

Episode 151

When does it make sense to demolish and rebuild? – with Janet Cotterell

The show notes: www.houseplanninghelp.com/151

Intro: Janet Cotterell from CTT Sustainable Architecture, is the project architect on our second case study in The Hub – Buckinghamshire Passivhaus. She is also behind the PH15 timber frame system that they are using.

The site already had a property on it which the owners had intended to refurbish, so I started by asking Janet to explain a little about the plot and how the project evolved.

Janet: Well I think they bought the property always thinking they would do it up because it's a replacement dwelling basically is what we're doing, and the existing dwelling on the site is not that beautiful, but it's a fantastic site. And I think the client's original intent was they would retrofit it and go to the full Passivhaus, which we did do a scheme to look at that.

Ben: How do you do that then in terms of getting all the detail, because you didn't go down this route? So maybe you could explain what detail you went into and when you made that decision or how it came about?

Janet: We just did an initial study and I looked at how I would go about doing the walls, the main elements basically and how we also could adapt it so it would give them the accommodation they required.

Interestingly we could get the accommodation alright, very similar to the way we did the new house, but the issue was just the complexity of dealing with the existing fabric which wasn't in great condition.

So in the end we reviewed it and agreed that it would be much easier to cost control for a start, and secondly it would just give them a perfect house, with no compromises.

And there is always the issue about replacing a house that isn't at totally the end of its life, but my feeling is it's so invasive doing a retrofit in any case that the fact that you are then replacing it and building something that will last for a very, very long time, my own position is that generally I would go for replacement dwelling unless there was some particular architectural reason.

Ben: And you obviously, not only The Passivhaus Handbook, you have that experience, but you've got the Totnes Passivhaus. So maybe you could explain a little bit about that one and did that entail more than you were expecting? Did that one go exactly to plan? I mean, what were the lessons learned off that?

Janet: It did go to plan, but because it was actually also the first Passivhaus I did it was incredibly invasive. I think that's what struck me. And there wasn't as much of the original fabric remaining as you might imagine by the time you've really upgraded everything. Obviously we did use the existing footings, we did use the existing slab, we did use the basic walls on the ground but everything else was stripped away.

And I think the issue was you can just see that it was a lot more time consuming, that's the thing. And the attention to detail for the contractor is much higher, so it is much easier for the contractor to achieve the Passivhaus standard on a new build. There's no doubt about it, because you can design out the complexity basically.

And interestingly Adam, who owns the Totnes B&B, if it hadn't been a planning constraint he would have definitely replaced it. And interesting from just a future housing provision need, you could have got two houses on that site if you'd done it new build, which would have lots of advantages at the moment when we desperately need houses and we need land.

I mean it's an interesting, you know, conserving something often isn't that efficient in many ways. And I think he would have ideally liked to have had two and be able to rearrange it on the plot. But still it's a lovely project and it is fully certified to the full standard.

Ben: That's it, I suppose you weren't even going for the retrofit standard, I'd forgotten that. It was the Passivhaus standard.

So coming back then to Buckinghamshire Passivhaus, there are other issues here. Maybe you can explain the one between VAT and how you can reclaim VAT? And that really, that was a big economic benefit of new build?

Janet: Yes, I didn't mention that. I mean that does make a huge difference. So if you imagine you've got 20% VAT on the retrofit and it got zero rated VAT on a new build house, that's a huge penalty for actually retaining your structure. I never understand it politically.

Ben: Well I was going to ask you that. How long has it been like that for?

Janet: My entire career. It's always been that way and people have mooted. And I don't understand why they don't say put 5% VAT on everything, so retrofit work and new build work was all rated at the same level. And then people would make choices purely on what is best for the site, rather than being swung one particular way or the other because of the VAT issue.

Ben: Well I guess there's nothing we can do on that one except know about it and then go down that route.

So coming back onto the site, have we mentioned all of the pros and cons in this process of doing analysis of a retrofit, thinking about what we have with new build? Because of course there are planning considerations alongside this that it wasn't a forgone conclusion.

Janet: No it wasn't a forgone conclusion. Although I try to just use common sense in these situations. I can't see any reason when I look at a site I think is there any reason really that somebody shouldn't do this, and then you have to make the planning arguments to the planners really. So you have to be confident about what you're doing.

Quite often you end up having to make quite strong arguments about what you're doing, but generally I find we get there! We get there! It's just frustratingly it can often be longer and cost maybe a little bit more for the client to make the arguments which is very frustrating for the client, and delays things. But generally we get there.

Ben: What did you have on the brief for this one?

Janet: It was a fairly straightforward brief. There was a certain amount of accommodation they wanted. That's very easy, most people building a house know what accommodation they desire. And then it really was Passivhaus they wanted. There was a little bit at the beginning the clients were nervous about achieving the

Passivhaus. And that is one of the things, if you're a self builder and you want to do Passivhaus, it's not one of those things where you can guarantee you'll get it because of the challenge of doing it. So the client is often trying to minimise their risk and to find a solution that is going to optimise their likelihood of achieving it.

Which is why we did what we do which is do the timber frame system. We're trying to de-risk it all. And I think that is what appealed as well in the end. I think they went round and looked. They were very efficient and going round and looking at what was available and risk was an issue I think for them and they wanted to minimise that. And they saw what we were offering, and the fact that I'd done it before and got there obviously. You're de-risking aren't you by having somebody with experience.

Ben: Also on the brief, or what I found quite interesting when I chatted to you before about this, was that they almost left the aesthetics to you and the outside. It was very much okay the inside it will have a kitchen diner space that will be the centre of the house, perhaps as outdoorsy people they wanted a special area to go from inside to outside. So all the things that you might expect on any brief. But then to leave that door open, so how did you go down that route? I know sometimes constraints really help, but did you have any constraints in that respect on this site?

Janet: I think as an architect you're often responding to the site more than you are to the client. That's not quite true because some clients have very specific ideas of what they like and dislike. But actually it is the site that you respond to.

And in this case it definitely was the site, so I was trying to... It's a beautiful site so for example, and looking at the area around the site as well. If you go around the vicinity of the plot you'll see that often there are houses but they're in the centre of the plot, not on the street edge, so I wanted to get it back to actually more in keeping with what the surrounding area was like, the character of the surrounding area, which again that's a strong planning argument in that as well.

And just to address the plot. I think if you've got a plot you want to make the most of the views, make the most of the sun. For me that's very important to get the orientation correct and to maximise what the site offers you.

Ben: Obviously if you set it back you've got things like driveways to consider. You can do whatever you want with it, but where did it

end up then? Because the plot theoretically is quite large, it's over an acre. So you could have had it anywhere. How do you decide the exact position or is this back to planning?

Janet: If you look at the site there is actually, by centring it in the site basically you maximise the views and you divide the plot into different sections which they're going to treat slightly differently so we decided different areas could be treated in different ways which would be quite attractive.

And then I wanted to create that feeling of coming into a courtyard, so there's a long brick wall for example which is buttressed in a traditional way, which goes into the house. It sort of meets the house and it creates the separation between a private and public space, but it starts to create this courtyard. And with the garages there's a double oak garage and that will start to embrace the space that will feel courtyardy. And you don't want that space to get too big because you lose a sense of containment but you don't want it to be too mean either.

So you're thinking about all those things. There's a lot of things going on that often the site tells you what to do, interestingly, when you're puzzling with it and all the different requirements that you're thinking about come together and then you find a solution.

Ben: How would you describe it then, what you're looking at? We can obviously put some photos into the show notes and we've got the full story unfolding in The Hub. How would you describe the look of the building now and then we'll start talking through some of the construction process?

Janet: Well the look of the building is, the external look of it, so the finishes of the walls, roofs, are very much dictated by the design guide. The local council design guide. And they have one of the most developed design guides that I've seen actually, because it covers the Chilterns area basically.

Ben: In a good or bad way, or it just doesn't matter?

Janet: Well I think it's good in the sense it's quite clearly done and they're trying to keep a certain sort of aesthetic going. Where it would be a problem is I don't think there's any problem in doing very modern designs and you just want it to be of a certain quality, and then it becomes frustrating. So that's the negative side of it. But in this case they weren't really worried.

And I was interested anyways about doing a traditional looking UK aesthetic house because of the fact the Passivhaus has been weak in that area because it's come from Europe. So it has a look some people like, but it's very subjective and for a lot of people it's not a natural look for them. So I wanted to go with that look and go with that traditional, play with it basically. I thought that would be a positive for Passivhaus.

Ben: How does it all start to come together then?

Janet: In terms of the design?

Ben: Yeah, in terms of the design and then lead on to, because we're on site at the moment.

Janet: Well always the first phase is getting that design and then getting it though planning. And then often people underestimate what is still to do. There is a huge amount of work still to do!

Ben: What's in the middle Janet?

Janet: Yeah exactly, it's the middle bit! So people get the idea of planning and design and they very much get the idea of construction, because you see it, but there's a middle section that people don't often understand has to go on. Which is all the working drawings, all the tender documents.

And so for Passivhaus, well with any house, you generally would be doing hopefully proper construction detail drawings of how all the bits are going together and what they're made of. And you're getting building control approval usually at that stage, so that's the technical approval. So you've got your design approval from planning but you're then going for your technical approvals from building control.

Ben: And this falls on you to do this, or how do you manage it in your business?

Janet: Well when I was a bigger practice before I did Passivhaus I was a bigger architectural practice.

Ben: That's interesting!

Janet: And when I decided to go down the Passivhaus route I completely slimmed right down because I used to end up doing a lot of just trying to get work and managing people. Now I do...

Ben: Sounds like a business doesn't it!

Janet: Yeah, so now because we've been building up this Passivhaus construction system and thinking how the business is going to play out, I've been trying to do everything myself. Because that's the way to get it right and work out all the processes and tweaks. So at that moment I'm doing all that, yeah. Or actually I'm working with Jonathan as you know, and Jonathan does detailing as well. He's a contractor so that's quite interesting because that relationship works very well when it comes to actual construction detailing.

Ben: So it sounds like there's a lot of time in there.

Janet: It is.

Ben: How many days would you put aside to get it done?

Janet: I would want to have at least a couple of months normally to do that work.

Ben: And you revise it do you again and that sort of thing, or not?

Janet: Well what we've been doing at the moment, because we are trying to get, not keep reinventing the wheel. So this idea we've got, this timber frame Passivhaus compliant solution, we're wanting to have details that we can also pass on to other people. So we're just tweaking them because we're building and then we're adapting. But I think we've got to a point now where most of it works really well.

Ben: In terms of these details, you've mentioned about reinventing the wheel, but how often is it a case of almost pulling them out of your archive and then starting again?

Janet: Well we're not starting again, no. Only tweaking. So we've now got details for everything, and actually at the moment we've got a pack of stuff that's just gone to WARM certifiers for Passivhaus, and they're going to be doing the Psi values, that's the thermal bridge values, for each of those principle details. So if you were going to use our frame system you would actually be able to say okay if I build it like this and if I install my window like this, this is the thermal bridge and it will be proven. So you would just bang it into your PHPP.

So it's trying to simplify it for everybody, because each of those thermal bridge details probably cost you £300. So you don't want to

be going off-piste and doing all these things because it's just adding cost to your build.

Ben: And this is also an attractive side, you talked about earlier of when you're building new you know some of these costs, but affordability as well.

Janet: It is. The challenge is actually not so much to do the grand design, the challenge is to bring Passivhaus to an affordable level. And the way you've got to do that is partly you've got to have details people can use.

This pack of details we've sent which is basically for a house isn't it, because you're doing the ridge, you're doing the window. You've got to think every window detail you did you'd have to do the reveal and the sill separately, you'd have to do the door separately, you'd have to do the floor to the wall, the intermediate floor, the ridge, the eaves. So you might have a dozen details. Now you can find there are details you can find. There's the standard IBO book which I'm sure people have probably come across and it's come from Europe, and they have different details. But they're not UK, generally not very UK friendly details and they're very simplified. And they give you an idea of the Psi value, the thermal bridge value, and I've used those and they have been really helpful, but it's not the same as I'm using that detail and it is this and I know it.

Ben: And you know it as well, yes.

Janet: So the only way you can get round that, if you were doing your self build and you didn't want to pay that money, you basically have to over design because the certifiers will say okay we'll allow you to use this thermal bridge because we know it's not going to be worse than that. But if you want to gain by getting the best benefit from the detail you've done, you've got to prove it. And that means you've got to calculate it.

So what we're trying to offer to people is say we'll use this system and then you can have it absolutely that intermediate floor to wall is thermal bridge free. Well you want to have that benefit don't you when you put it into your PHPP. So that's the point and our ridge detail is thermal bridge free and I think one or two of our others will be maybe even neg'd. That means you can get a positive benefit from the detail as well.

Ben: Right Janet, you're over-architecturing me and I'm going to bring it back to the project in the hope I start to understand things again! But don't worry, this happens frequently!

Back on site then, we were talking about some of the work that happens in between these two phases of the initial design and getting it on site. Is there anything else we should mention?

Janet: There's the design, then you're doing your working drawings. I suppose if you had any party wall issues. We've got one that you were thinking of following and you didn't actually, and we chose this one instead for you to follow. That one has about five party walls because it's in a London setting and so if your site is in an urban setting then that can be quite a process, just sorting all that out, and have costs associated.

And if you're buying a plot as a self builder you should think about that. Because I don't think these clients, I wasn't involved when they bought it, so they came to us with the plot. And you know you've got five different people to deal with and to agree your boundary details with. And you've got party wall surveyors involved on both sides. That's nothing to do with Passivhaus but it's very much to do with self build, and something people probably don't realise about and what extra costs.

Ben: That sounds quite unusual - five different.

Janet: It is but in London that can happen because it's going across several back gardens. But you could easily have two couldn't you?

Ben: I've seen it myself, the big hole that's been dug, but maybe you could lead us though what needs to happen before you can start putting up the system.

Janet: On this site what needs to happen, so this is a slight variation in that we've got two different contracting teams. So we've got a below ground works doing a basement, which is this German company called Glatthaar, who have a UK section of their company. And then we have the timber frame above ground works. The contractors who are doing the above ground works don't have to do any footings, they don't have to do a slab.

So basically that handover point is the critical thing, which is always critical anyway. So even if it was all done under one contracting team the handover from the ground works, which is always concrete, blockwork, and that sort of stuff, which is very different

from the above ground work which is all timber and carpentry and boards and tapes. So even if it was a single contractor you'd often have a sub-contractor doing the ground works because it's a different set of skills. So that handover between the ground works package and the above ground works is actually really important. And it's important at Passivhaus and the way we do the build is because we want the slab to be the airtight layer.

Ben: The slab, not right down at the bottom. Or no, it probably is right down at the bottom.

Janet: Yeah, right at the bottom, the ground slab. So the concrete ground slab which is...

Ben: Underground or on the ground? Sorry, just to clarify.

Janet: Well I suppose it's on the ground but it's certainly sitting on the ground generally. So it's the solid ground, usually about 150mm thick and it sits on the insulation.

Ben: But the basement is airtight and within the thermal envelope?

Janet: On this yes, sorry. On this project we've got a ground slab and it's the lid of the basement.

Ben: Right, okay, got it.

Janet: In a typical build it would be sitting on the ground, but it's a concrete 150mm say thick thing. And that is what we are then building off.

In a conventional timber frame I think they have plus and minus 10mm they go to that you can do across the slab and still get away with putting the what's called the floor plate is what goes down first and then the frame, main frame goes up. So the floor plate has a certain, it needs to be fairly flat for it. So I've never done a conventional timber frame because I used to do brick and block, but having looked at the regulation, all the general advice, it's plus or minus 10, whereas we try to do plus or minus 3. At most plus or minus 5 you might get away with. So they've got to do that slab to a better standard than they would normally be doing. So that needs to be managed. And then before the frame arrives you want to check it, it is actually to that standard and it is handed over to that tolerance.

Ben: So let's rewind. You're obviously designing the frame as part of what you do and we're hoping to go and see it being made, so can you fill in that area there?

Janet: Yes, so we are, well Passivhaus Homes is, designing and cutting the frame and delivering it to site. But in terms of the ground works or the foundation it's always you're in the mercy of that is just traditional. Somebody on site contractor is making that and we're just monitoring it.

If I'm involved, if someone, another project you could have covered there's another architect doing it. We're just providing the frame. That's a different situation. So we just need to advise them. But the architect, whoever the architect is, in this case I am the architect, but if it was another architect they would have to be managing that slab and checking it and doing the handover and making sure it was right, and we'd be saying to them you need to make sure that this surface is to this sort of standard. Because you're getting a precision cut timber frame.

This is not something someone's, if you imagine, well yeah, it's all of those pieces are coming to site. I think we worked out there's 500 or 600 pieces. That's a lot of pieces coming to site and they're all cut and they all have to fit together and you can't start on a wobbly base. It's as simple as that. You can't start on a wobbly base!

Ben: That's why you've got to get the foundations right. So those 500/600 pieces, is that you're saying what the architect does is separate to, I know you're doing all of it and it gets a bit confusing, but that would just go off to Passivhaus Homes and they would come up with all the elements?

Janet: Yes, so at the moment we're working with an architect called Peter Rankin for example. Well we're just doing a quote for them actually. So he's done the design for two Passivhauses and then what we're doing there is saying we'll supply the shell. And we will design it as in the frame will be designed, it will be structurally calculated. It will be cut, it will then arrive on site and in that case it might be or might not be either we would arrange for someone to erect it or the main contractor would erect it with some training.

Ben: I think what's going to be interesting about this is we can probably almost bring this to a close now, because we hope to catch up with you a couple of times as the project goes on. So this is quite a good point to leave it, that we've got these plans, we've got the frame

and maybe once I've seen the frame cut and seen what they get delivered and we've got more to talk about.

Janet: Yeah, I think that would be a good point and I'd just say just so people understand at this point of before it goes on site, we've done a 3D frame drawing with all the timber bits.

Ben: Can you maybe just explain that bit again? I don't quite understand how you went from your designs. Because an architect wouldn't be designing in the timber frame or would they?

Janet: No, so we would see a house design, plans and elevations and really if we were advising an architect who wanted to use a system we'd be saying you need to have the walls so thick, probably a little bit more information than that but for very few guidelines they could be designing their house so that it would be okay to build out of a timber frame. So then as long as the wall is that thickness then we would then take it and we would be designing the frame to fit in to that house design. Basically we're designing it for your house, whatever you decided really we would make it work. And then when you see our drawings it is just the frame. All the elements of the timber frame, the lintels, the beams, and we do it in 3D so that you can spin it and have a look at it.

And then each of those elements gets transposed just into almost like an Excel sheet – it's not an Excel sheet – but of the length and the width and the angles that are to be cut. And there's a bit, I can't remember what the software is called, but it goes into this bit of software that the cutter understands. And this is where we're going to have a look which will be interesting. This hum-digger saw then takes all this information and if you were willing to have it all delivered to site, just as it was most efficient, the hum-digger will work out how to cut all those pieces in the least waste. So it will literally go through and sort out all those pieces. It's actually amazing and you'll end up with a tiny little pile of no waste at all.

But we have a little more of a puzzle because we've got to try and deliver it to the builder so that they unpack it in a sequence that makes sense. So that's quite an interesting issue. So they will get a number of packs. Say they get, I don't know, 15 packs or maybe 20 packs, they want those packs to go sequentially through. So the hum-digger then, that's one of the things we've been recently doing, working out how we can make the hum-digger cut them out in sections so that it gets packed up in sections so you only unpack pack 1 and pack 2 and do the ground floor walls, and then you unpack pack 3 and pack 4 and then you do the next. It's all very...

And of course it's slightly more wasteful doing that but it's still incredibly less wasteful than doing it on site if you can imagine how much waste happens on site. So it's quite an interesting approach just from material waste.

Ben: And it's a balancing act isn't it as well?

Janet: It's a balancing act. You're balancing all different needs out. But the factor also which we'll see when we go, and I'm interested in seeing it, is of course the waste is being created at the factory. So where they are making the I-joists. So that will definitely all get recycled because I'm always suspicious on sites when they have the recycling stuff whether this is really full circle going back. But if you can create the waste at the actual factory, you know for certain it's all going to be done properly don't you. So it's a very, what's the word, pleasing sort of circle of producing the frames I think.

Ben: Well let's leave it there. Absolutely brilliant. Always a pleasure to chat to you, but yeah I think we need to pick up the story again a few months down the road. Thank you Janet.

Janet: Thank you!