ID 5334

THE BARGE

Passivhaus EnerPHit Project Documentation

ID 5334

THE BARGE

Project characteristics

Year of construction	2017 - 2019	**Space Heating**	28kWh/(m²a)
U Value External Walls	Thermal improvement to existing external solid wall constructions are limited by dew point calculations and thus the primary performance has been achieved at 0.302 to 0.348 W/(m²K) New external wall construction 0.14 W/(m²K)	**Treated Floor Area**	125m²
U Value Flat Roof	New construction 0.119W/(m²K)	**Air Pressure test @ 50 Pa**	0.43ac/hr
U Value Pitched Roof	Existing cottage renovation 0.134w/9m²K)	**Primary Energy Renewable**	119kWh/(m²a)
U Value Windows	0.86W/(m²K)	**Primary Energy Non renewable**	122kWh/(m²a)

Project Description

The Barge: circa 1810 solid wall brick cottage, south facing to a walled garden within the City of Ripon, adjacent to the Canal Basin.

The cottage was a two storey two up two down and had a 1970's extension to the west which included family bathroom, stairwell and mono-ridge sitting room. It was in very poor condition with considerable damp, mould growth, draughts and poor thermal value.

The property has undergone a deep retrofit taking it back to a carcass of external walls and roof rafters, before restoring it to achieve Passivhaus EnerPhit by components with a target Heating demand

Project Participants

Architect; Certified Passivhaus Designer & Self Builder	Claire Jamieson	Phi Architecture
Certifier	Kym Mead	Mead Consulting
Heating and Domestic hot water	Nick Roberts	NCR Heating and Plumbing

Certified Retrofit
Passive House Institute

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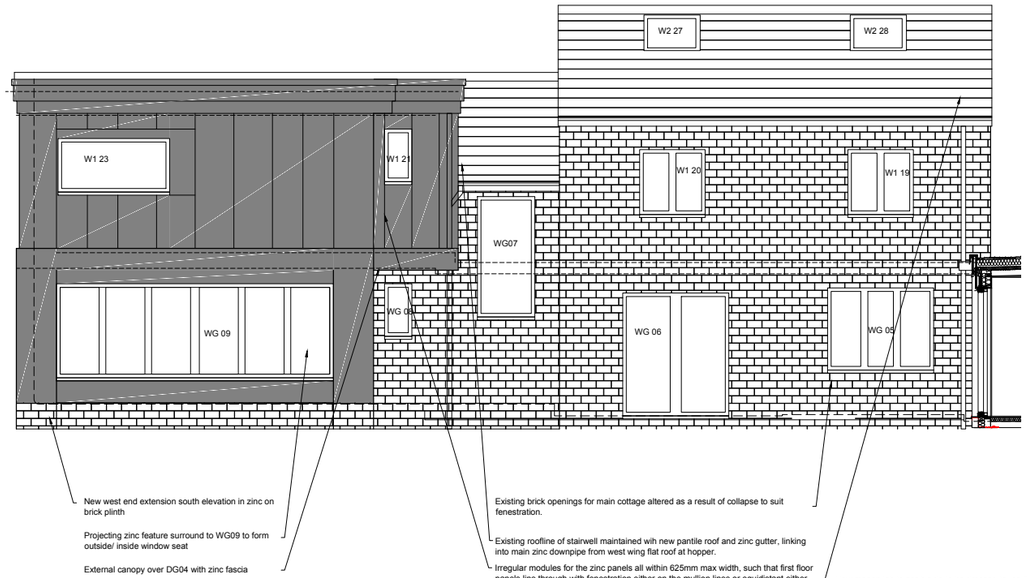
THE BARGE

Elevations



New west end extension south elevation in zinc on brick plinth

Projecting zinc feature surround to WG09 to form outside/ inside window seat

External canopy over DG04 with zinc fascia

Existing brick openings for main cottage altered as a result of collapse to suit fenestration.

Existing roofline of stairwell maintained wih new pantile roof and zinc gutter, linking into main zinc downpipe from west wing flat roof at hopper.

Irregular modules for the zinc panels all within 625mm max width, such that first floor panels line through with fenestration either on the mullion lines or equidistant either side of them.

Exsiting chimneys to main cottage roof removed. Whole roof to be recovered with Tyvek Supro and new pantiles to match garden room roof.

New monopitch to north side to be dressed to the GRP and zinc coping to form a continuos waterproof junction. End gable of northern roof to be finished with plastic coated black timber fascia boards to avoid further maintenance.

Existing west wall to boundary follows line of the Barge sitting room monopitch - to be demolished. New second hand brick outer leaf and blockwork inner leaf to be built up from this existing wall to the new flat roof structure.

W1 24 and W1 25 to have brick header courses to match those of the eastern garden room extension and zinc cills.

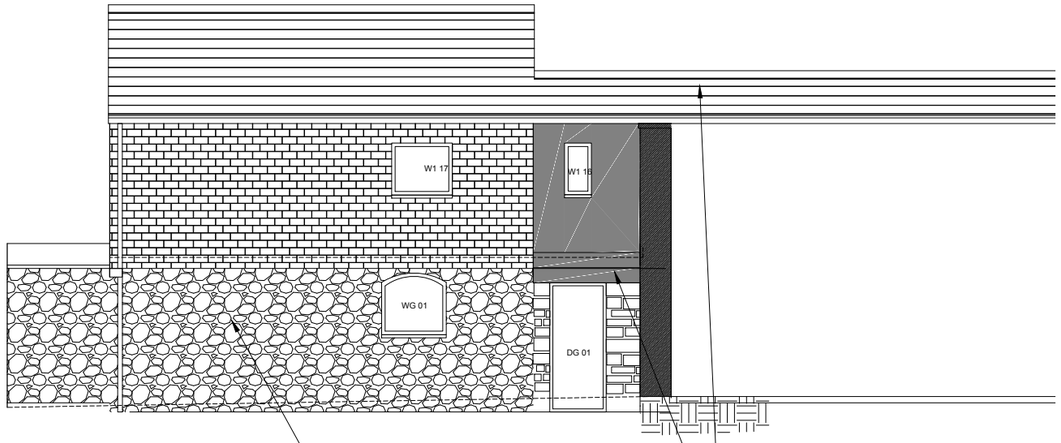
Zinc coping to be dressed over brick wall head to offer continutiy to the closing of the cavity and sealing of the roof.

Existing west gable to cottage

The new zinc southern facade to the western extesion is to "wrap around to the western elevation as indicated.

Garden wall to Foundry House, to remain as existing with new lead flashing to top dressing into raised brick wall for west extension.

South elevation



Small WG 02 and WG 03 "as existng" openings to be closed up and this whole cobbled lower elevation to be tidied up as best as possible with new infill cobbles/ brick to suit.

New extended monopitch roof to north side of west wing extension

Existing entrance recess to be clad in zinc from canopy up to and around W1 16.

Canopy to be extended out to form covered porch to DG 01.

North elevation

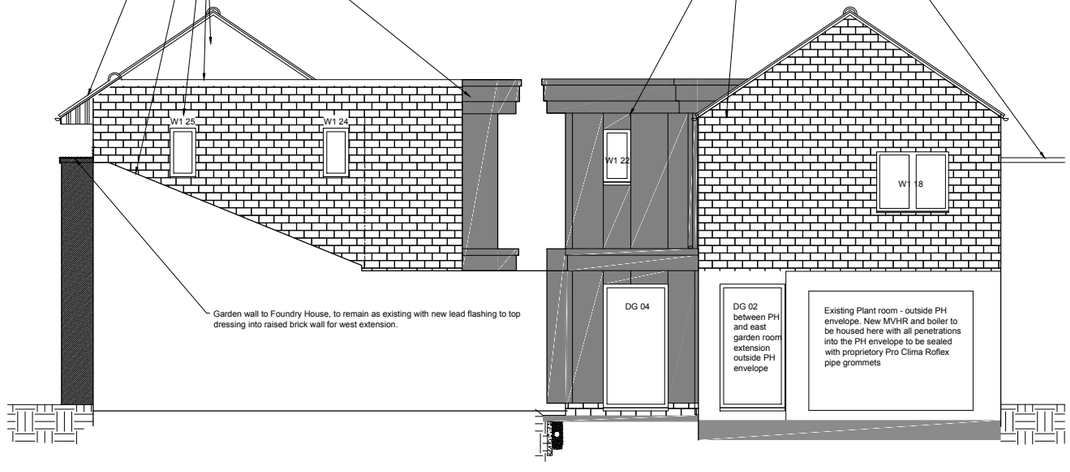
All facades of the original cottage to have the mortar raked out to receive new lime pointing. Lime mortar mx to be 3 parts Lime putty NHL 2 : 4 parts grit sand : 5 parts fine local sand - colour to be agreed.

Existing cottage roof to have chimneys removed and existing concrete tiles replaced with double pantiles to match east garden room roof. New Supro underlay to be laid over existing joists with 10mm drape between rafters. Underlay to be taped back to structure on all edges and at laps to ensure sealed membrane.

New west extension faced in zinc

Existing east gable to cottage

Existing garden wall to Foundry House



West elevation adjoining party wall

East elevation adjoining garden room and party walls

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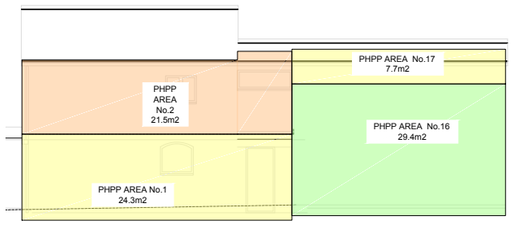
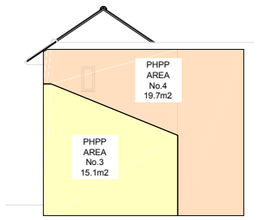
THE BARGE

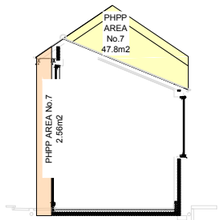
Surface Areas and Assemblies



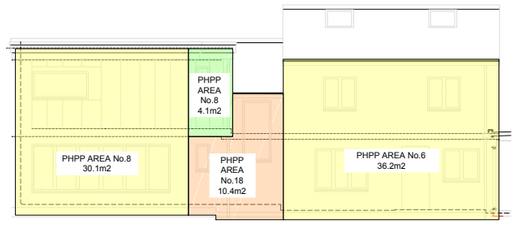
NORTH ELEVATION



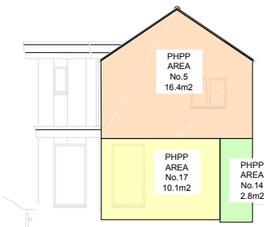
WEST ELEVATION



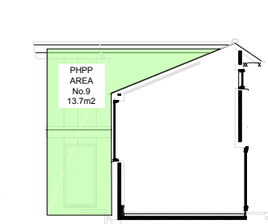
PHPP WALL AREAS OMITTED (since concept design PHPP stage)
No.18 - south wall west wing plinth
No.10 - included in 4 & 3

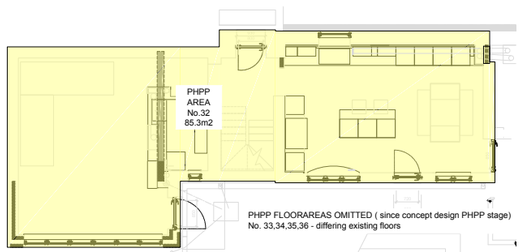


SOUTH ELEVATION



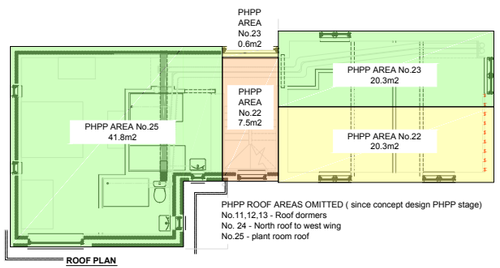
EAST ELEVATION





PHPP FLOORAREAS OMITTED (since concept design PHPP stage)
No. 33,34,35,36 - differing existing floors

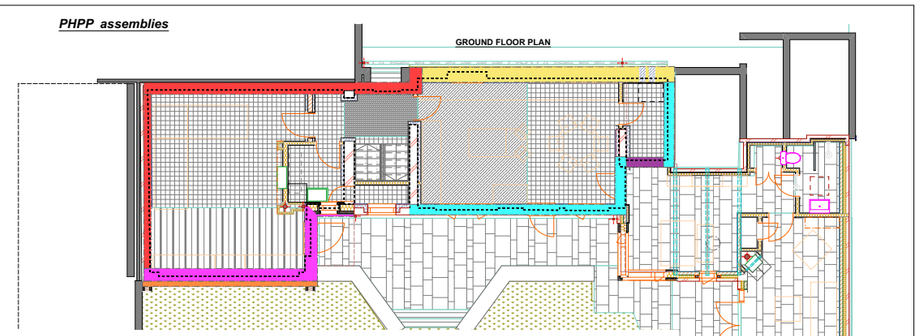
GROUND FLOOR PLAN



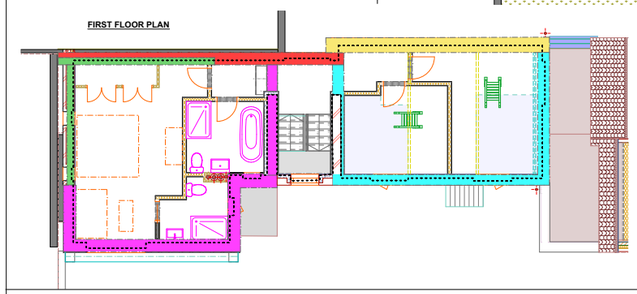
PHPP ROOF AREAS OMITTED (since concept design PHPP stage)
No.11,12,13 - Roof dormers
No. 24 - North roof to west wing
No.25 - plant room roof

ROOF PLAN

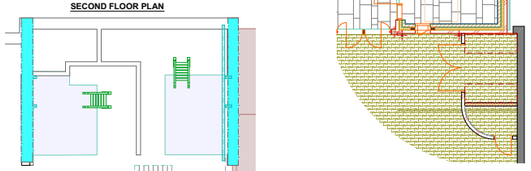
PHPP assemblies



GROUND FLOOR PLAN

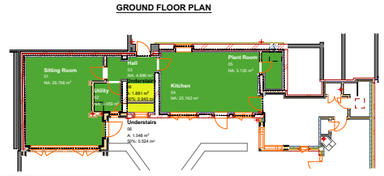


FIRST FLOOR PLAN

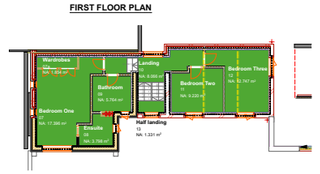


SECOND FLOOR PLAN

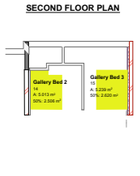
TFA calculations



GROUND FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Main header **TOTAL TFA 130.21M²**

Room Number	Room Name	Zone Category	Area m2	Floor
01	Sitting Room	Treated Floor Area 100%	26.80	00-Ground F...
02	Utility	Treated Floor Area 100%	3.46	00-Ground F...
03	Hall	Treated Floor Area 100%	4.89	00-Ground F...
04	Kitchen	Treated Floor Area 100%	25.16	00-Ground F...
05	Plant Room	Treated Floor Area 100%	3.13	00-Ground F...
06	Understairs	Treated Floor Area 50%	2.93	00-Ground F...
07	Bedroom One	Treated Floor Area 100%	17.40	01-First Floor
07a	Wardrobes	Treated Floor Area 100%	1.85	01-First Floor
08	Ensuite	Treated Floor Area 100%	3.80	01-First Floor
09	Bathroom	Treated Floor Area 100%	5.76	01-First Floor
10	Landing	Treated Floor Area 100%	8.07	01-First Floor
11	Bedroom Two	Treated Floor Area 100%	9.22	01-First Floor
12	Bedroom Three	Treated Floor Area 100%	12.75	01-First Floor
13	Half landing	Treated Floor Area 100%	1.33	01-First Floor
14	Gallery Bed 2	Treated Floor Area 50%	5.01	Second Floor
15	Gallery Bed 3	Treated Floor Area 50%	5.24	Second Floor

phi

Purpose of Issue: PHPP	Status	Drawn By:	Date:	Scales @ A1: 1:50, 1:100, 1:1	Project No.: 15/031	Originator: Phi Architecture, claire.jamieson@phi-architecture.com	Project: PHPP Barge Close	Client: Ann Thomas No. 1 Trust	Layout Title: PHPP Assemblies
		Checked By:	Date:						
		Approved By:	Date:						

Rev B — Dormers omitted. TFAs updated for Evolution; assembly added — 18.04.16
Rev A — Issued for comment — 30.03.16

Drawing Number: 15/031- A.01.3.5.1 — Rev: B

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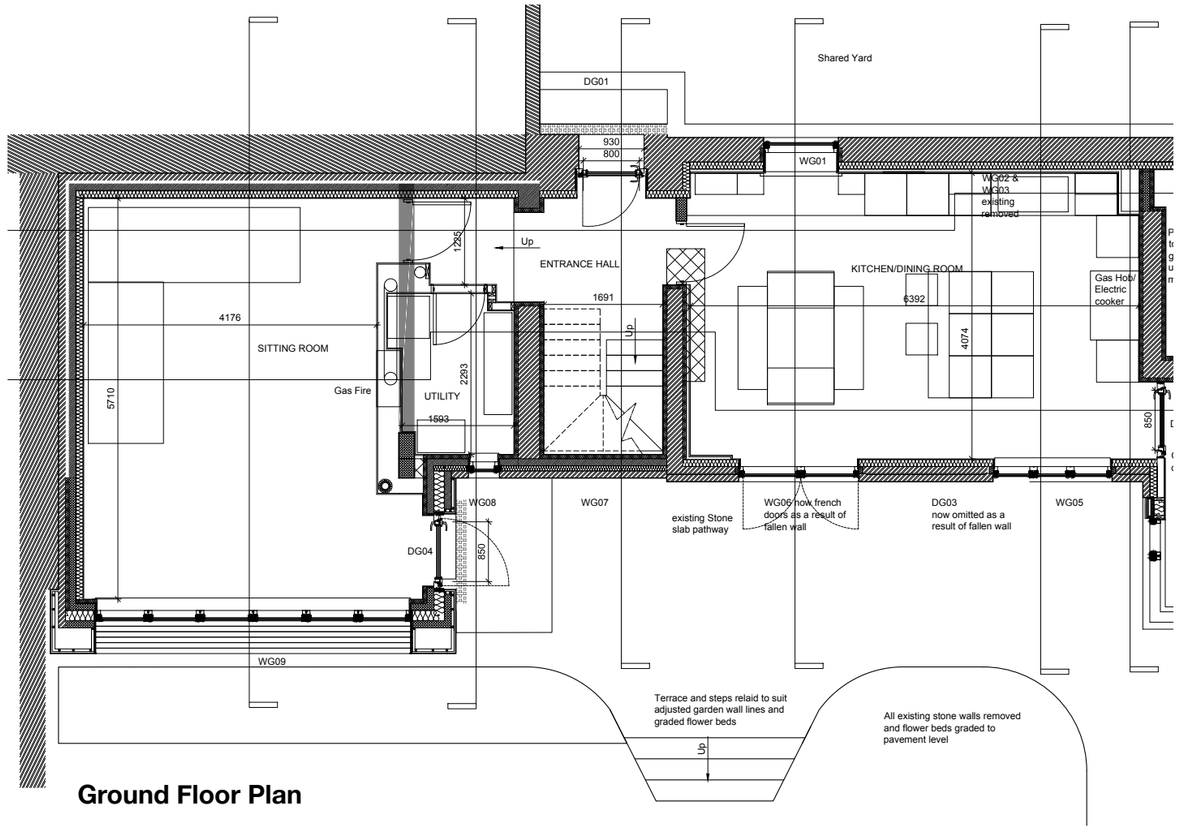
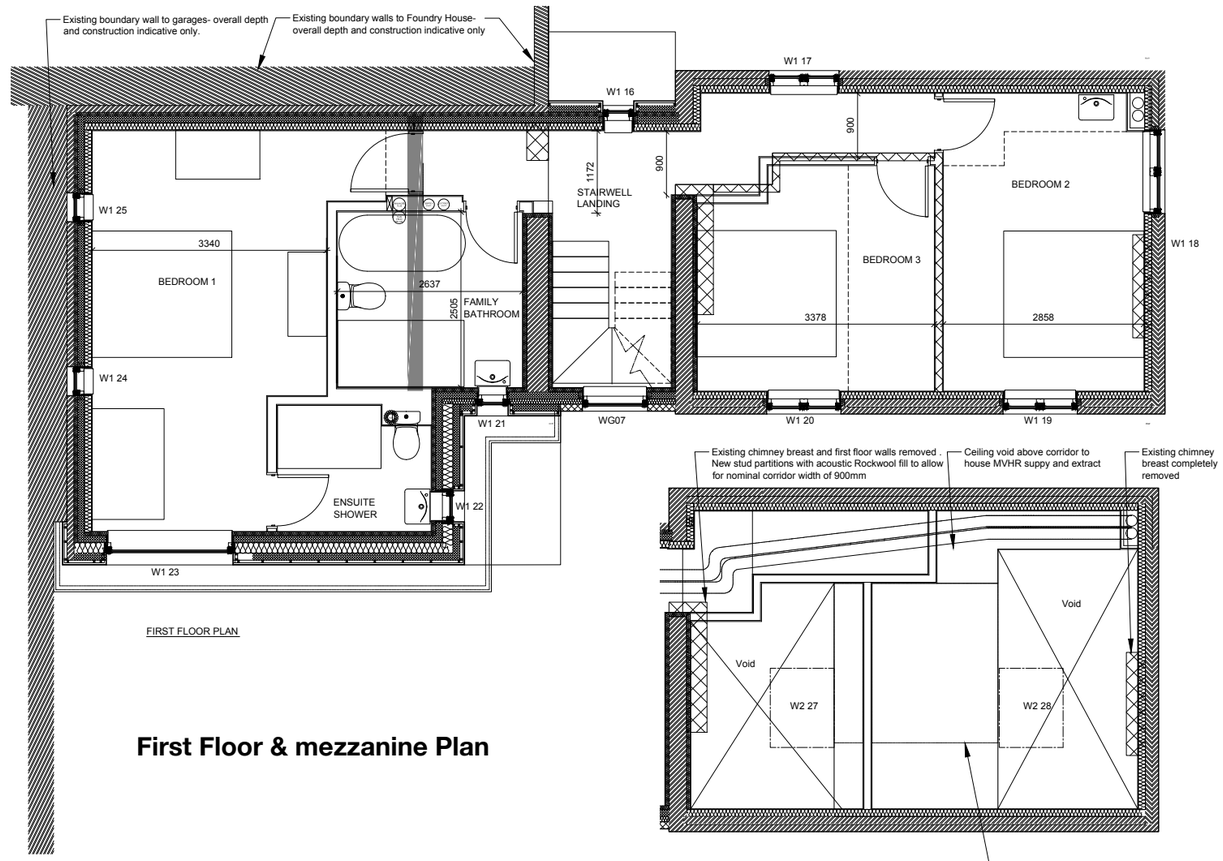
Plans



Ground Floor Plan

New West Wing | **Existing cottage**



First Floor & mezzanine Plan

EnerPHit
Certified Retrofit
Passive House Institute

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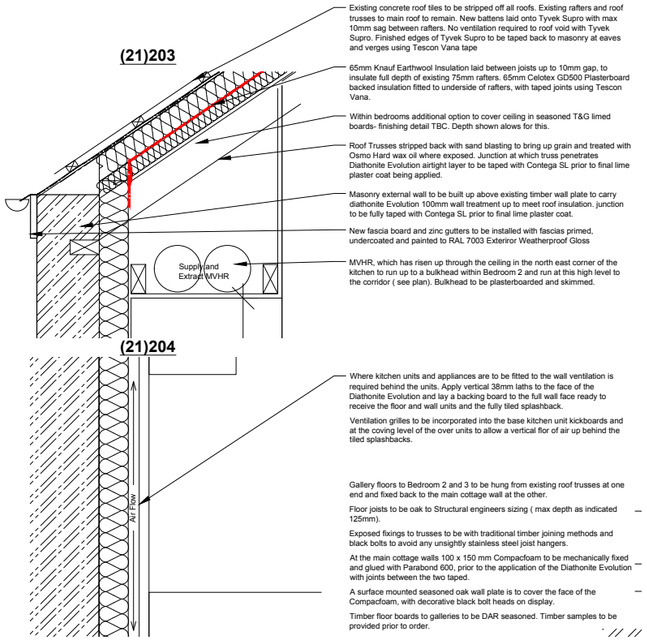
THE BARGE

Walls



Exterior wall construction - water vapour permeable approach

<u>Original cottage</u>

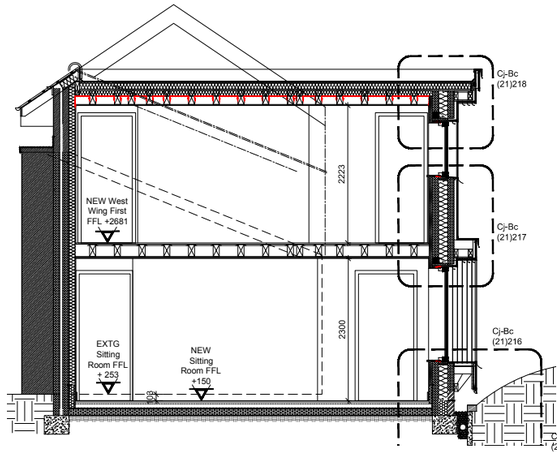
Solid walls stripped back to bare brick and cobble, with all layers of plasterboard, plaster, paint and wall paper removed.
Chimney breasts removed and complete internal face given a lime levelling coat
Airtightness primarily achieved through a lime slurry wash.
Internal insulation with Pavadentro
Lime plaster finish and Beeck mineral paint emulsion

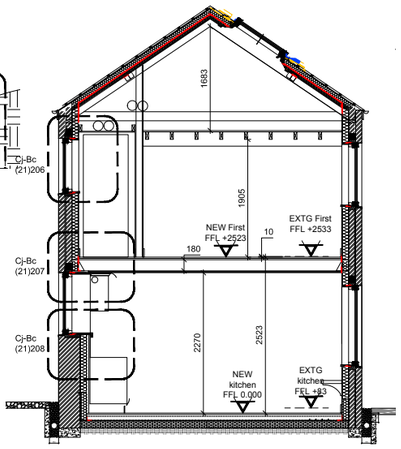
External mortar joints ground out and repointed with lime mortar to ensure water vapour permeable construction throughout.

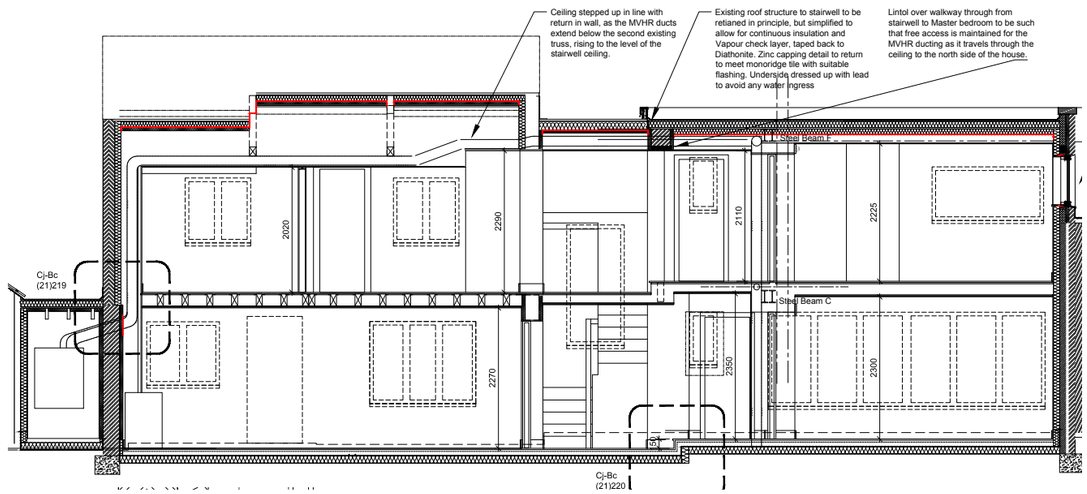
<u>New west wing</u>

Low lambda concrete block and cavity construction with full fill insulation
External zinc ventilated rain screen
Internal lime plaster finish and Beeck mineral paint emulsion

Perimeter ground external insulation with Foamit for thermal and moisture control







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Floors

Ground and first floors

Ground floors

Foamit compacted as thermal hardcore with internal perimeter Styrofoam insulation

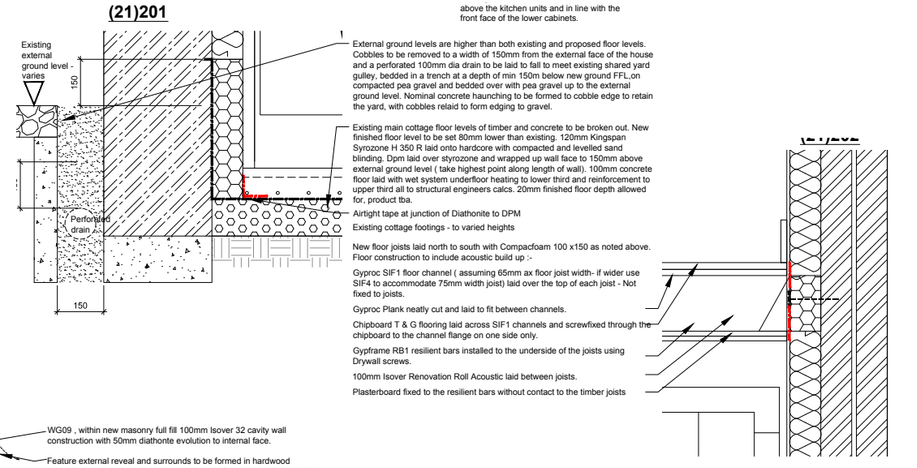
DPM laid over, taped at seams, to receive 100mm poured concrete.

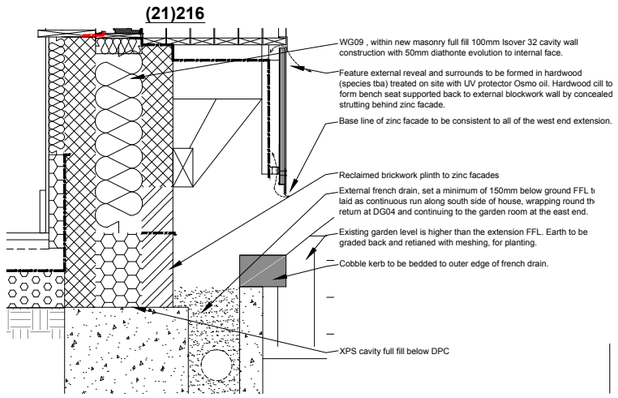
Internal studwork thermally broken from slab with fixing through Compacfoam spacers

Insulation laid over concrete ready to receive underfloor heating and screed

First floors

Hung as a raft, thermally broken from the existing solid wall constructions by Compacfoam spacers set through airtight lime slurry with Orcon airtightness sealant





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Windows

Windows and doors

Ideal Combi Futura+

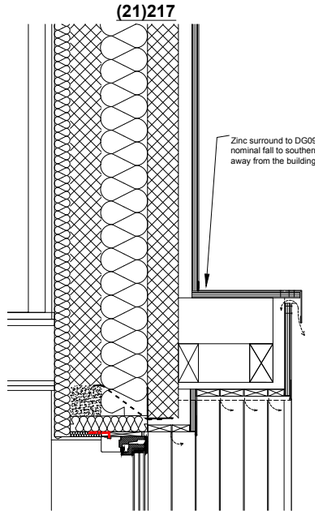
Windows set back 100mm from external facades and fixed with brakcets back to ply reveals.
Internal thermal envelope completed with Pavadentro and Spacetherm blanket

Siga airtight tapes close airtight layer to lime slurry.
Compriband infill to tolerance gaps on external faces

g values vary according to orientation 0.51 to 0.53
Ug value ranges from 0.52 - 0.57W(m²K)
Class 4 air pemeability

In addition :-

(21)217



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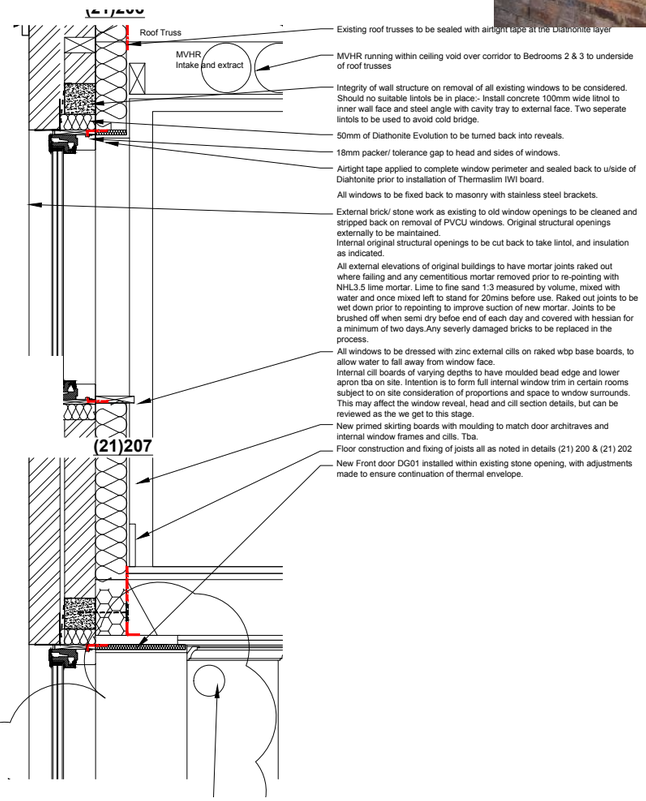

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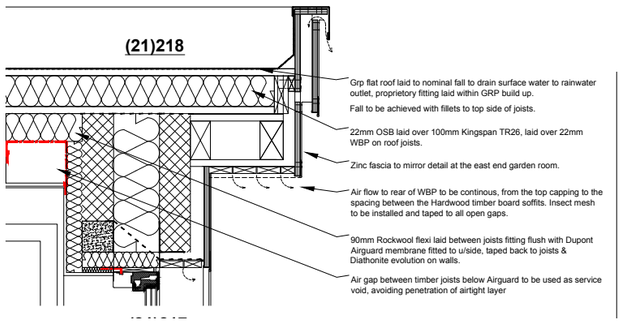
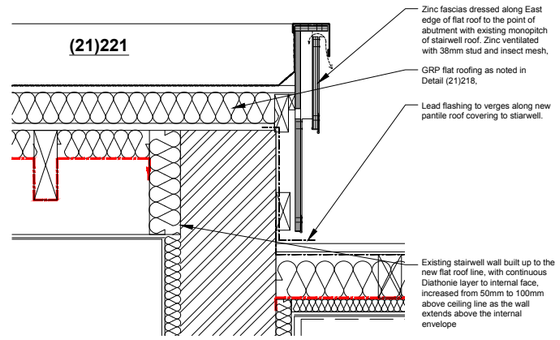
Roof





Roof construction

<u>Original cottage</u>

Original rafters retained and made true
Warm roof construction created using insulation overlay
Roofing membrane taped at all seams and back to gables and eaves
Additional insulation laid as infill between existing rafters, prior to fitting of internal airtight membrane

<u>New west wing</u>

New flat roof formed as a warm roof with GRP top coat to provide surface for south facing PV array

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THE BARGE

Passivhaus EnerPHit Project Documentation - Services

Services

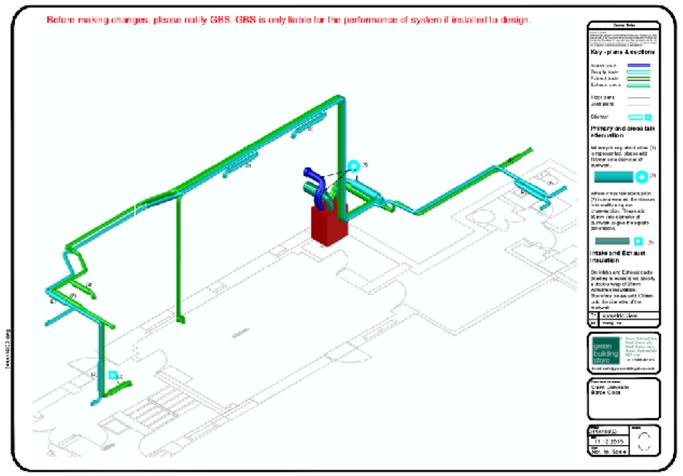
Heating nd DHW

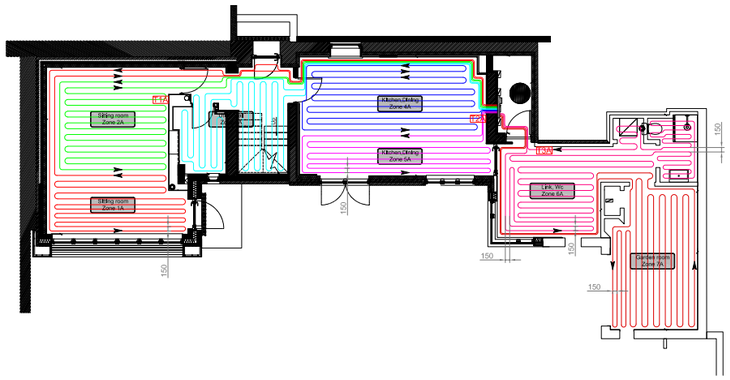
Ground floor under wet system underfloor heating
First floor nominal radiator sizes and towel radiators

Oso hot water cylinder
All supported by new Ideal gas boiler

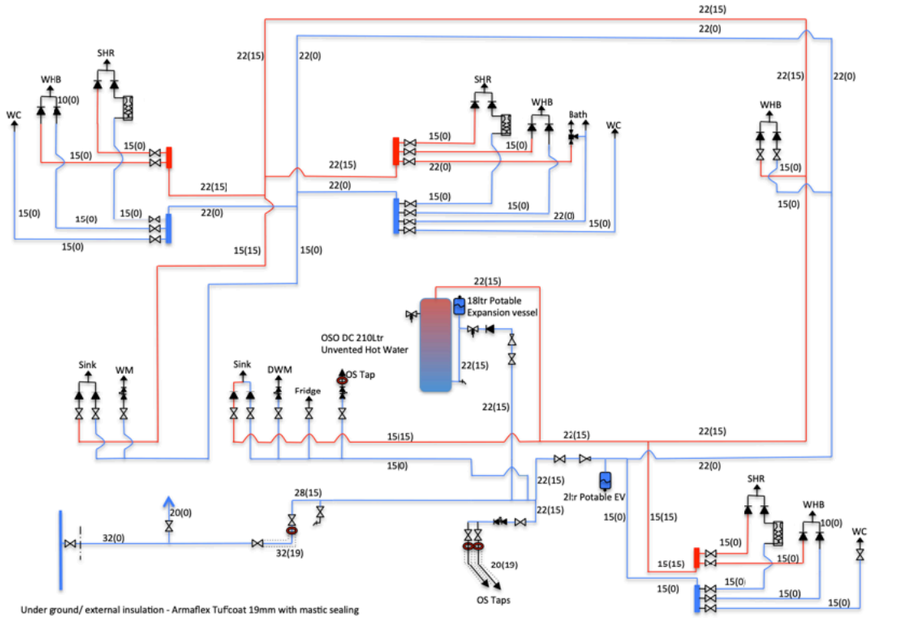
MVHR

Paul Novus 300
91.2% hHR,eff
0.24 specific efficiency





Hot and Cold Water Services



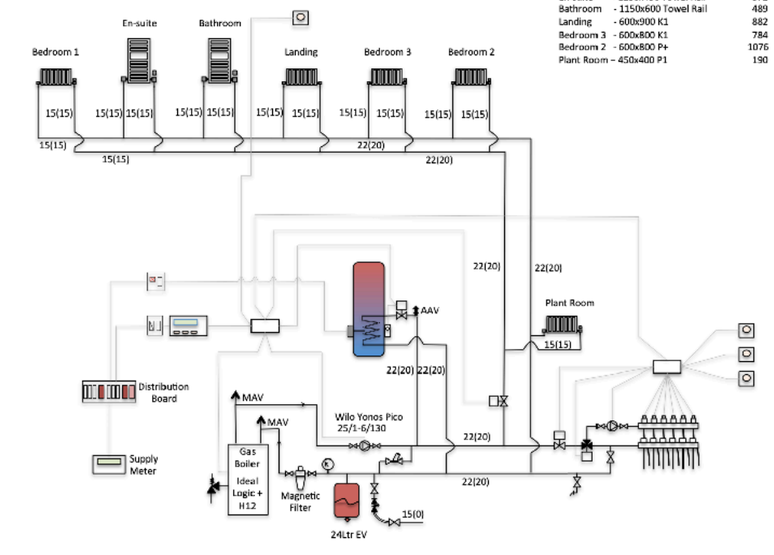
Under ground/ external insulation - Armaflex Tufcoat 19mm with mastic sealing

Internal insulation – Kingspan Kooltherm 15mm Silver foil phenolic with foil tape sealing

Heating Services

Radiator sizes (height x width x style) and heat output (Watts)

Bedroom 1	- 600x900 K1	882
En-suite	- 1150x450 Towel Rail	372
Bathroom	- 1150x600 Towel Rail	489
Landing	- 600x900 K1	882
Bedroom 3	- 600x800 K1	784
Bedroom 2	- 600x800 P+	1076
Plant Room	– 450x400 P1	190



Internal insulation – Kingspan Kooltherm 15mm and 20mm Silver foil phenolic with foil tape sealing

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THE BARGE

Air tightness & Certification

Air Leakage Certificate

In accordance with BS EN 13829, ATTMA TSL1 (2016) & TSL4 (2018)

Building Tested:		**The Barge** **5 Canal Road, Ripon HG4 1QN**
Test Date:		**18th December 2018**
Test Engineer:		**Paul Jennings, Aldas**
Certificate No:		**P3731-C01**

This is to certify that the above-named dwelling has been tested for air leakage in accordance with the BS EN 13829:2001 methodology and the requirements of ATTMA as specified in TSL1 (2016) & TSL4 (2018). The additional requirements of the Passivhaus Institute when Passivhaus Certification is required were also met. The average Leakage Characteristics of the dwelling were recorded as follows:

Airflow @ 50 Pa:		**123.1 m^3/hr**
Air Permeability @ 50 Pa:		**0.36 m^3/ ($hr.m^2$)**
Air Change Rate @ 50 Pa:		**0.43 AC/hr**
Data consistency, r^2 (requirement, $r^2 > 0.98$):		**0.995**
Slope, n (requirement, 0.5 < n < 1.0):		**0.78**
Intercept, C_{env}:		**5.85 m^3/ ($hr.Pa^n$)**
Test Parameters		
Envelope, A_E:		**346 m^2**
Volume, V:		**287.8 m^3**
Env. Calc. prepared by:		**Paul Jennings, Aldas & Claire Jamieson, PHI Architecture**

Initial Offset Pressure	**-1.40 Pa**	**Final Offset Pressure:**	**-0.07 Pa**
Initial Inside Temperature:	**13.8°C**	**Final Inside Temperature:**	**13.6°C**
Average Outside Temperature:	**9.8°C**	**Barometric Pressure:**	**102.5 kPa**

This certificate should be read in conjunction with the full airtightness test report P3731-02 and associated test method statement.

Signed: Paul Jennings **Name:** Paul Jennings **Date Issued: 18th December 2018**

Position: Air Leakage Specialist

Deviations from TSL1 & TSL4 methodology: None

Aldas, 53A Parade, Leamington Spa CV32 4BA
Telephone: +44 (0) 790 894 9869 | Email: enquiries@Aldas.co.uk | www.Aldas.co.uk

Certificate

Certified retrofit
'EnerPHit Classic'
(Climate zone: Cool-temperate)

Mead: Energy & Architectural Design Ltd.

Authorised by:

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany

The Barge
5 Canal Road, HG4 1QN Ripon, United Kingdom/ Britain

EnerPHit Certified Retrofit Passive House Institute
| classic | plus | premium |

Client	Claire Jamieson 5 Canal Road HG4 1QN Ripon, United Kingdom/ Britain
Architect	Phi Architecture 5 Canal Road HG4 1QN Ripon, United Kingdom/ Britain
Building Services	NCR Plumbing & Heating 3 The Green HG4 3NJ Galphay, United Kingdom/ Britain
Energy Consultant	Phi Architecture 5 Canal Road HG4 1QN Ripon, United Kingdom/ Britain

Buildings retrofitted to the EnerPHit Standard offer excellent thermal comfort and very good air quality all year round. Due to their high energy efficiency, energy costs as well as greenhouse gas emissions are extremely low.

The design of the above-mentioned building meets the criteria defined by the Passive House Institute for modernization to the 'EnerPHit Classic' standard:

Building quality			**This building**		**Criteria**	**Alternative criteria**
Heating	Heating demand	[kWh/(m²a)]	28	≤	-	-
Cooling	Frequency of overheating (> 25 °C)	[%]	3	≤	10	
Airtightness	Pressurization test result (n_{50})	[1/h]	0.4	≤	1.0	
Non-renewable primary energy (PE)	PE demand	[kWh/(m²a)]	122	≤	0	
Component quality						
	Building envelope to ambient air (U-value)	[W/(m²K)]	0.13	≤	0.15	
	Building envelope to ground (U-value)	[W/(m²K)]	0.14	≤	0.25	
	Wall with interior insulation to ambient air (U-value)	[W/(m²K)]	0.27	≤	0.35	
	Windows/Exterior doors (Uw,installed)	[W/(m²K)]	0.83	≤	0.86	
	Windows (Uw,installed)	[W/(m²K)]	0.99	≤	1.01	
	Glazing (g-value)	[-]	0.52	≥	0.00	
	Glazing/shading (max. solar load)	[kWh/(m²a)]		≤	-	
	Ventilation (effect. heat recovery efficieny)	[%]	91	≥	75	

The associated certification booklet contains more characteristic values for this building.

##

Certifier: Kym Mead, Mead Ltd

ID 5334

THE BARGE

Verification data & additional information

Specific building characteristics with reference to the treated floor area

					Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area	m²	124.8				
Space heating	Heating demand	kWh/(m²a)	28	≤	-	-	-
	Heating load	W/m²	16	≤	-	-	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	-	≤	-	-	-
	Cooling load	W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C)	%	3	≤	10		yes
	Frequency excessively high humidity (> 12 g/kg)	%	0	≤	20		yes
Airtightness	Pressurization test result n_{50}	1/h	0.4	≤	1.0		yes
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)	122	≤	135.739464		yes
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	119	≤	-	-	-
	Generation of renewable energy	kWh/(m²a)	28	≥	-	-	

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Additional Information

Special features, factors

Integration of 18th Century cottage solid wall renovation with new build Pigmento green zinc extension within considerable party wall constraints accommodating 8 different external wall types and two different roof types

Water vapour permeable renovation to restore original building fabric

Walled garden with almost entirely south facing aspect enabling excellent solar gains.
4KW array installed on southerly orientation flat roof

Construction costs

Cost per square metre < £2,000
Overall witheld

Energy consumption

Currently monitored by Carlos Jimenenz Bescos, Nottingham University

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