

Kate Hawksworth - Pease House ppt Notes

For Open Eco Homes 'Eco Self-Build' event' 26/9/19

1. Back of house

2. Land registry map

2006 was the year before Nick and I got married. We had been talking about a renovation project, or a self build, for a while and the idea was just starting to get settled in and our pot of savings was looking good.

We have no direct experience of house building but we are both practical people with a design and art background. I had recently enjoyed renovating a Victorian terrace and we both liked the idea of a project.

We spent a year looking for plots of land around Cambridge, where we both work. We found that they were all very expensive, or very tiny or in some way very inconvenient.

If we'd had to rely on buying a plot I'm not at all sure we'd have got started. However, my parents have a large garden in Girton, and after a good period of consideration on both sides we accepted their very generous offer of a slice of it. It's about a third of an acre – a well-defined strip of land which was already nicely divided from their main garden area by a large yew hedge.

3. Clay plastering

Here is some clay plastering done by Nick and myself at the Ecobuild show in 2009. This picture represents our growing interest in 'green building'.

Nick had not long before helped to deliver some workshops in schools for a local organisation called Smartlife looking at urban building using ecological design and modern methods of construction (timber frame/prefab) so he was already tuned into it all.

I began to read up on the subject and became convinced that this was a once-in-a-lifetime opportunity to make a big difference to our long term energy use and lifestyle through careful planning and choices.

One book which stands out for me is the Whole House Book by Cindy Harris and Pat Borer. I found it very accessible and we took a lot of guidance from it when setting our early principles and brief.

4. REW, composting toilet

These images are from our visit to the Centre for Alternative Technology (CAT) in Wales. It's an education and visitor centre set-up in a disused quarry in Wales. They demonstrate practical solutions for sustainability and green living – a very dedicated bunch of people who practice what they preach.

I'm mentioning this particular visit as a defining moment. We came away from the CAT centre with two items on our build wish list that were to feature a lot over the process of our build.

We visited before they had finished their conference centre, which is built entirely from rammed earth, but the visitor centre and shop had the central feature of a rammed earth wall, which we fell in love with. As well as the beautiful striation and texture related to the forming process, they have very practical properties – helping to regulate heat through thermal mass and humidity through the breathable nature of the clay earth.

I also rather loved the idea of having a composting toilet, of which they had several types in use at CAT. We are not off grid, and didn't intend on being so at any point, but I didn't think it could be so very hard to incorporate one into the build.

We wrote a very ambitious brief to include the basics of an ecobuild such as air tightness, super insulation and solar gain. The earth wall would be our thermal mass with a gasifying log batch burner joining the composting toilet and various other pieces of technology.

5. ACA

I had started sketching layouts as soon as the build felt like it might actually happen. I have a fine art background and consider myself creative, as well as reasonably logical and good at problem solving, but it was amazing how much more cohesive and beautiful the designs from the experts were.

It was great when we found AC Architects. As well as having the benefit of being very local to us they felt extremely well aligned. As soon as we visited their offices we felt very much at home. Lots of reclaimed materials. Nothing too showy. And with a bespoke passive stack ventilation system that pulls air in via an underground tunnel to heat it. They were really proud of it and we really loved everything about that.

We saved a little on architect's fees by taking on the site management ourselves but still spent around 10% of the build cost on their fees. As I'll explain, this was money well spent in my opinion.

6. Outline planning

Here is one of the drawings for our outline planning application. Our plot had lots of constraints (as I guess most of them do) and we got straight into the business of compromise – trees to avoid, clay soil to contend with, traffic noise from the A14, etc. After careful consideration and looking at various options, we had decided on a size and layout of building that we very happy with.

Full of chutzpah with how far we'd got, it came as a surprise when the planning process turned out to be rather dramatic and (obviously) potentially show stopping.

A pre-application meeting with a planning officer seemed very friendly and positive with lots of nodding and smiling, so it came as a real shock when, right at the end of the 8 week processing time, we received a letter informing us that as it was a sensitive area at the edge of the village and in order to keep the semi-rural feel they would not be giving consent and we should re-apply for a single story building.

7. Design and access statement pictures

Perhaps it wouldn't have been the end of the world if we'd gone with that but it felt like we had a lot invested into our design already and we were ready to push for it.

We contacted our local councillor – who as it happened was on the planning committee. Fortunately for us he was very supportive of our project. I can't remember the exact order of things but we withdrew our planning application and he put it forward to the planning committee. It was amazing how the process then switched from bureaucratic to political.

With ACA we wrote a very detailed design and access statement, specifically responding to points raised by the planners and putting forwards our case with regard to the local planning policies. We made our case to all our prospective neighbours (receiving two letters of support) and to the village parish council.

The planning committee visited our plot and we wrote a statement to make in our allotted time at the planning committee meeting itself. In the end, if memory serves me correctly, it was a unanimous vote to give consent.

8. Detailed layout

Once we had planning permission, we then embarked upon a phase of research and meetings with our architects to put together detailed drawings and a design specification document.

We researched, specified and costed the main elements to the building to try and make sure we could afford what we were asking for.

For the structure we initially looked at local company who specialise in airtight and super insulated buildings using i-beams and cellulose fibre insulation (Touchwood Homes). Their quote felt too expensive for us at the time but in hindsight it may not have been much more than we eventually spent. In the end we went with Structurally Insulated Panels (SIPS) – again a relatively local company (SIPS UK). I'm not aware of any way of getting a higher insulation value for thickness.

We sourced triple glazed windows, rainwater harvesting and solar panels – voltaic (3.8kw) and thermal.

The heating and ventilation strategy was something I found particularly challenging. There were so many options and opinions out there. We couldn't have passive stack ventilation as the bedrooms were built into the roof so there was nowhere to stack. I didn't really like the idea of mechanical ventilation and heat recovery (MHRV) and at

the last minute we said goodbye to our gasifying log batch burner (which you can still see here in this drawing).

I spent a fair bit of time exploring how we could get a composting toilet into the envelope of the house, but without a basement there would be difficulties sinking a tank into the clay. It was the need for continuous ventilation through to the outside that was the final straw for this idea.

In the end we have a gas boiler and a wood burning stove with a back boiler feeding into a storage tank, along with the solar thermal for our heating and hot water. To ventilate we have a whole house extraction with all vents controlled by moisture sensitive strips (passive intelligent). There is an extra vent bringing air through the greenhouse to preheat it.

9. Ian and team

Our specification document went out to four companies. Ian Rudd won the tender – on price in the end. ACA strongly advised that we should keep them on to ‘manage the contracts’ – that is look after the money side of things - and I am very grateful that they did as I know it made a huge difference to the smooth running of the build. We had a good experience with the team throughout.

We took on site management, so were at the build day to day to make decisions as needed. The detailed drawings, backed up by full written explanations, in the spec document were invaluable in enabling us to do this. There was very little that was open to interpretation and so very little negotiation needed from us and we could concentrate on the seemingly endless task of sourcing fixtures and fittings.

10. Archaeology

Our planning consent came with various conditions, as many do, I believe. One of these was that we must have an archaeological survey. As we would have to pay £1.5k for this ourselves, and since the planning consent given to the plot opposite ours did not include this survey, we initially felt hard done by and challenged the condition. We were told it had been an oversight on the other development. As it happened the dig uncovered some artefacts! Luckily no bodies, unfortunately no gold, but some history— a cobbled yard and evidence of dwellings. We have an ancient horse shoe and pieces of quern stone and sharpening stones embedded in our earth wall and a cobbled area underneath our stairs made from the cobblestones uncovered.

11. REW prep

Our rammed earth wall was a whole adventure in itself. Our architects had wisely designed the house around it so that it was not integral to the structure of the house. However, they'd set us quite a challenge as it was over 5 metres tall.

ACA and our builders had no experience of rammed earth building so we took on this part of the project ourselves (bearing in mind we also had no experience of rammed earth building). There aren't many specialists around but we found ourselves some support in the form of Michael Thompson who runs rammed earth wall building

workshops in Norfolk. He had never undertaken a project as big as this but had done quite a few smaller projects. He was passionate about the technique and had good information on how to go about testing soil to find the right stuff.

Nick spent months sourcing soil with the right clay content and the right amount of grit. It was all delivered to site and then shovelled through his self-built sieving machine. Something like 20 tonnes of it. The soil was local, from building sites at Orchard Park and Addenbrooke's.

12. REW1 build

Here you can see our foundations in place – mini-piles with a slab floated on clay board to allow for the ground movement.

The building of the wall has started with the formwork designed and made by Michael.

We usually worked as a team of four. Sieved soil went into a cement mixer where we added moisture until it passed the tennis ball test (shaped into a ball, dropped from 1 metre, it should crack, not shatter or splat), we then shovelled in 8 or 10 inches or so of the loose earth mix and rammed it down with a modified scabbler (construction tool with 'hydraulic' hammer action for removing concrete).

And repeat. Each layer ends up around 3 inches thick and took anything from 20 minutes to 3 hours to complete depending on how all the machinery was going and how far up we had to get the soil. It was around 12 day's work in total.

At the top right you can see the shuttering coming off our completed wall. It looked amazing, until we released the bottom level of formwork. Then it fell. It really was a devastating moment.

We initially thought our thermal break at the base made from foamed glass was to blame but in fact it was the wall itself. The soil couldn't dry inside the formwork and the wet earth couldn't support the weight of the wall once the formwork was removed.

13. REW2 build

With a great effort we delayed the build by 2 weeks. Poor old Nick moved all the earth ... again. It was then taken by a grab lorry to a local plant where they sieved it in an afternoon and brought it back.

We sent some samples off to a testing centre for compression testing, proving that we could build halfway up, allow to dry, and then continue to the top. But with limited time and cold weather making drying time difficult to predict we decided to add 7% cement.

This makes it a stabilised rammed earth wall, rather than a pure rammed earth wall and it loses its moisture-regulating property, but the drying/hardening process is then chemical so will start to take place inside the formwork. So, for the sake of our

budget and our jangling nerves, we needed to take the safest option. BTW it took the best part of £10k to build – both times.

14. Reclaimed stuff

Here are some of our reclaimed materials going in.

We really love our reclaimed surfaces, and some of the reclaiming was fun – such as the shopping and the finished look. However, I have to say that preparing the materials ready for installation was pretty awful.

Our main living area, small sitting room and upstairs office are all tongue and groove – either maple from old gym floors or a very nice batch of oak that we also found. So quite a large area and small width plank, as you can see. Each tongue, and groove, was coated with a hard tar like substance that needed scraping off before it could be fitted again, likewise the quarry tiles all needed mortar chipping off.

I can't remember what exactly the negotiations with our builder were but I think we must have said we'd prep the reclaimed stuff. It was another call to family and friends as well as literally weeks of work through February and March of 2012.

15. Back of house – rainwater hole

Money-wise, I mentioned earlier that keeping ACA on to manage the contracts and having such a detailed spec to work from meant that everything ran very smoothly with our builders and we stayed pretty much in budget.

We did have one horrible hiccup with our cash flow though. We started the project with savings and money from the sale of another house. We knew we would need a self-build mortgage to finish and had one lined up which had been agreed in principle. However, when we came to put the application in for it they requested an NHBC certificate (national house-building council) – a home construction warranty. We hadn't got one. We should have applied for one at the start of the build and trying to get it retrospectively was a nightmare and took a lot of correspondence and wrangling from Nick. It took months, so in the meanwhile we had to borrow from family to get our build weather tight. We were then able to get it valued (in its then current state) and took out a normal mortgage. All very stressful.

16. Finished front/car port

The whole project took around 5 years, with just under a year for the build. We moved in in summer of 2012 and a lot has happened since that time. Here you can see the 2013 car port getting its green roof. However, the main change has been the addition of two children.

The house has proved to be very comfortable and wonderfully light.

The heating system is complicated. It works well but I'm not sure I understand it all fully and I used to worry that we might not have things adjusted or set up properly.

Luckily Nick was prepared to spend the time needed to understand it and find a local heating engineer who can deal with it all.

I have a small list of little things I might change when there is time, such as the larder door, and the jury is still out on whether the Velux windows in the bedrooms are really needed. But ...

Over all we really love it!

The reclaimed materials look brilliant.

We love our wall – thank goodness. It looks fantastic and we can really feel it doing it's job in the summer when we night purge – that is we open the Velux above the wall and a window downstairs to draw the cool night air past it overnight. The cooled mass is then ready to absorb more heat the next day.

The greenhouse heats up nicely on sunny days in the spring and autumn. We can open the door to it and let the warm air into our living space and it has been an amazing clothes drying area – we've been through two sets of cloth nappies and are still managing without a tumble drier.

I could go on, but I'll leave it there for now. Thank you.