



How we let the sunshine into our home



Mole



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PRESENTATION CONTENTS

- ▶ **1. The pre-build phase – 15 minutes**
- ▶ **2. Q&As - 15 minutes**
- ▶ **3. The build and post-build experience – 15 minutes**
- ▶ **4. Q&As - 15 minutes**

THE BUNGALOW



PLANNING APPROVAL

- ▶ 1. Building plot part of front garden of our home
- ▶ 2. Difficulties:
 - ▶ i. In a conservation area
 - ▶ ii. Immediate neighbouring houses listed thatched cottages
 - ▶ iii. Restrictive covenant
 - ▶ iv. Stream running through side of plot
 - ▶ v. South Cambridgeshire District Council
- ▶ 3. After nearly 3 years PP approved 5 March 2018

A DISTILLATION OF OUR CLIENT BRIEF

- 1. Brings joy**
- 2. Adaptability**
- 3. Light-filled**
- 4. Efficiency**
- 5. Sustainability**
- 6. Security**
- 7. Resalability**

BRINGS JOY

Joy – the emotion of great delight or happiness caused by something exceptionally good or satisfying.

Will your design bring a sense of happiness when you come home? It's not just a vessel to contain green technology

ADAPTABILITY

Adaptable to meet our needs as we get older

How was this met?

- 1. Easy conversion of internal garage to provide a large en-suite ground floor bedroom**
- 2. Part M category 3 compliant**
- 3. Provision for a lift with structural support built in**
- 4. Additional beams in ceilings for hoists**
- 5. Internal walls non-loadbearing to allow for internal changes to layout**

LIGHT-FILLED

- 1. Humans like light**
 - 2. It reduces the need for artificial light**
- However the compromises are:**
- 1. Larger windows giving less thermal efficiency**
 - 2. Bigger areas for air-tightness issues**
 - 3. Solar gain (overheating)**
 - 4. Increased costs**

EFFICIENCY

An efficient home requires:

- 1. Good design to reduce heat loss**
- 2. High levels of thermal insulation**
- 3. An uncompromising attitude to build quality particularly air tightness**

SUSTAINABILITY

How do we measure this?

I think this is a very personal decision with too many variables to measure

A personal choice

SECURITY

A secure home can be easily built using systems and devices that are relatively cheap and easy to incorporate

RESALABILITY

It will not always be your home. Will what you are doing make your home attractive only to a niche market with the same levels of interest as you?

SUMMARY

My general principle was that although I wanted the most efficient house for the least amount of money, on analysis the efficiency requirement came down the list somewhat. What I have is still a very efficient house but I am happy that to make it a home there have to be compromises.

Q & As?



"Absolutely inspirational"
12 Sept - 18 Oct 2022

The best local advice

- 9 home tours online & in person
- 5 home improvement talks & events

Run by householders and experts



Open Eco Homes is a project of Cambridge Carbon Footprint, with thanks to our funders and supporters

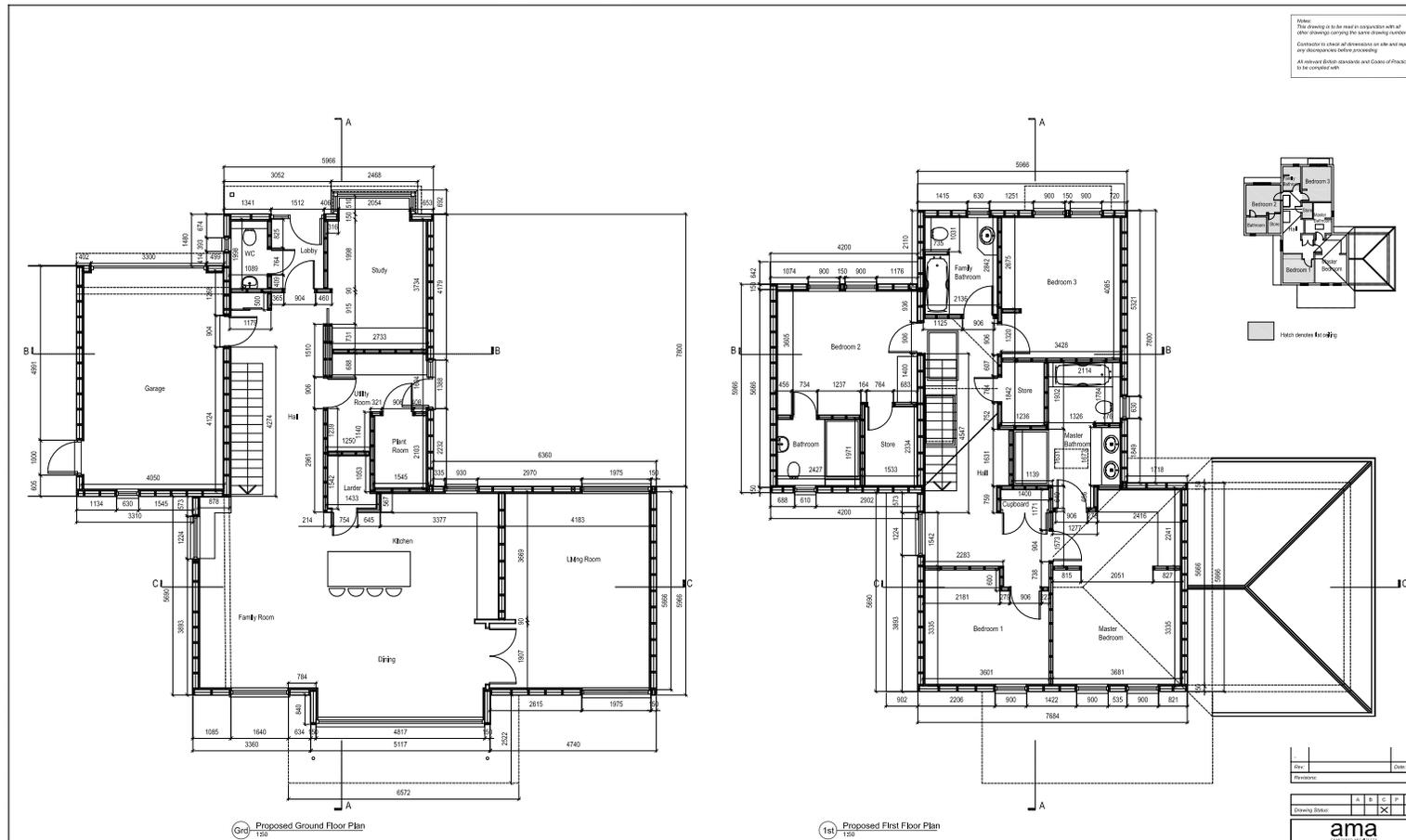


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THE PLANS



THE BUILD



Day One

THE BUILD



For timber frame houses an accurately built foundation is essential

THE BUILD



Our flat-packed home

THE BUILD



Lunchtime day one of the timber frame construction

THE BUILD



We chose to fully sark the roof which helped with insulation and airtightness work

THE BUILD



The accuracy of the timber frame fabrication allowed the ordering of the windows and doors before the start of the build.

We reached watertightness by week 5

THE BUILD



THE BUILD

- ▶ **PIR insulation thickness and U-Value W/m²K**
- ▶ **Floor 220mm – 0.11**
- ▶ **Roof 220mm between trusses and 50mm internal layer – 0.09**
- ▶ **Walls 140mm in the frame**
 - 50mm continuous internal layer**
 - Vapour Control Layer and external wrap – total 0.14**
- Windows and skylights triple glazed – average 0.78**
- Doors – 0.81**

THE BUILD

- ▶ **Initial air tightness test 0.76 (air changes per hour at 50 pascals)**
- ▶ **Second test 0.68**

THE ELECTRICAL AND HEATING SYSTEM

- ▶ **Thirteen LG panels on two elevations facing south east and south west with a rated output of 5.4kWp**
- ▶ **Solaredge inverter linked to a Givenergy 8.4kWh battery**
- ▶ **Nibe F2040 ASHP rated at 12 kW supplies DHW through a 400 liter buffer tank and UFH on both floors through multiple zones with a 100 liter buffer tank. The system has an external sensor for weather compensation and is left on fully automatic.**
- ▶ **LED lights throughout**
- ▶ **MVHR (90% of energy in extracted air is recovered)**

ENERGY USE 12 MONTHS TO 1 OCTOBER 2022

	kWh	
1. Generation to home	1810	
2. Generation to battery	1520	
3. Import from the grid	<u>3760</u>	Export to the grid 1750
	7090	

**Energy consumption from the grid is virtually zero
from mid April to mid October**

HOW DO I COMPARE TO A PASSIVHAUS?

Estimating my space heating:

Annual consumption 7090kWh

Livable area (excluding garage) 231m²

To estimate non-space heating usage by taking the average summer months consumption $320 \times 12 = 3840$

The difference gives an estimated space heating consumption of 3250kWh or 14kWh/m²

HOW DO I COMPARE TO A PASSIVHAUS?

	Passivhaus	Home
Primary energy renewable demand (kWh/m².year)	≤ 60	?
Space heating demand (kWh/m².year)	≤ 15	14
Space cooling demand (kWh/m².year)	≤ 15	0
Airtightness (air changes/hr@50 Pascals)	≤ 0.6	0.68
Summer overheating (max 10% > 25°)	Yes	Not measured

THE COSTS

After the VAT refund the build cost was £455,100

For a 255m² house £1,785/m²

At the time of the project a rule of thumb for a good quality house was £2,000/m²



How we let the sunshine into our home

Trevor Purnell

Your next steps

Find out how you can get started with your retrofit

Book another tour or talk

Research our past case studies

Book a training session and borrow a thermal imaging camera

Use Transition Cambridge's personalised home energy advice tool



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cambridgecarbonfootprint.org/donate

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