Project Documentation
Gebäude-Dokumentation

Abstract | Zusammenfassung

Watterson Residence

Data of building | Gebäudedaten

Year of construction Baujahr	2022	**Space heating** **Heizwärmebedarf**	**12.2** **kWh/(m²a)**
U-value external wall U-Wert Außenwand	0.224 W/(m²K)		
U-value basement U-Wert Kellerdecke	n/a W/(m²K)	Primary Energy Renewable (PER) Erneuerbare Primärenergie (PER)	37 kWh/(m²a)
U-value roof U-Wert Dach	0.131 W/(m²K)	Generation of renewable Energy Erzeugung erneuerb. Energie	0 kWh/(m²a)
U-value window U-Wert Fenster	1.0 W/(m²K)	Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE)	0 kWh/(m²a)
Heat recovery Wärmerückgewinnung	86.7 %	Pressurization test n_{50} Drucktest n_{50}	0.2 h^{-1}
Special features Besonderheiten			

Brief Description

Watterson Residence

The house is situated in rural small town Featherston at the foot of Remutaka Ranges, approximately 60km from the capital city Wellington.

It's a 2-storey building in part, with the west and south end of the house having two floors and the centralised part in the middle having large ceiling height with a cathedral ceiling. All bedrooms and common areas are facing north and storage/plant rooms/bathrooms are located along the southern elevation.

The house has been future proofed to go off-grid, with plumbing connections ready for water harvesting and wiring installed for future solar panels.

The materials used are locally made and sourced in NZ, with the Abodo cladding being carbon negative and the metal cladding fully recyclable.

Kurzbeschreibung

Das Haus liegt in der ländlichen Kleinstadt Featherston am Fuße der Remutaka Ranges, etwa 60 km von der Hauptstadt Wellington entfernt.

Es handelt sich teilweise um ein zweistöckiges Gebäude, wobei das westliche und südliche Ende des Hauses zwei Stockwerke hat und der zentrale Teil in der Mitte eine große Deckenhöhe mit einer Kathedralendecke aufweist. Alle Schlafzimmer und Gemeinschaftsbereiche sind nach Norden ausgerichtet und Lager-/Technikräume/Badezimmer befinden sich entlang der Südfassade.

Das Haus ist zukunftssicher für den netzunabhängigen Betrieb, die Wasseranschlüsse sind für die Wassergewinnung vorbereitet und die Verkabelung für künftige Solarpaneele installiert.

Die verwendeten Materialien werden lokal in Neuseeland hergestellt und bezogen, wobei die Abodo-Verkleidung kohlenstoffnegativ und die Metallverkleidung vollständig recycelbar ist.

Responsible project participants
Verantwortliche Projektbeteiligte

Architect Entwurfsverfasser	Josefine Watterson www.thrivearchitecture.co.nz
Implementation planning Ausführungsplanung	Josefine Watterson www.thrivearchitecture.co.nz
Building systems Haustechnik	Josefine Watterson www.thrivearchitecture.co.nz
Structural engineering Baustatik	Anil Krishnan www.msc.co.nz
Building physics Bauphysik	Josefine Watterson www.thrivearchitecture.co.nz
Passive House project planning Passivhaus-Projektierung	Josefine Watterson www.thrivearchitecture.co.nz
Construction management Bauleitung	Maple Build Construction www.maplebuild.co.nz

Certifying body
Zertifizierungsstelle

Sustainable Engineering Ltd
www.sustainableengineering.co.nz

Certification ID
Zertifizierungs ID

ID7328	Project-ID (www.passivehouse-database.org) Projekt-ID (www.passivhausprojekte.de)

Author of project documentation
Verfasser der Gebäude-Dokumentation

Josefine Watterson
www.thrivearchitecture.co.nz

Date Datum	Signature Unterschrift
8/9/2023	

1. Exterior photos - Ansichtsfotos

Eastern elevation

Western elevation

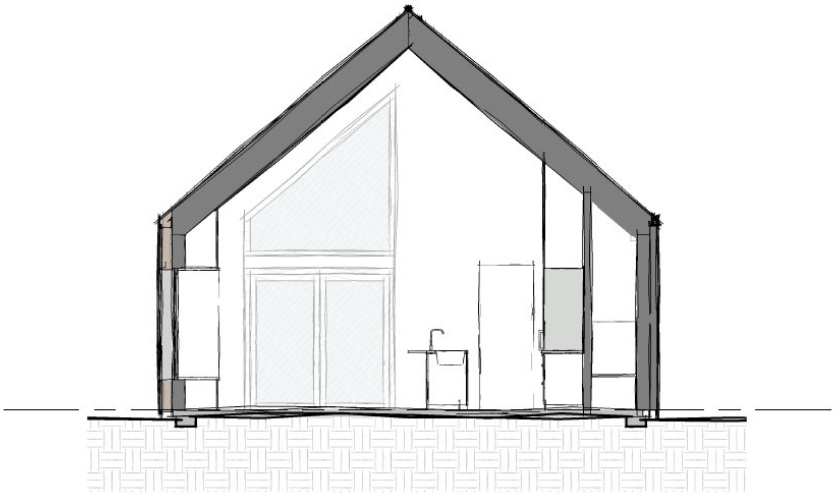
North/western elevation

2. Interior photos - Innenfoto exemplarisch

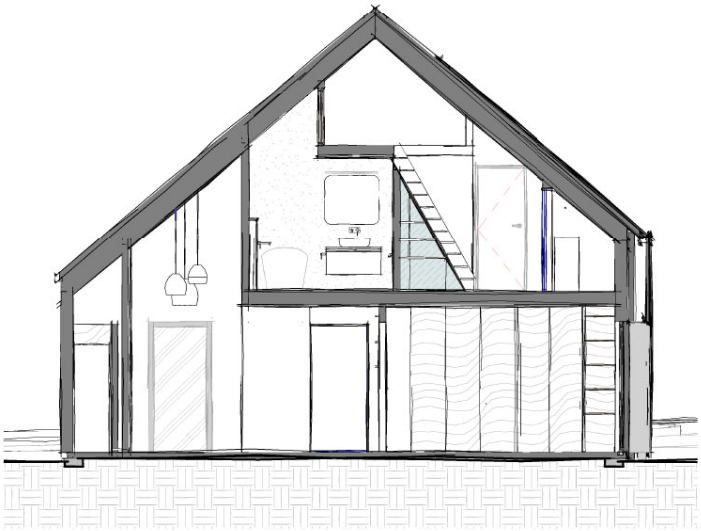
Image top left: Steel portal frame inside the thermal envelope to avoid thermal bridging,
Image top right: Upstairs bathroom with skylight above bath
Image bottom: Main living/kitchen/dining

3. Sections - Schnittzeichnung

North/south section through dining/kitchen

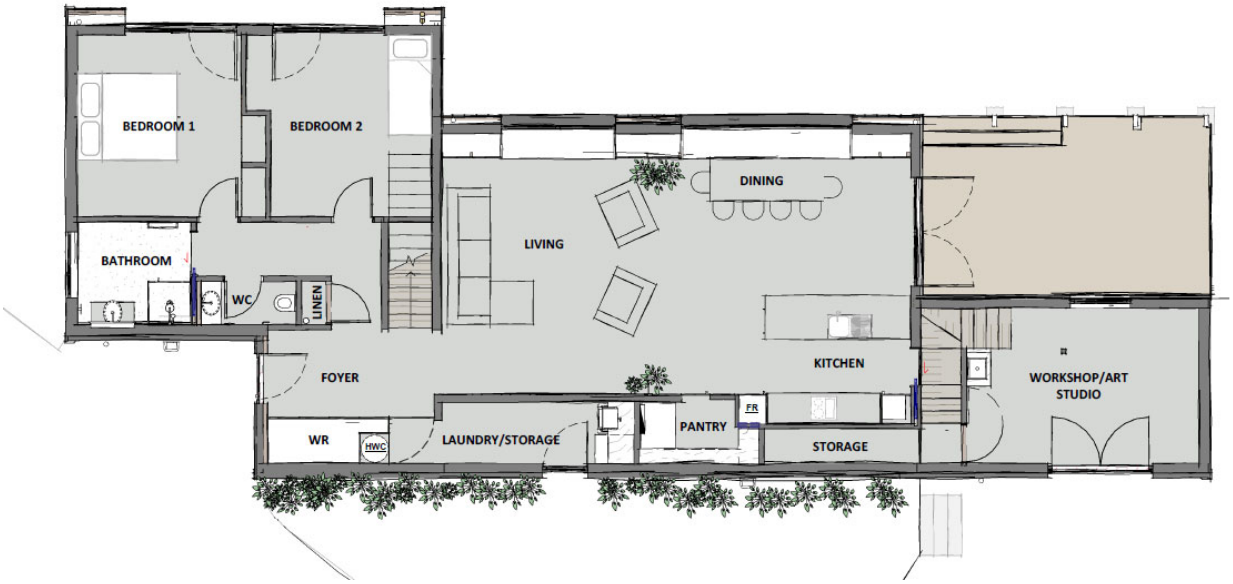


North/south section through loft, ensuite, bedroom/hallway



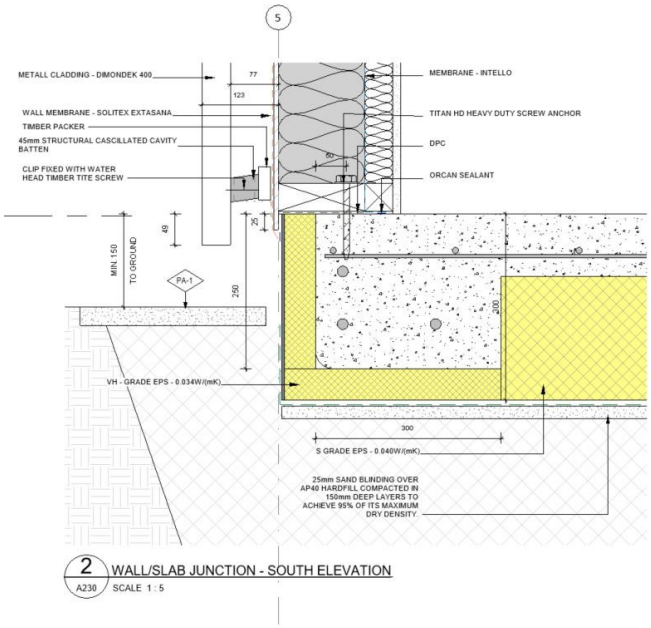
4. Floor plans - Grundrisse

The layout was based on passive design principles, living areas and bedrooms are facing north and storage spaces, toilets etc facing south. Windows towards east and east were kept to a minimum to reduce over-heating. The house has a centralised open space with large ceiling heights and two private areas on the west/east portion where ceiling heights are dropped, and the spaces are more enclosed and cosy.



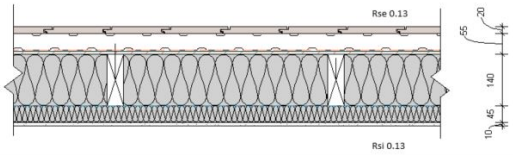
5. Floor slab/ basement ceiling construction including insulation Konstruktion der Bodenplatte

The floor is made from 100mm concrete with rigid insulation below. The product system is called “Max Slab”. Most of the floor has 200mm thick insulation, in localized areas where there is slab thickening or bathroom set down the insulation is reduced as required. There is 50mm edge insulation that lines up with the timber framed walls to reduce the thermal bridging at this junction.



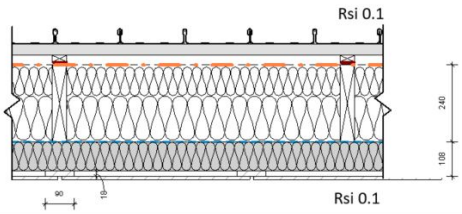
6. Wall construction including insulation - Konstruktion der Außenwände

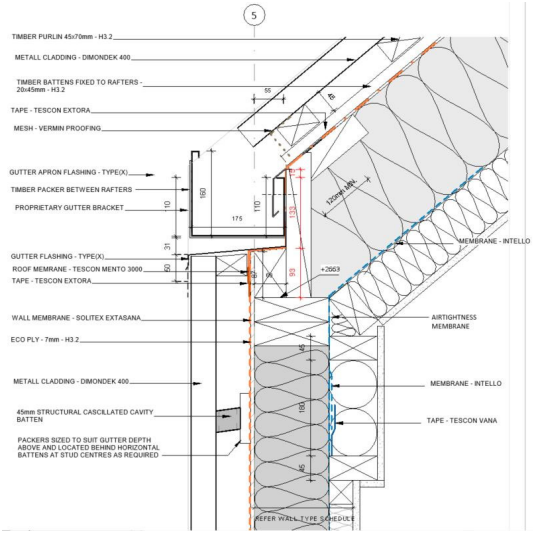
The building has two different cladding types; vertical timber cladding and interlocking sheet metal cladding. External walls consist of 140 timber with a 45 mm service battens (sometimes upgraded to 90mm to facilitate services)

EXT1(T)		- **WEATHERBOARD CLADDING** (ABODO VULCAN VERTICAL 50%WB10 & 50% WB12) - **HORIZONTAL CAVITY BATTEN** (ABODO PROPRIETARY BATTEN) - **WALL MEMBRANE** - SOLITEX EXTASANA - **INSULATION** (GlassfibreKnaufR4.1@140mm) **/ TIMBER STUD** - **AIRTIGHNTESS LAYER** (INTELLO) - **INSULATION** (GlassfibreKnaufR1.4@50mm)**/TIMBER BATTEN** (600cc) - **PLASTERBOARD** (TO BE REPLACED WITH VILLABOARD IN WETAREAS)	n/a n/a n/a 0.034/0.13 n/a 0.036/0.13 0.25	R4.5

7. Roof construction including insulation - Konstruktion des Daches

Skillion roof construction is used throughout. The rafters are 240 or 190 depending on span. Customized roof details allow the face of gutter to be flush with the face of the cladding.

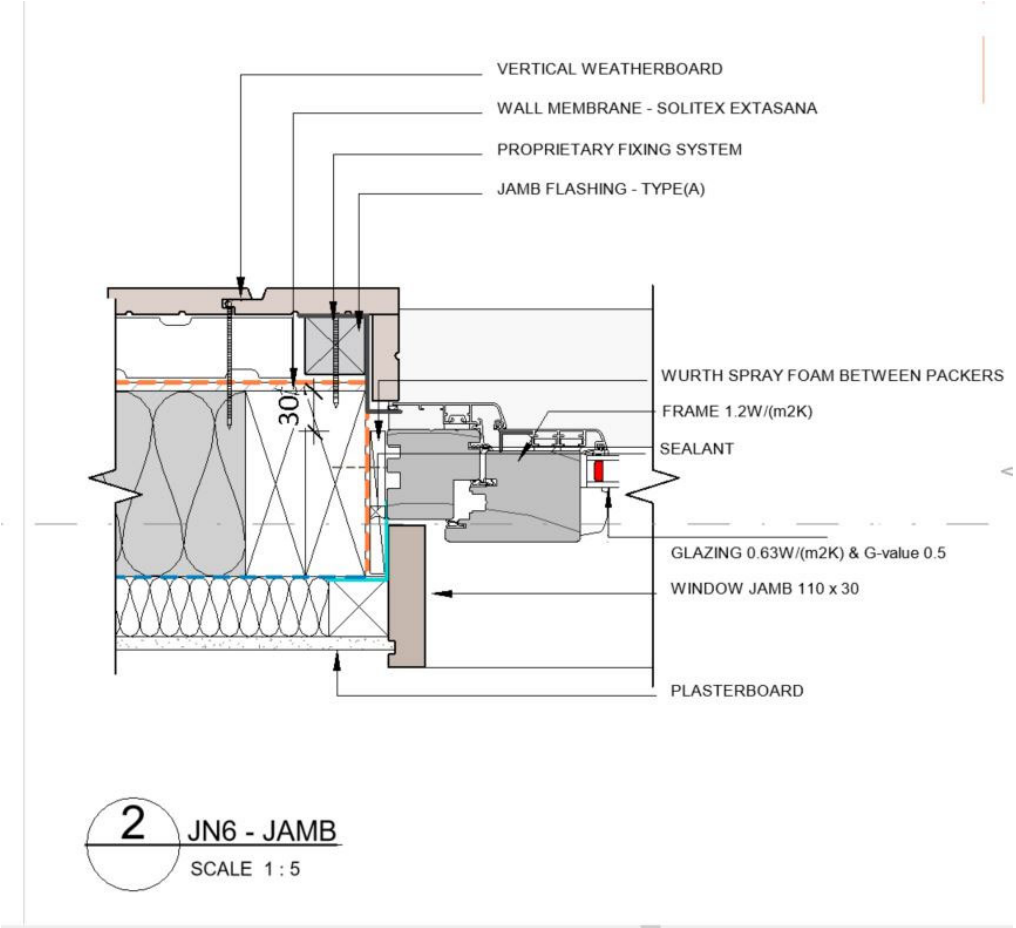
ROOF - 240 RAFTER		- **METAL ROOFING** (DIMONDEK 400) - **PURLIN** (50x55mm @ 400cc, H3.2) - **TIMBER BATTEN** (20x45, H3.2) + PROTECTIVE TAPE (TESCON NAIDECK) - **ROOF MEMBRANE** (SOLITEX MENTO 3000) - **INSULATION/RAFTER** 1 X GlassfibreKnaufR2.6@90mm & 1 X GlassfibreKnaufR4.1@140mmRAFTER (900cc) - **AIRTIGHTNESS MEMBRANE** - INTELLO - **INSULATION** (GlassfibreKnaufR2.6@90mm) **/ TIMBER BATTEN** (900cc) - **PLASTERBOARD** (TO BE REPLACED WITH FIBER CEMENT SHEET IN WETAREAS)	n/a n/a n/a n/a 0.040/0.13 n/a 0.0335/0.13 0.25	R8.2



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

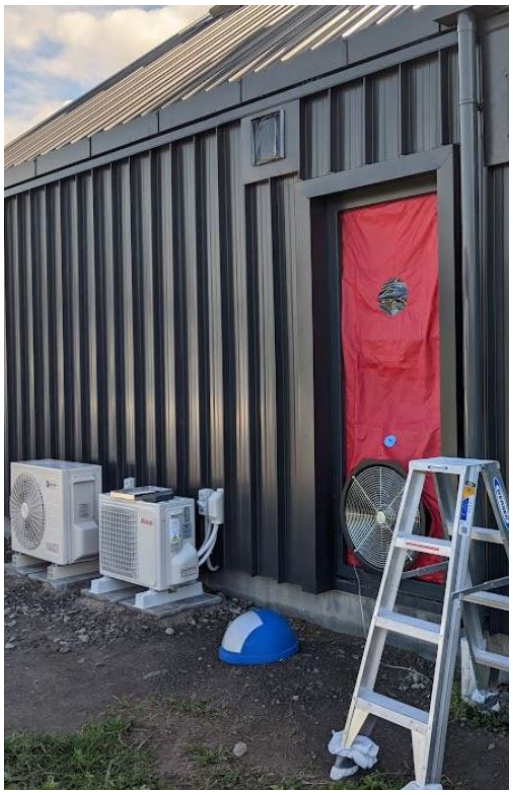
The window joinery is made from timber frames with aluminium at the front. It is triple glazed and has High performance edge spacers. Instead of using sliding doors, which are very popular in NZ, French doors are used in areas where indoor/outdoor flow is important.

The face of all joinery is recessed back 30mm into the envelope to improve the thermal performance of the detail.

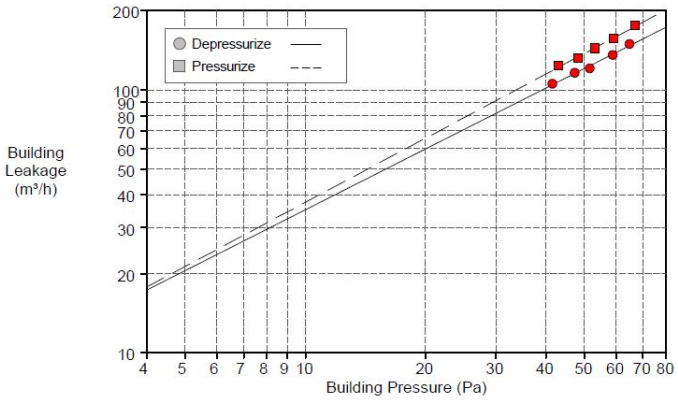


9. Air leakage testing - Beschreibung der luftdichten Hülle

The blower door result was outstanding; 0.2air changes per hour at 50 Pascal. This kind of result can't be achieved through good products and details alone, it requires a builder who pays very close attention to his work during construction. All subcontractors were briefed by the architect that any penetrations through the envelope needed to be approved in writing prior to works being carried out. The penetrations were carefully scheduled on the drawings, the correct sealing grommets were ordered. The main contractor, architect and subcontractor did a walk through the house and marked out together where penetrations were to be made and checked that all the sealing grommets where the right size. A "B test" were carried out before linings were put on to ensure there were no accidental leaking anywhere.



	Depressurization	Pressurization	Average
Test Results at 50 Pascals:			
V50: m³/h50 (Airflow)	121 (+/- 2.5 %)	138 (+/- 1.7 %)	129
n50: 1/h (Air Change Rate)	0.21	0.23	0.22
w50:			
q50:			
Leakage Areas:			
Canadian EqLA @ 10 Pa (cm²)	39.2 (+/- 25.9 %)	41.7 (+/- 17.3 %)	40.5
LBL ELA @ 4 Pa (cm²)	18.7 (+/- 40.2 %)	19.2 (+/- 26.6 %)	19.0
Building Leakage Curve:			
Air Flow Coefficient (Cenv) m³/(h·Paⁿ)	5.9 (+/- 61.9 %)	5.8 (+/- 40.8 %)	
Air Leakage Coefficient (CL) m³/(h·Paⁿ)	6.0 (+/- 61.9 %)	5.8 (+/- 40.8 %)	
Exponent (n)	0.768 (+/- 0.156)	0.810 (+/- 0.103)	
Correlation Coefficient	0.99392	0.99763	
Test Standard:	EN 13829		
Test Mode:	Depressurization and Pressurization		
Type of Test Method:	A		
Regulation complied with:	Passive House Certification n50 ≤ 0.6 1/h		



10. MVHR - Lüftungsgerät

The architect decided to go for a well-known brand with a good reputation; Zehner's Comfoair 350 unit. 90mm ducting was used internally and concealed in the 90mm ceiling service battens.

Selection of ventilation unit with heat recovery

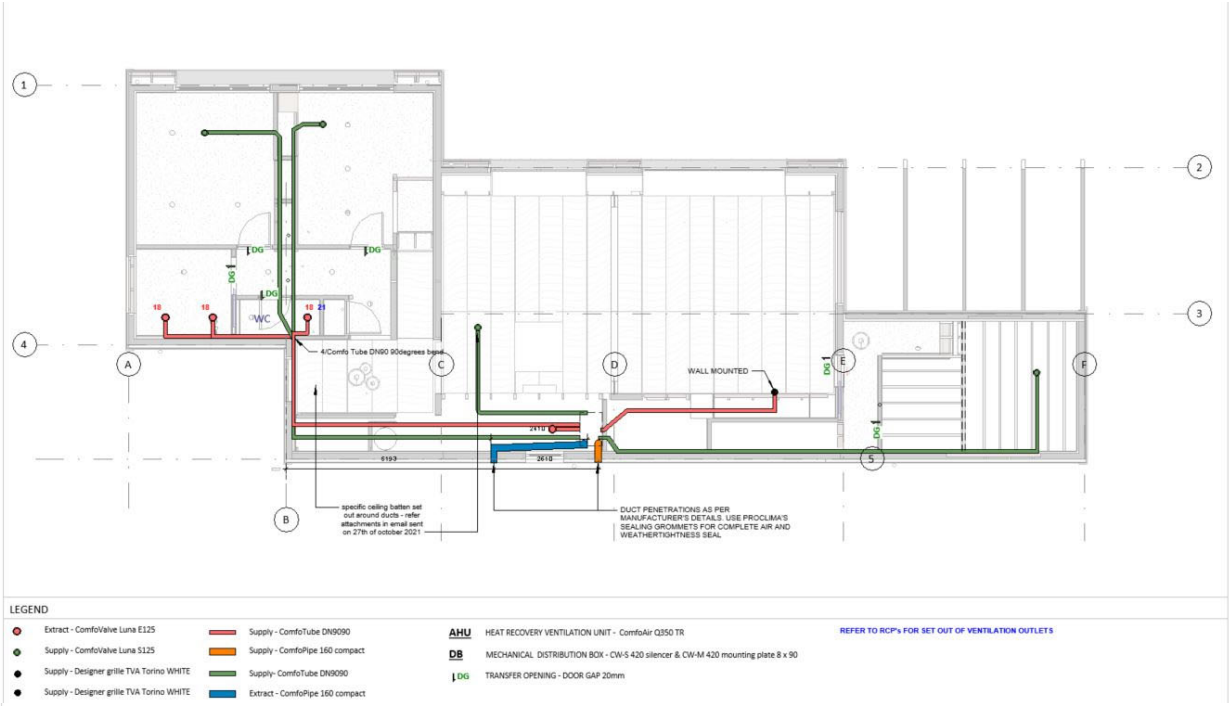
Location of ventilation unit	1-Inside thermal envelope						
	Go to ventilation units list 2-Sorting: BY ID			Heat recovery efficiency	Humidity recovery efficiency	Specific efficiency [Wh/m³]	Application [m³/h]	Frost power input
Ventilation unit selection	01ud-ComfoAir Q350 HRV, Comfort Vent Q350HRV			0.91	0.00	0.24	70 - 270	NO
						Implementation of frost protection		1-No
Conductivity outdoor air duct	Ψ	W/(mK)		0.868		Limit temperature [°C]		0
Length of outdoor air duct		m		0.5		Useful energy [kWh/a]		0
Conductivity exhaust air duct	Ψ	W/(mK)		0.868				
Length of exhaust air duct		m		2.5		Room temperature (°C)		20
Temperature of mechanical services room		°C				Avg. ambient temp. heat. period (°C		10.0
(Enter only if the central unit is outside of the thermal envelope)						Avg. ground temp (°C)		13.7
Effective heat recovery efficiency	$\eta_{HR,eff}$			86.7%				

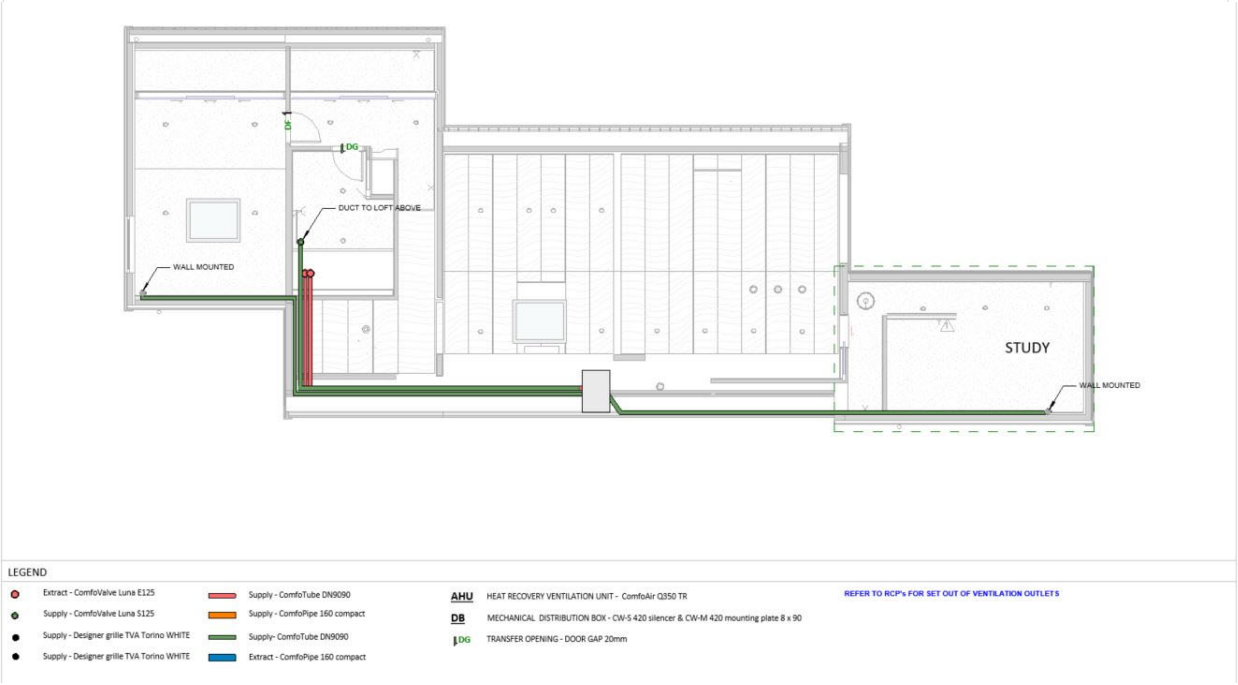
Effective heat recovery efficiency subsoil heat exchanger

SHX efficiency	η^*_{SHX}	
Heat recovery efficiency SHX	η_{SHX}	0%

11. Ventilation ductwork - Lüftungsplanung Kanalnetz

The heat recovery unit is in a centralized location close to the thermal envelope so that the extract and supply duct length is minimalized. The ducts are mainly clustered around the southern back of the house and then branch out as required into the various rooms. Most of the supply/extract grills are ceiling-mounted but in a couple of locations (study and master bedroom) it was more practical to use a low-level wall mounted grill.





12. Heating systems - Wärmeversorgung

The heating requirement for the house is very low and direct heat through radiators and heated towel rails are therefore sufficient. Provisions were made for solar panels to be installed on the roof, with the wires poking through the roof ready to be hooked up. In the future the heating can be run off the solar panels during daytime as 24/7 heating is not required.

13. Building costs - Baukosten

n/a

14. Publications featuring the building - Literature

Green Home of the Year 2023: Featherston Passive House | HOME Magazine
Featherstone Passive House | Knauf Insulation New Zealand
tvnz.co.nz/shows/grand-designs-nz/episodes/s7-e6
Watterson Residence - Sustainable Engineering Ltd.
Grand Designs NZ: Aucklanders swap city rental for 'good life' passive house | Stuff.co.nz
Multidek Cladding and Roofing Helps Bring Scandinavian-Inspired Design to Life – EBOSS

15. PHPP-Ergebnisse

Passive House Verification

Building:	Watterson Residence
Street:	18 Ataahua Place
Postcode/City:	5710 Featherston
Province/Country:	NZ-New Zealand
Building type:	Residental
Climate data set:	NZ0004a-Masterton
Climate zone:	4: Warm-temperate — Altitude of location: 50 m
Home owner / Client:	Josefine Watterson & William Watterson
Street:	
Postcode/City:	
Province/Country:	NZ-New Zealand

Architecture:	Josefine Watterson
Street:	18 Ataahua Place
Postcode/City:	5710 Featherston
Province/Country:	NZ-New Zealand
Energy consultancy:	Josefine Watterson
Street:	18 Ataahua Place
Postcode/City:	5710 Featherston
Province/Country:	NZ-New Zealand

Mechanical engineer:	Maple Build Ltd
Street:	PO Box 67
Postcode/City:	5740 Featherston
Province/Country:	NZ-New Zealand
Certification:	Sustainable Engineering Ltd
Street:	65B Hungerford Road Houghton Bay
Postcode/City:	6023 Houghton Bay
Province/Country:	Wellington NZ-New Zealand

Year of construction:	2021	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]:	72
		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	177.3				
Space heating	Heating demand kWh/(m²a)	12.2	≤	15	-	yes
	Heating load W/m²	12.9	≤	-	10	
Space cooling	Cooling & dehum. demand kWh/(m²a)	-	≤	-	-	-
	Cooling load W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C) %	0.4	≤	10		yes
	Frequency of excessively high humidity (> 12 g/kg) %	0.0	≤	20		yes
Airtightness	Pressurization test result n_{50} 1/h	0.2	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	86.8	≤	-		-
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	37.0	≤	60	60	yes
	Generation of renewable energy (in relation to projected building footprint area) kWh/(m²a)	0.0	≥	-	-	

[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:	
	02/01/00	Wellington	