

Project Documentation

1.0 ABSTRACT / ZUSAMMENFASSUNG



Frenchay Primary School – South Gloucestershire UK

1.1 Data of building | Gebäudedaten

Year of construction Baujahr	2021 - 2022	Space heating Heizwärmebedarf	11.3 kWh/(m²a)
U-value external wall U-Wert Außenwand	0,127 & 0.079 W/(m ² K)		
U-value floor U-Wert Kellerdecke	0,228 W/(m ² K)	Primary Energy Renewable (PER) Erneuerbare Primärenergie (PER)	71.5 kWh/(m ² a)
U-value roof U-Wert Dach	0,105 W/(m ² K)	Generation of renewable Energy Erzeugung erneuerb. Energie	19 kWh/(m ² a)
U-value window U-Wert Fenster	0,93 W/(m ² K)	Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE)	175 kWh/(m ² a)
Heat recovery Wärmerückgewinnung	83 & 68 %	Pressurization test n ₅₀ Drucktest n ₅₀	0,56/ ach
Special features Besonderheiten	PV/ ASHP		

1.2 Brief Description

Frenchay Primary School – South Gloucestershire UK

A new build Passivhaus school to house 420 students and 40 staff – the building had obtained planning permission on a tight site without it intended to be certified, the design optimises the site constraints for education benefits and footprint. The brief was adapted once the school was being prepared for tender to be a certified Passivhaus building. The initial PHPP evaluation indicated while challenging that it was possible. Passivhaus designers for the project Jon James Studio Architecture were appointed at stage 4 of the project to review and support the appointed contractor team (under BAM construction) through the process collaboration very closely with the certifying team at WARM. Key challenges included an unusual form, challenging the traditional form factor principles, curved façade and stepped elements at first floor and external AHU's. Primary facades and windows facing east and west but shaded on the east with historic and established trees – with little south facing glazing opportunities.

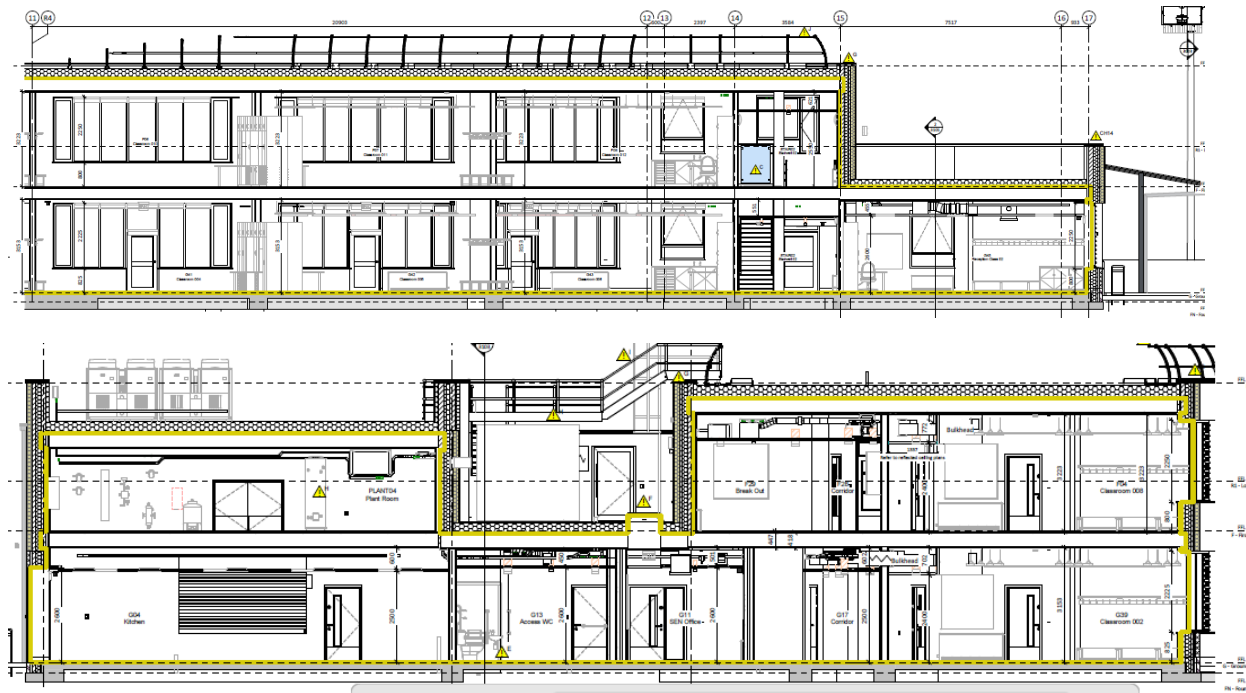
1.3 Responsible project participants/ Verantwortliche Projektbeteiligte

Architect Entwurfsverfasser	South Gloucestershire (Stage 1 – 3) Stride Treglown Stage 4 – 6)
Mechanical & Electrical engineering Haustechnik	Hydrock
Structural engineering Baustatik	Hydrock
PassivHaus Designer & Passive House Planning Package Passivhaus-Projektierung	Jon James Studio Architecture https://jjstudioarchitecture.co.uk/
Construction management Bauleitung	Bam Construction
Certifying body Zertifizierungsstelle	WARM: low energy building practice www.peterwarm.co.uk
Certification ID Zertifizierungs ID	45032-45052_WARM_PH_20241009_SG
Author of project documentation Verfasser der Gebäude-Dokumentation	Jon James (Architect/ Passivhaus designer)
Date Datum	Signature Unterschrift
4th Aptil 2025	

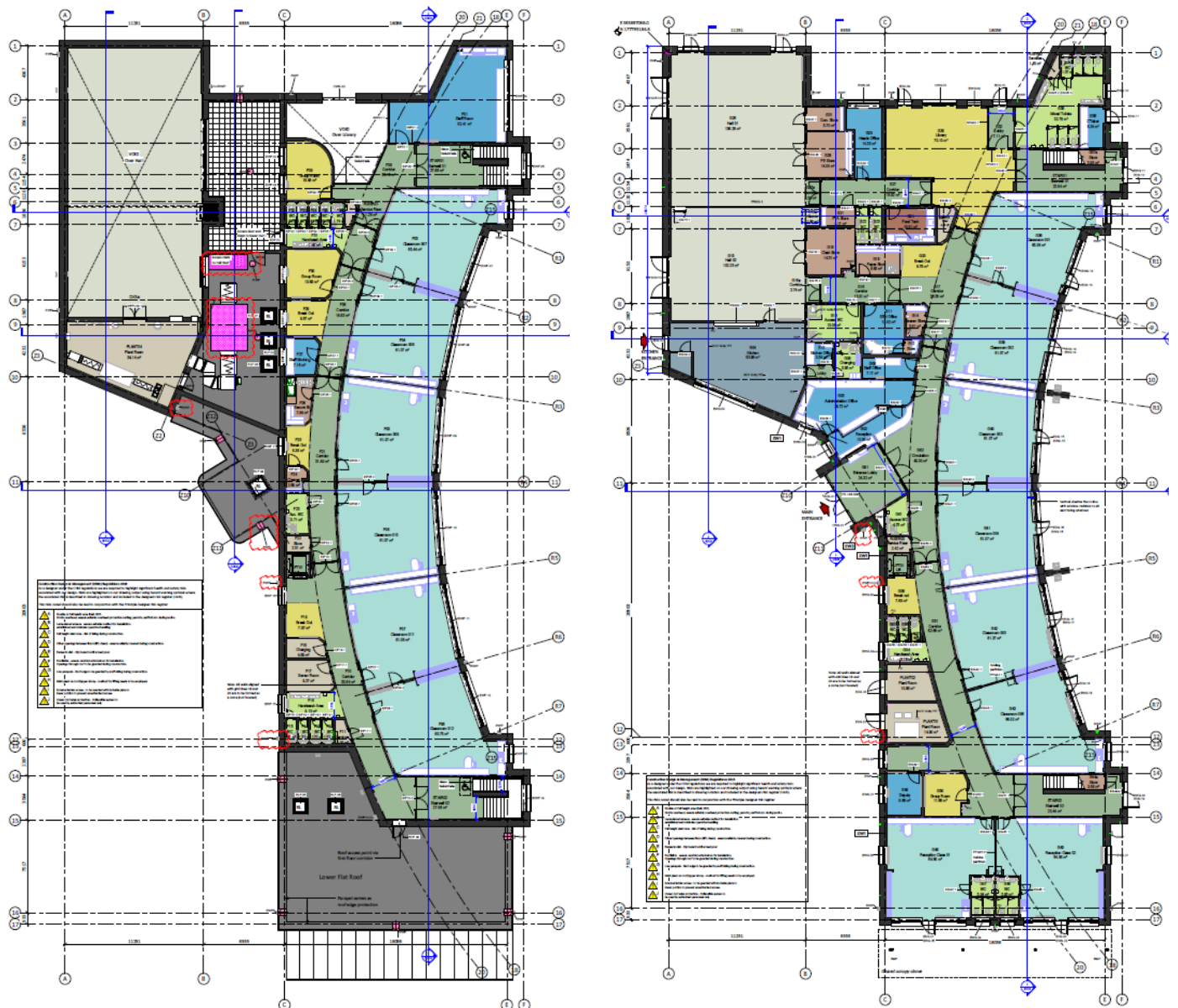
2.0 Photos - © John Seaman Photography



3.0 Typical Sections © Stride Treglown

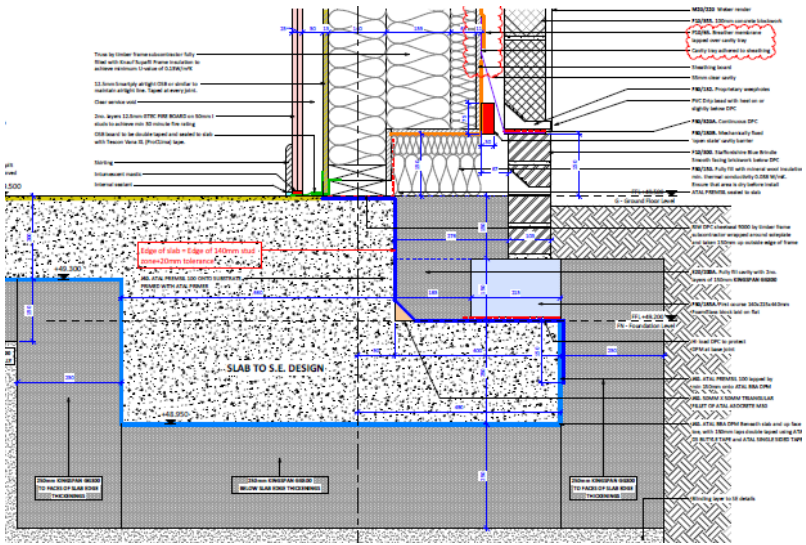


4.0 Floor Plans © Stride Treglown



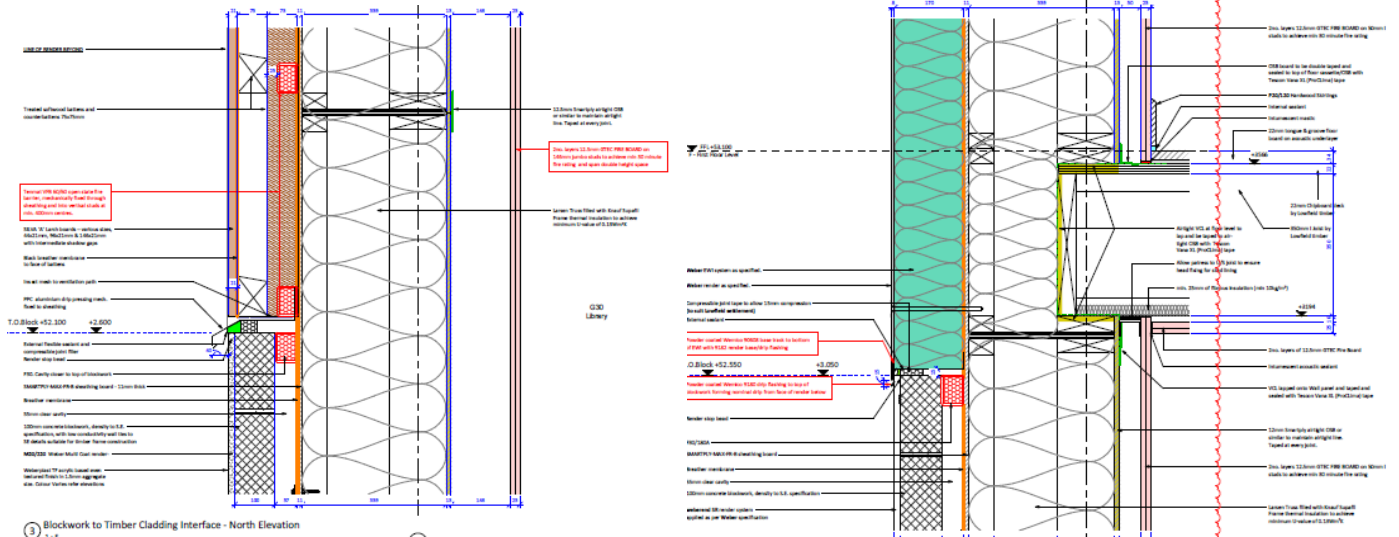
5.0 Construction Details

5.1 Ground Floor Slab © Stride Treglown, BAM & Jon James Studio Architecture



Assembly no.	Building assembly description		Heat transmission resistance [m ² K/W]			Interior insulation?
01ud	Floor construction (Kinspan greenguard)					
Orientation of building element	2-Wall	Adjacent to	interior R _{si}	0.13		
	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]
Concrete	2.100					200
Insulation- Greenguard	0.036					150
Percentage of sec. 1	Percentage of sec. 2		Percentage of sec. 3			Total
100%						35.0 cm
U-value supplement	W/(m ² K)		U-value: 0.228 W/(m ² K)			

5.2 Walls © Stride Treglown, BAM & Jon James Studio Architecture



Assembly no. 02ud **Larsen wall Construction Rainscreen** Interior insulation?

Orientation of building element: **2-Wall**
Adjacent to: **1-Outdoor**

Heat transmission resistance [m²K/W]
interior R_{si}: 0.13
exterior R_{se}: 0.04

Assembly 1	λ [W/(mK)]	Assembly 2 (optional)	λ [W/(mK)]	Assembly 3 (optional)	λ [W/(mK)]	Thickness [mm]
Plasterboard	0.250					13
Service Void						13
Smart ply	0.130					13
Insulation	0.038	Varmcelt/ Knauf innerstud	0.130	Varmcelt/ Knauf innerstud	0.130	140
Insulation	0.038			Varmcelt Webzone	0.130	155
Insulation	0.038	Varmcelt/ Knauf innerstud	0.130	Varmcelt/ Knauf innerstud	0.130	63
Medlite Vent board	0.100					12
Insulation						
Percentage of fac. 1		Percentage of fac. 2		Percentage of fac. 3		Total
76%		20.0%		4.0%		39.5 cm

U-value supplement: W/(m²K) **U-value: 0.127** W/(m²K)

Assembly no. 03ud **Larsen wall Construction (Render Cladding)** Interior insulation?

Orientation of building element: **2-Wall**
Adjacent to: **1-Outdoor**

Heat transmission resistance [m²K/W]
interior R_{si}: 0.13
exterior R_{se}: 0.04

Assembly 1	λ [W/(mK)]	Assembly 2 (optional)	λ [W/(mK)]	Assembly 3 (optional)	λ [W/(mK)]	Thickness [mm]
Plasterboard	0.250					13
Service Void						13
Smart ply	0.130					13
Insulation	0.038	Varmcelt/ Knauf innerstud	0.130	Varmcelt/ Knauf innerstud	0.130	140
Insulation	0.038			Varmcelt Webzone	0.130	155
Insulation	0.038	Varmcelt/ Knauf innerstud	0.130	Varmcelt/ Knauf innerstud	0.130	63
Medlite Vent board	0.100					12
Insulation Dual Density Slab	0.036					170
Percentage of fac. 1		Percentage of fac. 2		Percentage of fac. 3		Total
76%		20.0%		4.0%		56.5 cm

U-value supplement: W/(m²K) **U-value: 0.079** W/(m²K)

6.0 Airtightness test © BAM & Jon James Studio Architecture



3no Air test were under taken by Stroma – one at the completion of the timber frame/ windows – one at project completion and a further test after occupation – the final results are shown here:

Summary - Final Passivhaus test with ventilation in overnight / weekend mode (Off) just off and unsealed.

Volume = 7051.0m³ / Envelope = 4663.9m² (Volume / Envelope area calc email attached)

De-pressurising: 0.5538 ach @ 50Pa / 0.84 m³(h.m²)@50Pa / 3905m³/h @ 50Pa / 0.6404 'n' / 0.9991 r²

Pressurising: 0.5734 ach @ 50Pa / 0.87 m³(h.m²)@50Pa / 4043m³/h @ 50Pa / 0.6698 'n' / 0.9991 r²

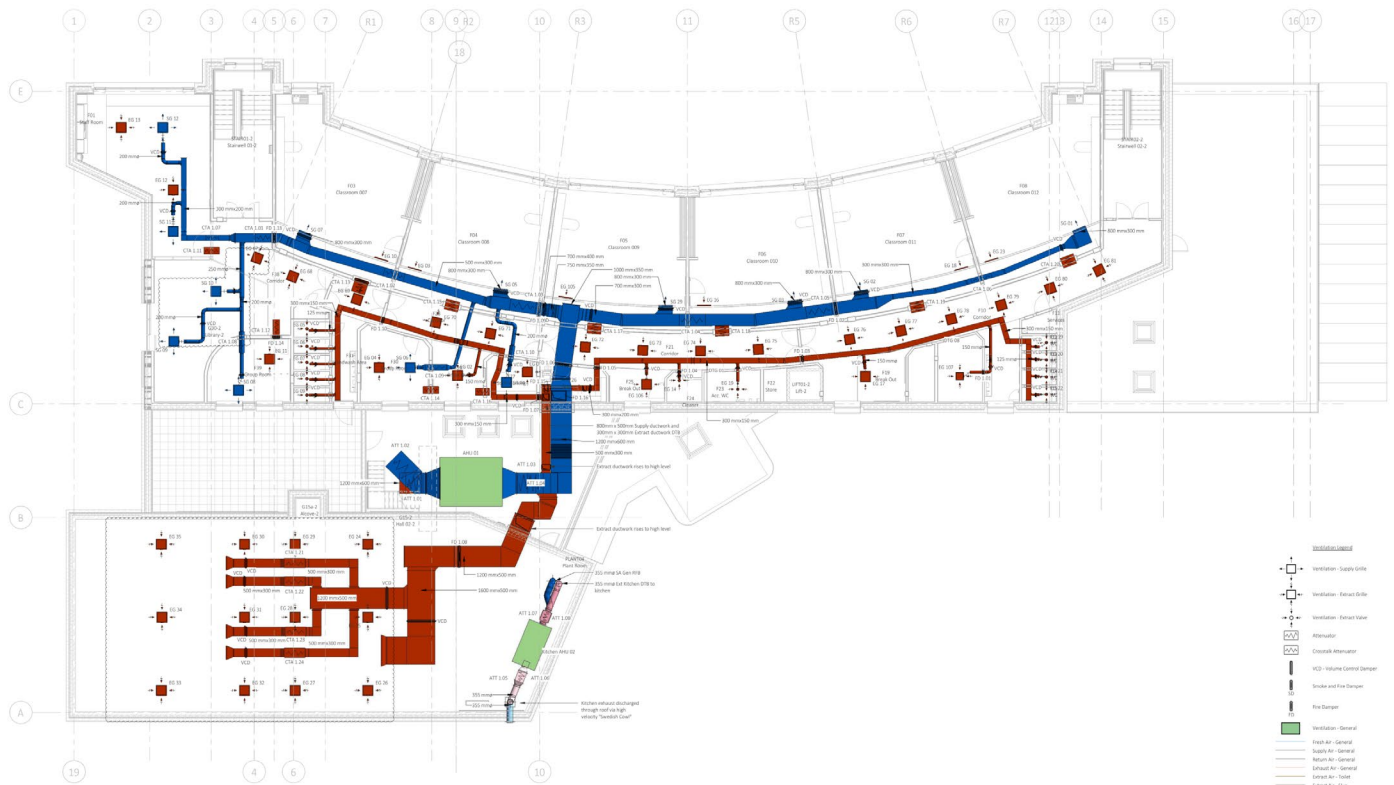
Ave: 0.56 ach @ 50Pa

7.0 Ventilation © BAM, Hydrock, Focus MEP & Jon James Studio Architecture

2no. MVHR (AHU's) are installed one for the school and one for the kitchen, both are Swegon units. The external plant are insulated units.

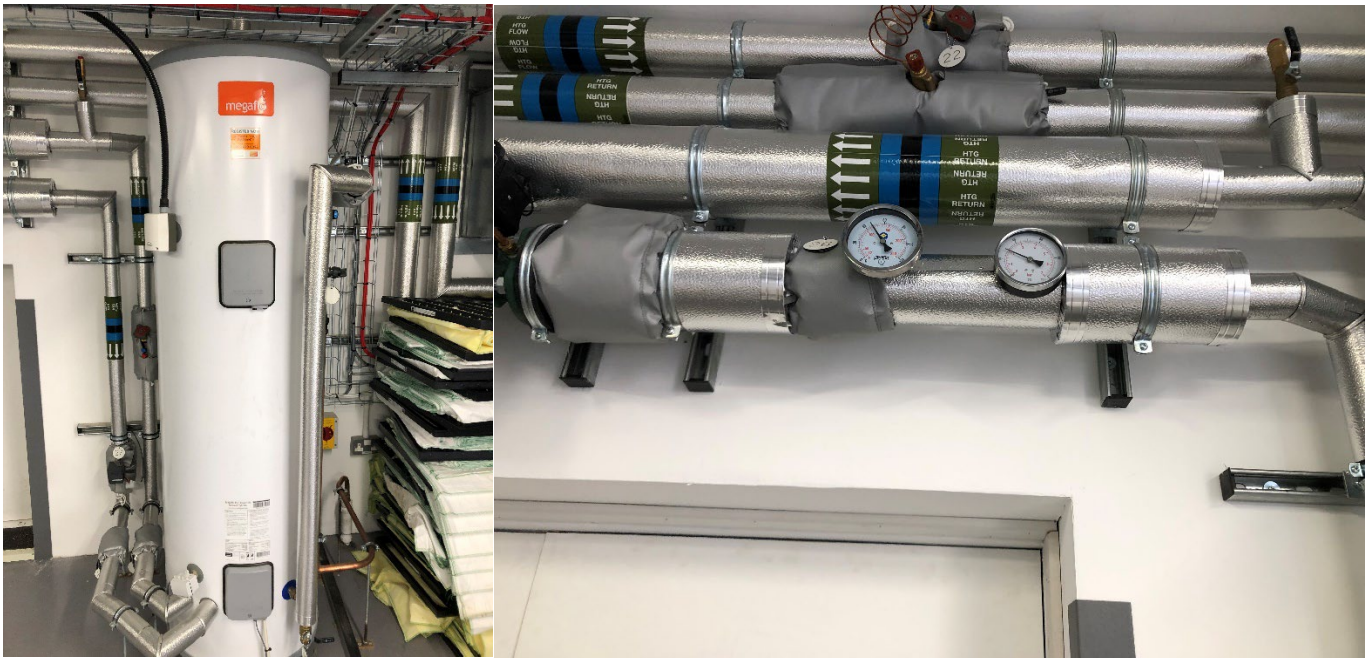


The Focus MEP drawing indicates the supply and exhaust. The high level concept is that the supply to the main classroom spaces moves to the corridor via the door undercuts through the main hall and is extracted at high level.



8.0 Heat supply © BAM, Hydrock, Focus MEP & Jon James Studio Architecture

ASHPs are ducted via insulated ductwork to the plant room/ buffer vessel, then to the radiators in the classroom spaces – All pipework insulated.



9.0 Energy Generation – PV's © BAM, Hydrock, Focus MEP & Jon James Studio Architecture

The roof array of 940sqm of PV panels generates 32057 kWh/a



10.0 PHPP calculations

Passive House Verification



Building: Frenchay Church of England Primary School
Street: Alexander Road, Frenchay
Postcode/City: BS16 1UZ Bristol
Province/Country: South Gloucestershire GB-United Kingdom/ Britain
Building type: 2FE Primary School
Climate data set: ud--01-GB0006b-Lyneham
Climate zone: 4: Warm-temperate **Altitude of location:** 52 m

Home owner / Client: South Gloucestershire District Council
Street: Council Offices, Badminton Rd, Yate
Postcode/City: BS37 5AF Bristol
Province/Country: GB-United Kingdom/ Britain

Mechanical engineer: Hydrock
Street: 5th Floor, Merchants House North
Postcode/City: BS14RW Bristol
Province/Country: GB-United Kingdom/ Britain

Certification: WARM
Street: No.3 Admirals Hard,
Postcode/City: PL4 9DH Plymouth
Province/Country: Devon GB-United Kingdom/ Britain

Year of construction: 2021 Interior temperature winter [°C]: 19.0 Interior temp. summer [°C]: 25.0
 No. of dwelling units: 1 Internal heat gains (IHG) heating case [W/m²]: 3.2 IHG cooling case [W/m²]: 2.8
 No. of occupants: 460.0 Specific capacity [Wh/K per m² TFA]: 72 Mechanical cooling:

Specific building characteristics with reference to the treated floor area

				Criteria	Alternative criteria	Fullfilled? ²
Space heating	Treated floor area m²	2103.0				
	Heating demand kWh/(m²a)	11	≤	15	-	yes
	Heating load W/m²	8	≤	-	10	yes
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	0.6	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	175	≤	-		-
	PER demand kWh/(m²a)	72	≤	60	72	
Primary Energy Renewable (PER)	Generation of renewable energy (in relation to pro-jected kWh/(m²a) building footprint area)	19	≥	-	15	yes

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**
 Signature:

Task: 2-Certifier First name: Sally Surname: Godber
 Certificate ID: 45032-45052_WARM_PH_20241009_SG Issued on: 9th Oct 2024 City: Plymouth

11.0 Construction Costs

£11m

11.1 Construction period

June 2021 – October 2022

