
Ply	0.130					12

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
87%	13.5%		24.5 cm

U-value supplement: W/(m²K)

U-value: 0.197 W/(m²K)

8. Window and window installation including glass Ug / g-value and frame perfromance - Fenster und Fenster-Einbau



All windows and doors are Gealan S 9000 uPVC frames with triple glazing. The U-value of the frames typically sits between 0.95W/(m^2K) to 1.2W/(m^2K). The glass has a Ug of 0.525 W/(m^2K) and a G-value of 52.57%.

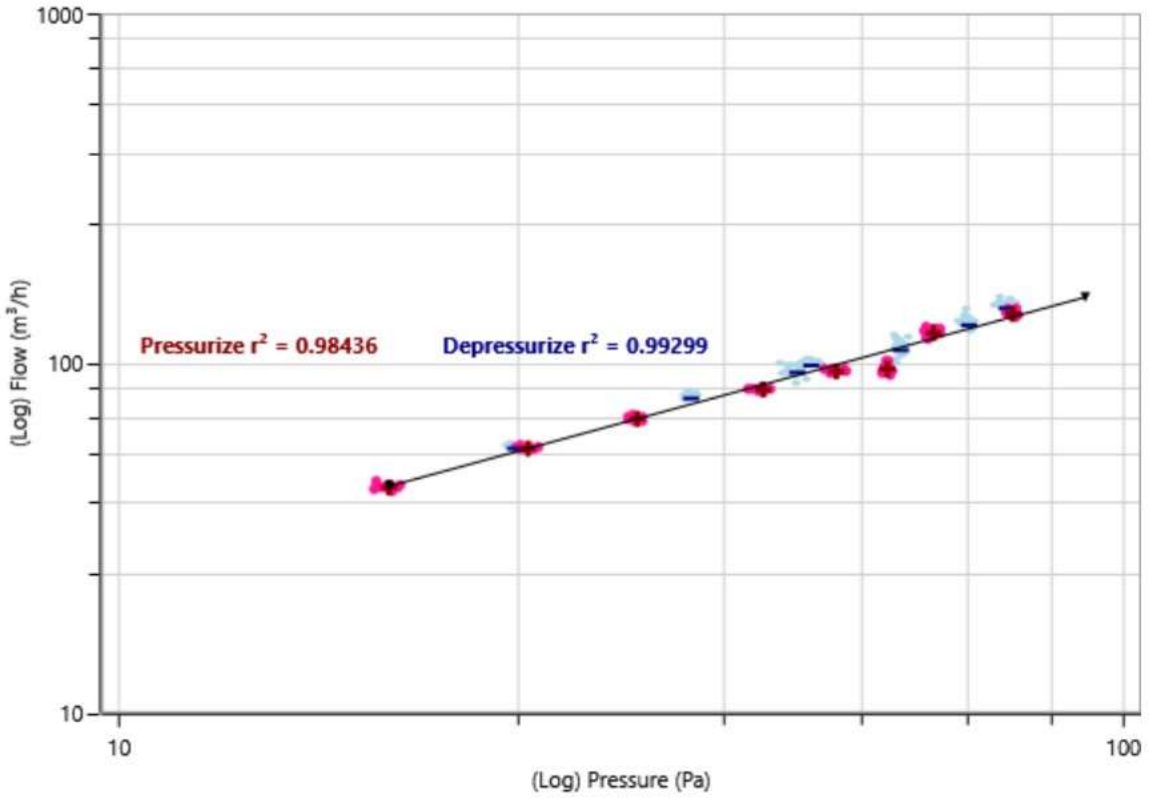
9. Air leakage testing - Beschreibung der luftdichten Hülle

Summary

retrotec **FanTestic**	version: **5.11.2.**	licensed to: **THERMFIT**
Test date: **2022-07-02**	By: **Malcolm Pasley**	
Customer:		
Building Lot Number:		
Building address:	**1 Crathie PLace** **Nelosn,**	

Building and Test Information	
Test file name:	**1 Crathie Place Test 5**
Building volume [m³]:	**312.7**
Envelope Area [m²]:	**255.2**
Floor Area [m²]:	**107.2**
Building Height (from ground to top) [m]:	**59**

Results	
Air flow at 50 Pa, Q_{50} [m³/h]	**98.155**
Air changes, n_{50}	**0.31**
Equivalent leakage area at 50 Pa [cm²]	**14.25**
Permeability at 50 Pa [m³/h/m²]	**0.385**



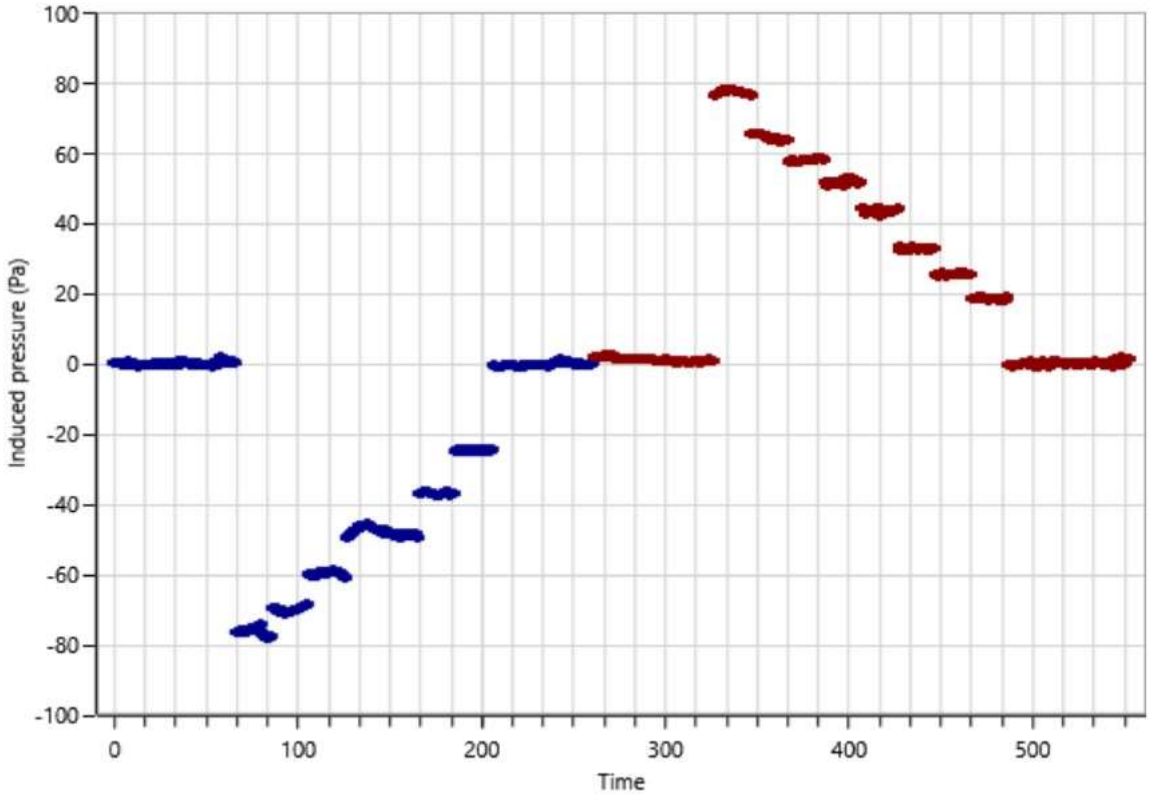


Photo 7: Photo of head of window from the inside. Window flashing tape can be seen around the opening and insulation used as packer when window was installed.

Photo 8: Photo of main bedroom window with foam air seal installed.

Photo 9: Photo of hinge side of main bedroom window with foam air seal installed.

Photo 11: Photo of northern kitchen window. Window airseal tape has just been installed over foam airseal to connect window frame to intello.

Photo 12: Photo of southern kitchen window. Window airseal tape has just been installed over foam airseal to connect window frame to intello.

Photo 13: Photo of upper level northern window showing interior jamb insulation install prior to timber revaels being installed.

10. MVHR - Lüftungsgerät

Photo 1: Ventilation extract above shower to the west. Also, packing over intello for installation of plasterboard and insulation.

Photo 2: Ventilation intract in south wall of MHRV cupboard. Pipe sealed to intello and taped in place.

Photo 3: MHRV unit installed in cupboard. Ventilation pipes starting to be installed

Photo 4: More ventilation pipes (flow and return) coming out of the space above the MHRV cupboard into the bulkhead space.

Photo 5: Riser to upper level visible for MHRV pipes to service bedrooms and bathroom on the upper level. Also visible here is the hotwater waste heat recovery pipe.

Photo 6: MHVR extract and instact pipes at project completion.

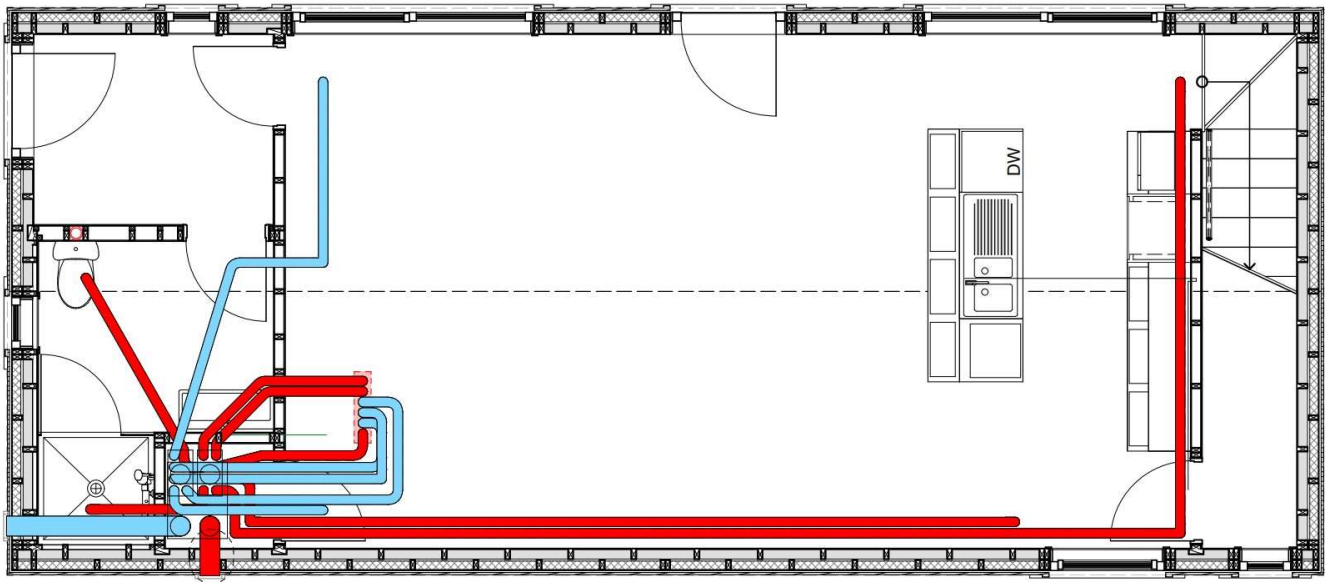
Photo 7: G4 filter intalled in the Zhender Unit

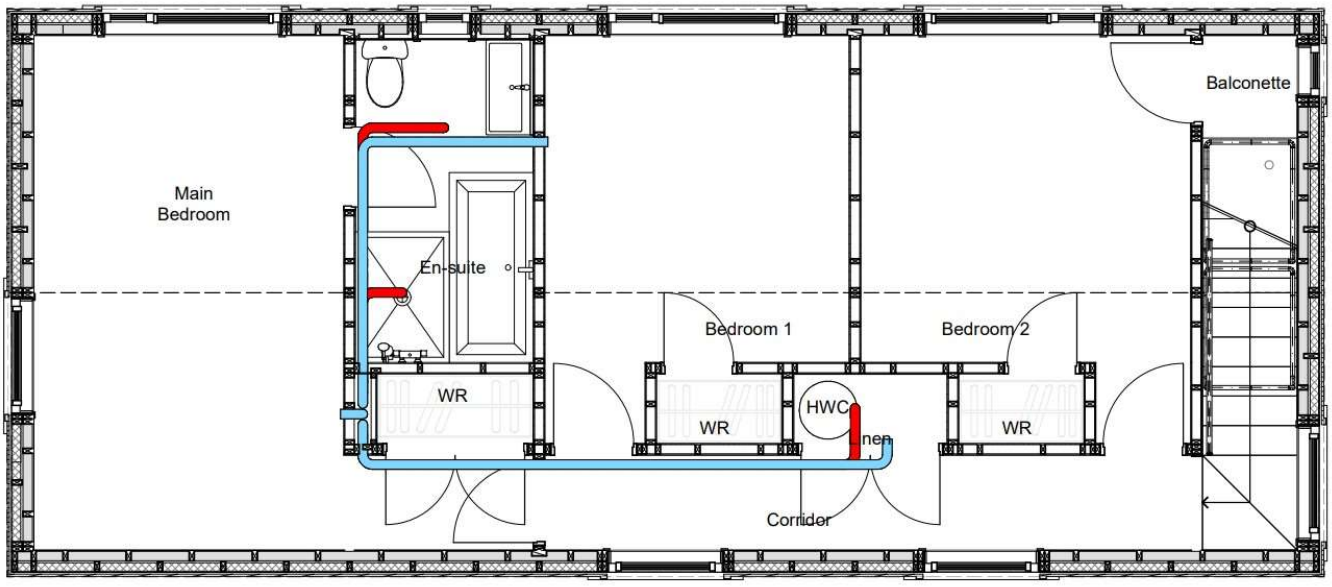
Photo 8: F7 filter intalled in the Zhender Unit

Photo 7: Zhender Unit

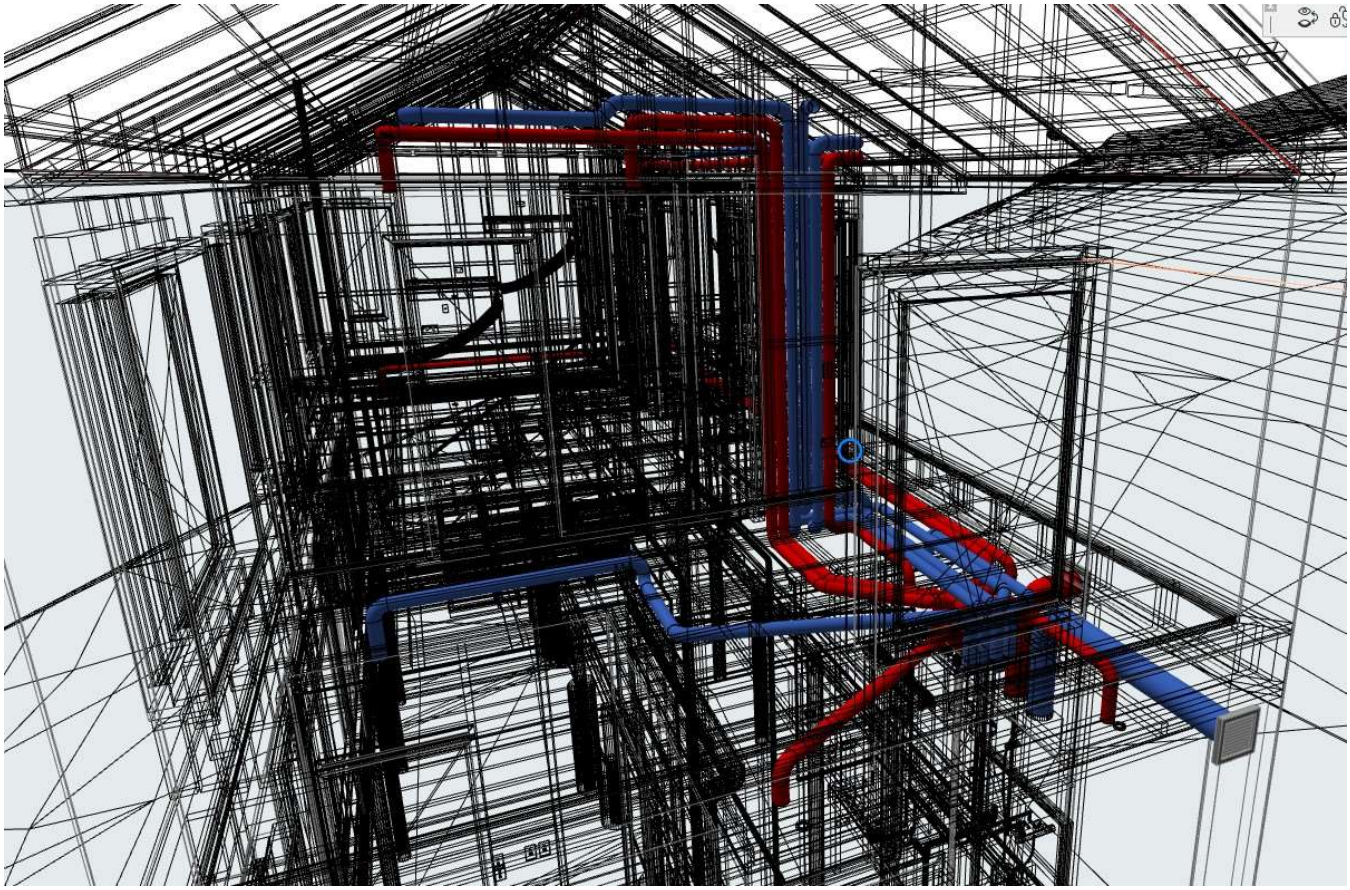
The ventilation system used was the Zehnder ComfoAir Q350 which has 89% efficiency.

11. Ventilation ductwork - Lüftungsplanung Kanalnetz





Floor plans above showing generic layout for the ventilation pipework around the building.



3D schematic showing the reticulated pipework for the ventilation system – this was all modelled in BIM prior to construction to ensure everything would fit in the confined space.

12. Heating systems - Wärmeversorgung

The only heat appliance provided is a portable oil column heater which was not required in 2023.

13. Building costs - Baukosten

N/A

14. Publications featuring the building - Literatur

- Also certified with a 10 Homestar Rating and will feature on the NZGBC website.

15. PHPP-Ergebnisse

Passive House Verification

Building:	Whakatu Passivhaus		
Street:			
Postcode/City:	7010	Nelson	
Province/Country:			NZ-New Zealand
Building type:	1-Residential building		
Climate data set:	NZ0012a-Nelson		
Climate zone:	4: Warm-temperate	Altitude of location:	59 m
Home owner / Client:	Yuki Fukuda		
Street:			
Postcode/City:	7010	Nelson	
Province/Country:			NZ-New Zealand
Architecture:	Nathan Edmondston		
Street:			
Postcode/City:	7010	Nelson	
Province/Country:			NZ-New Zealand
Mechanical engineer:	(Builder)Basham Building Limited		
Street:	99 Cambria Street, The Wood,		
Postcode/City:	7010	Nelson	
Province/Country:			NZ-New Zealand
Energy consultancy:	Nathan Edmondston		
Street:			
Postcode/City:	7010	Nelson	
Province/Country:			NZ-New Zealand
Certification:	Sustainable Engineering Ltd		
Street:	65B Hungerford Road		
Postcode/City:	6023	Houghton Bay	
Province/Country:	Wellington		NZ-New Zealand

Year of construction:	2022	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]:	2.6	IHG cooling case [W/m²]:	3.8
No. of occupants:	2.5	Specific capacity [Wh/K per m² TFA]:	60	Mechanical cooling:	

Specific building characteristics with reference to the treated floor area

					Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area	m²	106.8				
Space heating	Heating demand	kWh/(m²a)	9.97	≤	15	-	yes
	Heating load	W/m²	9.55	≤	-	10	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	-	≤	-	-	-
	Cooling load	W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C)	%	9.54	≤	10		yes
	Frequency of excessively high humidity (> 12 g/kg)	%	0.26	≤	20		yes
Airtightness	Pressurization test result n_{50}	1/h	0.31	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)	92.42	≤	-		-
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	44.43	≤	60	60	yes
	Generation of renewable energy (in relation to projected building footprint area)	kWh/(m²a)	7.12	≥	-	-	

[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	Jason	Quinn	

Certificate ID	Issued on:	City:
	02/11/22	Wellington