



Chair: Malcolm Hackett OAM

Presenter: Dr Justin Leonard

Justin Leonard

I've got an example where regulations more or less have gone wrong. So, this is a BAL-40 house that we couldn't quite understand why and how it actually burned down in Wye River. I couldn't actually understand how it could be a BAL-40 house in Wye River because it was actually clad in timber. And when we looked closer to it, they'd exploited a loophole in the Building Standard by building a fire resistant house that had a fire rating.

So, it was something like a BAL-40 construction approach, which then didn't specifically say that you couldn't clad over that in decorative timber. So you can see the obvious issue that as the decorative timber ignited and burned, it provided direct flame attack on the BAL-40 windows within the same façade, which meant that the house failed. And you can actually see the type of detail in the bottom left of this picture, where we've got a little retaining wall, a fantastic location for leaf accumulation, adjacent to the combustible fascia materials, which would have supported and allowed spread of fire up to and consuming this house.

And that's pretty much the aftermath of that particular location on the house. So, a regulated house does not mean you have a great solution. It takes a lot more than that, and a lot more wisdom and learning to build a really good resilient house.

Justin Leonard

Now, there's quite a lot of us in different circumstances, whether we've got a house that's been built to regulation, or we're using regulation as a bit of a guide to what we need to do in our preparations, or we're anticipating building to regulation, what's really important is regulation.

House Design & Maintenance

What are we up against?

Attack Mechanisms Check List :

- Large fire front – Radiant Heat & Flame
- Ember attack**
- Adjacent buildings
- Adjacent combustible objects
- Surface fire**
- Tree and large branch strike
- Wind and wind blown debris**
- Smoke (Human exposure)**

Considered by
Bushfire building
Regulation.

Partially or not
Considered by
Bushfire building
Regulation.

Both planning and building regulations deal with the first two line items. So they deeply consider how far we are from the bushfire, you would have heard of Bushfire Attack Level assessments and BAL assessments and things, all deal with how large could the fire be, and how close I am to it, therefore what have I got to design for.

And they also implicitly try to design for and consider ember attack within some bounds. They certainly only try to specify and do that within 100m from identified problematic fuels and then not really deal with it after, but that's an internal regulation issue.

All the lower line items are only partially or not considered at all by building regulation, so they really fall to dealing with these things on an individual due diligence basis, which is quite a lot of deep consideration to work through really.

Adjacent buildings beyond property boundaries are simply ignored by regulation.

Adjacent combustible objects are the responsibility to manage.

Relocatable adjacent objects are not a factor in consideration for regulation.

The combustibility of fences and retaining walls is not considered as something that regulation attempts to recognize or design for.

It doesn't really account for surface fires and how they play out, so a mulch garden up against a house is a fire source not really considered within regulation.

Trees and large branch strike: not really considered at all.

The wind actions and wind borne debris are not considered at all in regulation. In fact, they just assume that the Wind Loading Codes and the requirements of how Wind Loading Codes are dealt with for your given region are enough to not deal with that superficial damage to the house. But when you actually open a Wind Loading Code and really unpack it, the Wind Loading Codes are more about preventing your roof being blown off your house, and not dealing with the issues of superficial damage. So, really, that then falls to thinking about additional measures and being quite detailed about how we design the specific aspects and features around our house to deal with that.

And smoke and human exposure is not a factor in building regulations. It's not a design objective when we're looking at building and planning regulations, so once again it falls to individuals and individual circumstances.

Chair

What were the key learnings from the Canberra Fires some years back, would regulations have made a significant difference to house loss due to the adjacent building fires and the sheer size of house- to- house involvement?

Justin Leonard

Yes, I think that that is in itself a significant learning. The houses that were impacted within Canberra were not regulated, and probably what's very even more interesting is that after the fires took out significant houses in those neighbourhoods, they didn't actually invoke regulations in those areas.

And to this day, house to house is not considered part of the building regulations nationally, and it seems to be a really bizarre oversight that falls somewhere between the building regulations, which don't acknowledge it, and the planning regulations, which say you can still build close to your neighbour's house.

So, it remains an unfortunate oversight by regulation that really falls to the individual to understand and develop that sense of mutual risk obligation that you have with your neighbour if you're, say, within 6-10m of your neighbour's structure.

Chair

Is there an easy and affordable way to find out your home's Bushfire Attack Level rating? And if so, would having this information be useful to assist homeowners to direct their attention to the more vulnerable aspects of preparing their home?

Justin Leonard

Yes, I certainly would encourage people to determine their BAL attack level as a measure of working out whether they've got simply an ember attack problem, or an ember attack and significant radiant heat and/or flame problem. I'd always start with ember attack as the first thing to address, but it's very worthwhile knowing how much of a list you actually have to solve. In terms of determining your Bushfire Attack Level, it's a method that's described within the Australian Standard AS 3959, which should be available in your local public library. And if it isn't, I would badger them until they got it in.

Now, actually getting a BAL assessment done for you is a great thing in itself, but even better is actually learning how to do your own BAL assessment and self assessing your own property. And through developing that understanding and knowledge, you'll have a far deeper appreciation for the specific risks on your property.

Chair

I can imagine it would be useful thing for people perhaps to learn with their neighbours because you're more likely to keep a bit of a check on each other. You might be letting yourself off with an easy answer. When someone else picks up, it doesn't quite work that way

Justin Leonard

Yes, that's right. And because the system is actually a bunch of lookup tables and a process to step through, with pictures and guides and vegetation structure guides, you really can get to the end of the process without actually doing any deep math. So, I strongly encourage everyone to have a go.

Justin Leonard

Structure-to-structure spread is also a major issue in areas where houses are in within reasonable proximity of each other. These are pictures synonymous with the losses in America, where we start to term them as urban conflagration fires rather than actual bushfires. In the Australian context, we've noticed that houses can be compromised at distances of up to 12m.

So, this is actually a BAL-29 built house in the distance, where it was pretty much at the critical point of failure, simply from the heat load from its neighbour's house at a separation distance of 12m. Now, the windows and the glazing in the windows was just intact, and the seals had melted, and the glass had started to drop out in those windows.

This picture was also another house that had experienced the heat load of its neighbour at a distance of 12m. And, this is a particularly interesting house in that it shows the front half of the house heavily scorched, with the eave already charred, and has obviously been suppressed, and the cementitious cladding was quite heat affected. One of its windows, which was plain glass, had broken, that had a fly screen over it.

The second glazing element in that same window had not broken, and the rest of the house looks relatively unaffected because the back half of the house was sheltered and screened by a tree that shaded the radiant heat from the neighbour's house, and in doing so pretty much sacrificed itself with that level of intense radiant heat, but did not ignite and present an additional fuel load to the house. So, here's a great example of a very good behaving tree of the right type and structure, that provided a very important strategic radiant barrier in an urban fire context.

Justin Leonard

House-to-house spread is another ubiquitous form of consequential fire, so the typical separations we see between neighbouring houses, or houses and sheds on the same property, or houses and sheds on neighbouring properties, when they're significantly less than 12m, say around the 6m range or less, then there is a higher chance that one house can burn its neighbour down.

Now the things you have to do to actually resolve a house-to-house spread are things like very tall steel fences, elimination of fuel loads between those two houses, which simply add to the problem, and quite fire resisting construction on both houses, considering the windows, the eaves, and the fascia materials, is really the types of efforts you need. So, it's a really challenging mutual risk problem that many face, and ideally having good separation is a virtue. However, when you don't, you're really in it together in a mutual risk scenario. And I guess, in a way, it's a very important neighbourly conversation to have when you share a mutual risk like this. And I guess another way to address it is to simply be as diligent as the neighbour that you share the risk with to make both properties as bushfire resistant as you can, so that you don't face anywhere near as much prospect of one house burning its neighbour down.

Justin Leonard

Adjacent building and adjacent combustible objects are put into one broader category because, I guess, in a traditional urban setting, houses are packed in quite close and the fences are put in between, and all the traditional objects we put around our houses not only act on our own houses but act on our neighbour's houses. So it's this collective aggregation of all of these potentially combustible objects that are very significant and burn down for not just the 10, 20 minutes, half an hour, 40 minutes that a fire front classically can pass by. These burn for hours and hours and act on your home if they're close enough.

So, they're absolutely critical to deal with. Very difficult to mitigate the types of barriers you need to mitigate a structure from an adjacent structure is really tough, but you can build or retrofit houses, walls and windows to actually handle the potential of a neighbouring house ignition. But probably one of the best ways to think about house-to-house ignition risk is to have a really deep discussion and a strategy with your neighbour.

Because one thing you can do is if two houses have the potential to burn each other down, one of the key ways is ensuring neither a house ignites in a bushfire so you don't have that mutual risk problem. But either way, your chances are elevated because you don't have to just get one house through the fire, you've got to get two or more houses through that fire, so it is a real question of a discussion at the streetscape level. And probably a good way to hopefully bring neighbours together around a common issue.