Springfield

RIBA Chartered Practice

Energy Statement

July 2023

PROJECT ARCHITECT OF THE YEAR
RIBA SOUTH WEST
AWARD
2021

SMALL PROJECT OF THE YEAR
RIBA SOUTH WEST
AWARD
2021

WINNER
RIBA SOUTH WEST
AWARD
2021

barefoot architects

Project Information

PROJECT ADDRESS:
Springfield
The Street
Regil
BS40 8BD

CLIENT:
Martin Brice & Jenna Brice

JOB REFERENCE:
2217

DOCUMENT TITLE:
ENERGY Statement

REVISION STATUS:
Issue 1 Date: July 2023

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Site Location

Contents

1. Executive Summary

- This Energy Statement has been prepared in support of a detailed planning application for a replacement dwelling at Springhill in Regil to demonstrate how the development has been designed to reduce energy use, and takes into consideration the following key areas:
- Siting and Location
- Shelter planting
- Internal layout of rooms
- Insulation
- Natural ventilation and lighting
- Material usage (using thermally efficient materials)
- Construction techniques
- On-Site Renewable Energy Systems
- Predicted Energy Demand

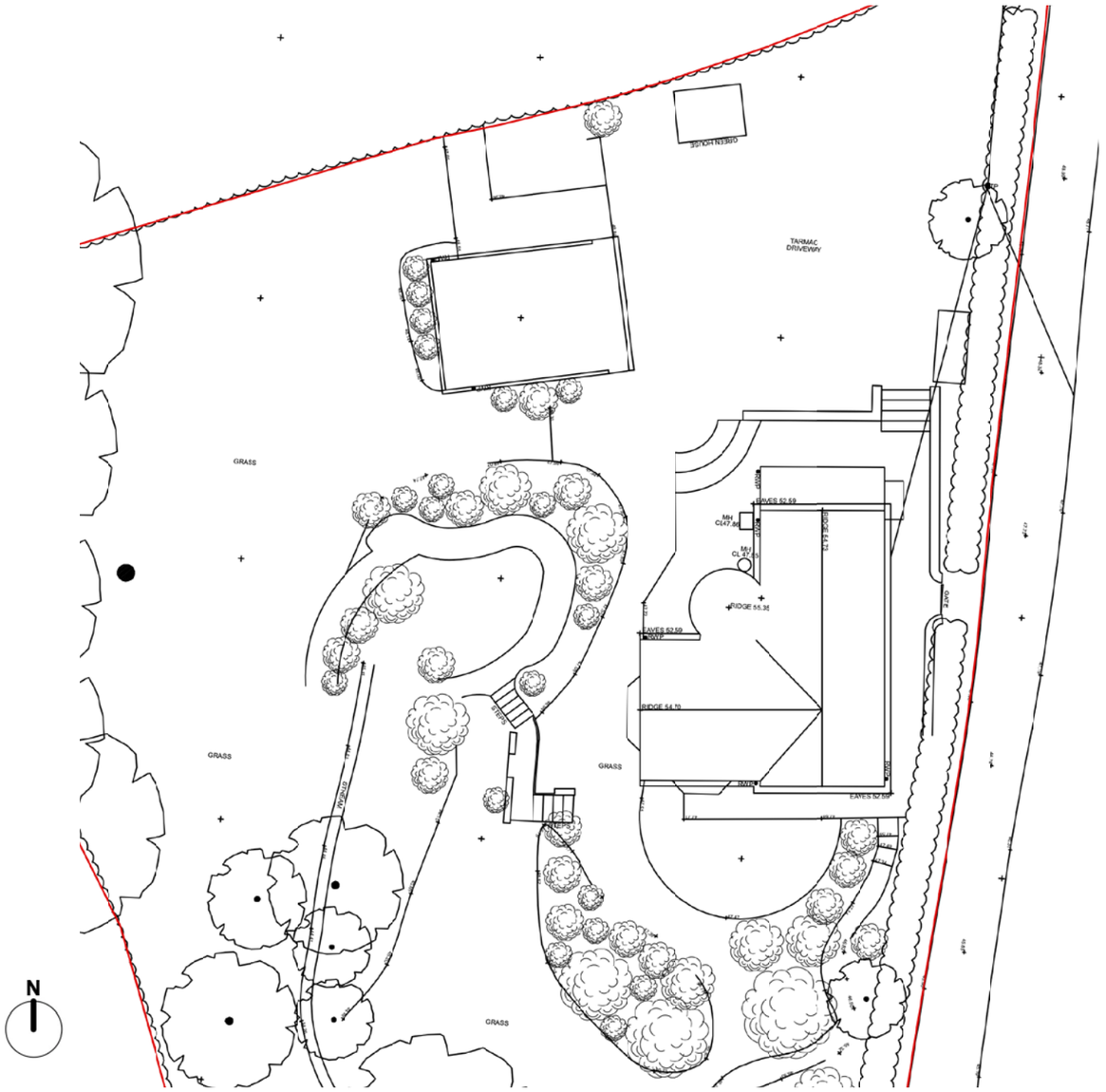
2. Site Analysis, Shelter, Orientation, Planting

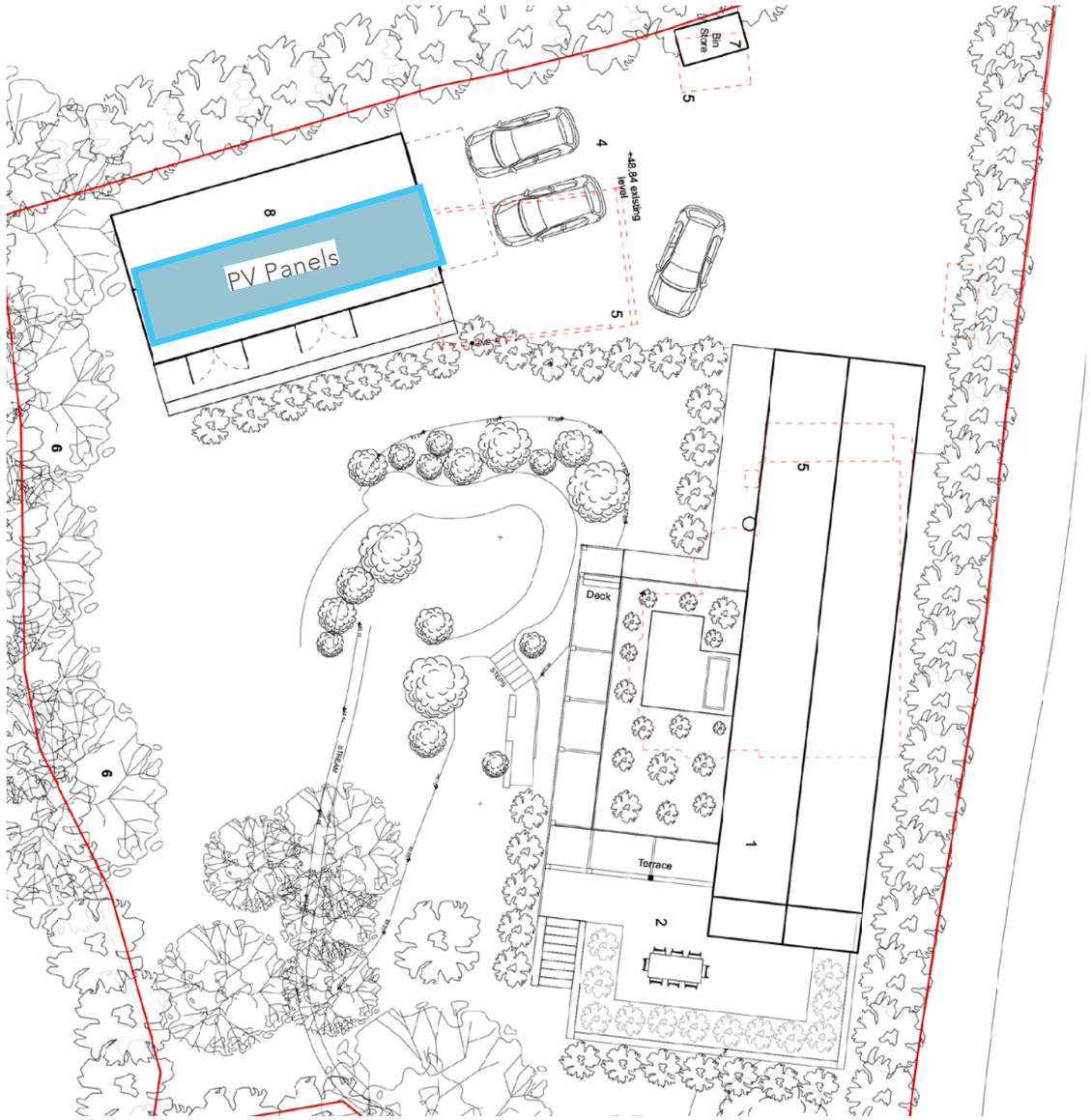
- Concealed from road with hedges
- House set back from the entrance
- Good solar orientation
- Mature garden surrounded by high hedges and trees for shelter from wind and views into the site
- Edge of settlement
- Context is more agricultural
- Beginning of more farm buildings than domestic

Existing site/building footprint analysis

3. Siting and Location

The proposal is for a replacement dwelling. It is sited on much the same footprint as the original house, and takes the form of a traditional Somerset Long house. This position is sheltered from the road by mature hedgerows, has excellent southerly orientation for solar gain and views. Overheating will be controlled with deep overhanging canopies and shading structures to the south and west elevations. The proposed garage workshop has a south facing roof for optimised PV panels. A large overhang to the northerly end of the house provides covered external space adjacent to the utility boot room.





4. Internal Layout - Proposed House

- The proposed house is a four bedroom family home with open plan ground floor kitchen, dining area and sitting room. All main spaces are located facing south and west for both views across the valley but importantly the solar orientation suitable for Passivhaus design.
- The house has additional ancillary accommodation located in the spaces with reduced passive solar gain / natural light with utility, bathroom, office, plant etc. located facing in the lower north and east parts of the house.
- At first floor the master bedroom captures the south sun and other bedrooms designed to capture the east morning light.
- Projecting solar shading to the master bedroom is proposed to reduce overheating.
- The bedrooms are designed to meet Space Standards for double bedrooms.
- The existing garage will be replaced with a new garage and workshop. The client is a well established local builder and will utilise the workshop for tool storage.
- As discussed above the solar orientation has remained the key focus for the design. This has shaped the fundamental principles of the layout of the house.
- The covered area adjacent to the utility / plant room will act as a useful location for access into the house on wet days to leave muddy boots and hang wet coats to dry.
- The space will also assist with level ramped access into the building from the driveway level into the utility space (see the site plan).

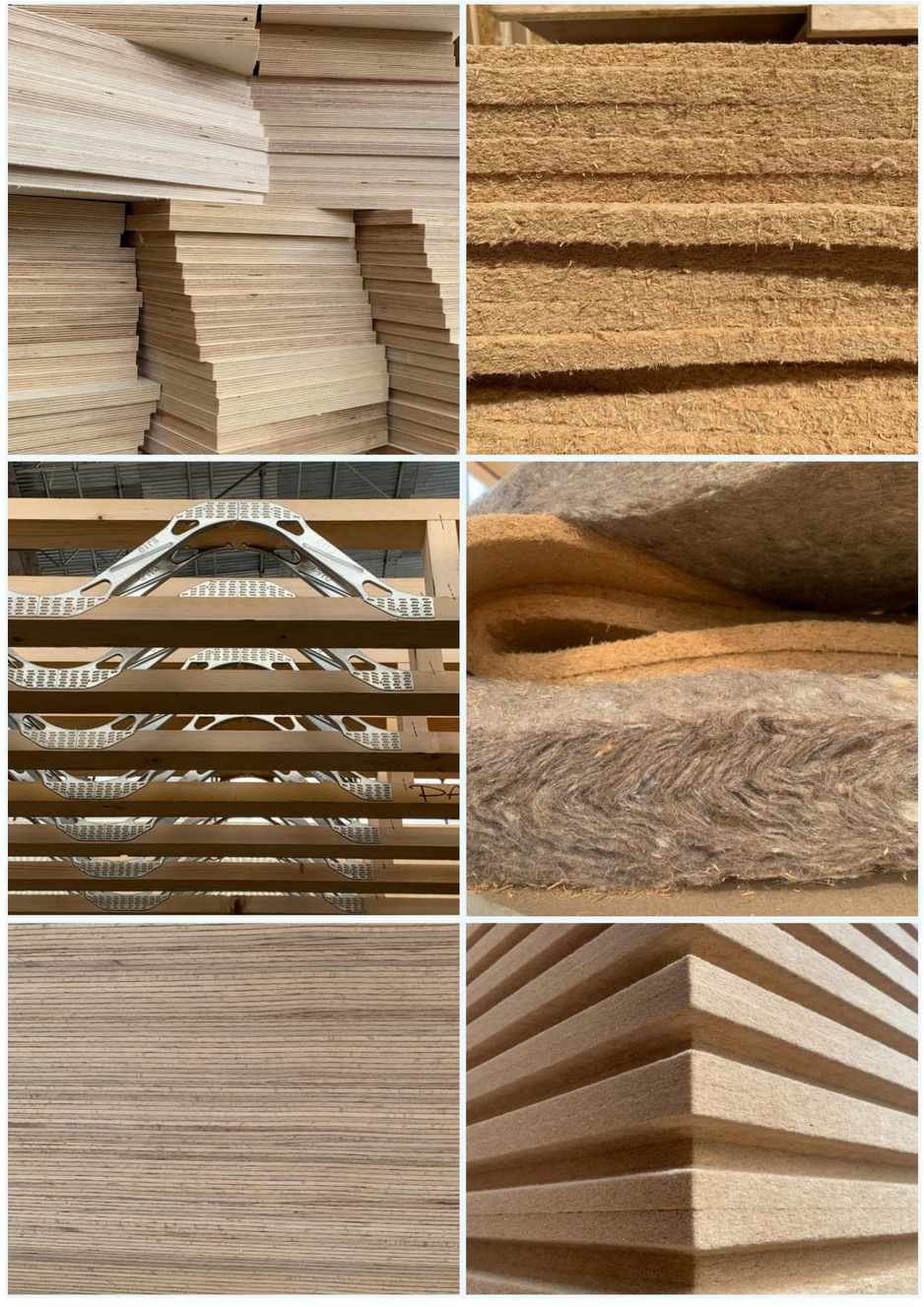
5. Sustainable Materials

The most sustainable strategy is to minimise the amount of steel and concrete necessary and to specify natural, renewable materials, such as timber, and to insulate with wood fibre, recycled newspaper or other natural materials.

Using materials that are lower in the Embodied Carbon Pyramid below will help to reduce the environmental impact of the project. Though it is proposed to use Zinc as a roof and wall cladding finish, it is a relatively thin, low volume material choice, which is both recycled, and recyclable.

The new house is proposed to be built as a highly insulated timber frame. It is proposed that the house will be built using an innovative system called PH15 which utilises a pre-fabricated timber frame kit designed to meet the stringent requirements of Passivhaus with natural materials (opposite).

2217_Springfield_ENERGY Statement



Images from PH15_NetZero_Homes_Brochure.pdf

5.1 Sustainable Materials

External timber cladding is proposed at ground floor & gable ends with standing seam zinc to the first floor - using this durable, traditional material effectively to provide a robust, long lasting finish.

Timber / aluminium composite windows are proposed with slim frames maximising natural light. These will sit subtly with the zinc. Timber solar shading will wrap the south and west elevations cooling the house in the hottest months. To the south a deep projecting overhang is proposed to shade the master bedroom's large glazed facade.

Left: Proposed bay study

Above: South view of the new house & deck and solar shading. New native hedge planting is proposed around the deck edge to soften it's appearance, provide for increased biodiversity and connect the house to the existing landscape.

6. Solar Shading & Ventilation

Solar Shading

The building has been assessed by a company specialising in Passivhaus design. They advised on the overheating risks and as a result we have added solar shading to the proposed design.

This constitutes slatted timber fins to the master bedroom gable end and horizontal solar shading is proposed as a pergola structure to the perimeter of the South and West elevations.. This will allow natural light whilst minimising solar gain and overheating.

The images adjacent are precedent examples of buildings utilising a similar approach for solar shading.

Ventilation will be provided by a Mechanical Ventilation with Heat Recovery (MVHR) System. This might include for summer cooling provision subject to the final specification.

7. Passivhaus Construction System

- The house will be a self-build by the client who has extensive construction experience. It will be used as their family home. They want a house with low bills that is sustainable, modern and beautiful.
- We will be exploring construction options at RIBA Stage 4 and are considering the use of a prefabricated timber framed system such as PH15 (adjacent).
- This will have much enhanced thermal performance to Passivhaus standards (not certified)
- Adequate Recycling & bike storage
- Solar shading
- Passive solar gain
- Materials with low embodied energy which also sit subtly in the rural context
- Form and massing to reflect that of a traditional Somerset longhouse
- A precedent of a sustainable new home for climate resilience and reduced fuel demand.
- The existing garage, sheds will be removed and replaced with a new insulated garage / workshop suitable for year round use and home-working.
- New planting
- New and improved surface water treatment and foul drainage.
- Heating is proposed using an air source heat pump (ASHP), with PVs on the roof (providing a 4kw output)
- Mechanical ventilation and heat recovery (MVHR) as the new building will be very air tight.

8. PH15 Passivhaus System & Predicted Energy Use

The PH15 package includes all elements a building needs to meet the passivhaus standard; the insulated frame, airtight shell, high performance windows and MVHR.

PH15 also includes PHPP energy modelling with rigorous overheating assessment and mitigation. Technical support for the architects and the construction team is provided throughout, including contractor training modules.
The frame is pre-cut in the UK, using the latest precision technology and delivered to site coded and flat-packed ready for assembly; an economical approach that also retains local labour input on site.

A PH15 frame is constructed using engineered I-Joists and wood-fibre insulation, achieving a ratio of 85% insulation to 15% structure. External finishes options are varied and include direct applied render and many rainscreen cladding systems. Internally, the walls include a robust airtightness layer and a continuous service void, which both protects the airtightness and allows for easy install and maintenance of services.

PH15 comes with high quality and durable triple glazed timber windows and doors which are Passivhaus suitable and eliminate internal condensation and drafts. The windows can also be aluminium clad for a maintenance free solution. The design and supply of a Mechanical Ventilation with Heat Recovery system (MVHR) including a highly efficient heat exchanger. This supplies continuous fresh filtered air whilst recovering 90% of the heat from the stale air removed. The extremely high efficiency of a Passivhaus certified MVHR unit means that for every 1kWh of electricity used by the unit, up to 16.5kWh of heat is being conserved through heat recovery.

9. Passivhaus Planning Package Energy Calculations

PH15 Consultants have undertaken a PHPP (Passivhaus Planning Package) assessment for the project. This provides detailed energy calculations to assess the predicted energy demand of the project. This assessment demonstrates compliance with the Passive House Institutes Low Energy Building Standard.

Heating Demand: 26 kWh/m2 per annum

Primary Energy: 84 kWh/m² per annum

Air Changes per Hour: 0.6ach @50pascals

PHI Low Energy Building-Verification

10.4 EN

PHPP

[redacted]

Building:	Springfield				
Street:	The Street				
Postcode/City:	BS40 8BD	Bristol			
Province/Country:	Bristol		GB-United Kingdom/ Britain		
Building type:					
Climate data set:	GB0006b-Lyneham, Altitude corrected				
Climate zone:	3: Cool-temperate		Altitude of location:	130 m	
Home owner / Client:					
Street:					
Postcode/City:					
Province/Country:					
Architecture:	Barefoot Architects				
Street:	Unit 5, 2 Paintworks				
Postcode/City:	BS4 3EH				
Province/Country:	Bristol		GB-United Kingdom/ Britain		
Mechanical engineer:					
Street:					
Postcode/City:					
Province/Country:					
Energy consultancy:	Passivhaus Homes				
Street:	1 High Street				
Postcode/City:	TQ9 5NN	Totnes			
Province/Country:	Devon		GB-United Kingdom/ Britain		
Certification:					
Street:					
Postcode/City:					
Province/Country:					

Year of construction:	2024	Interior temperature winter [°C]:	20.0	Interior temp. summer [°C]:	25.0
No. of dwelling units:	1	Internal heat gains (IHG) winter [W/m²]:	2.4	IHG summer [W/m²]:	4.6
No. of occupants:	6.0	Specific heat capacity [Wh/K per m² TFA]:	84	Mechanical cooling:	

Specific building characteristics with reference to the treated floor area

					Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area	m²	181.1				
Space heating	Heating demand	kWh/(m²a)	**26**	≤	30	-	**Yes**
	Heating load	W/m²	**16**	≤	-	-	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	**-**	≤			
	Frequency of overheating (> 25 °C)	%	**3**	≤	10		**Yes**
	Frequency of excessively high humidity (> 12 g/kg)	%	**0**	≤	20		**Yes**
Airtightness	Pressurisation test result n_{50}	1/h	**0.6**	≤	1.0		**Yes**
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)	**84**	≤	-		**-**
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	**66**	≤	75	75	**Yes**
	Renew. energy generation (in rel. to projected building footprint area)	kWh/(m²a)	**19**	≥	-	-	

I confirm that the values given here have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

PHI Low Energy Building?

Task:	First name:	Surname:	Signature:
1-Design	Anna	Carton	
Certificate-ID	Issued on:	City:	

PHPP, Verification

PHPP_EN_V10.4_Springfield_PA_July23

10. Contact Details

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