Designing your home
for the unique
challenges +
opportunities
of a sloping block of
land



the SLOPING BLOCK

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INTRODUCTION

Hello! I'm Amelia Lee, the Undercover Architect.

I'm a registered architect with over 20 years industry experience, in over 250 projects. And I'm also a wife, a mum to 3 young kids and a serial renovator.

Undercover Architect helps and teaches homeowners how to get it right when designing, building or renovating your family homes. With a blog, a podcast, and online programs, there's lots of ways to get the support and guidance you need in your project.

Homeowners often share with me how hard it is to find design advice for their non-standard block of land. And yet, designing your renovation or new home is an exciting opportunity to create something that suits the qualities and assets of your site uniquely.

So, let me share with you specific design strategies you can use to overcome the challenges for a sloping block, and maximise its opportunities. And the key questions to ask yourself, and your team, to create a great outcome for your home and land.

Your Secret Ally

Amelia, UA x



So many homeowners get in touch with me because they have a sloping block and none of the inspiration they're looking at applies for their scenario. They're confused about how to get a connection with their outdoor areas, about how they'll not spend a fortune in excavation and retaining, and how to best deal with the sloping terrain.

This can apply whether their block has a gentle slope to it, is like goat country, or is somewhere in between.

And it usually becomes a case of which of these three options you'll choose ...

- do you build or renovate so our home sits elevated above the slope, floating over it
- do you excavate the site to create a flat platform so the whole home can be built of renovated on one flat pad
- Or do you do something in between, and step the home to marry in with the slope of the land, so you can create a connection with the site as the home terraces across the slope of the site, creating more of a split level home

Each of these choices have an impact on your costs, the type of home you can build or renovate, and the outcome you create with your home.

When it comes to sloping sites, we often talk about slopes as grade ratios ... such as 1 in 10, or 1 in 14, for example. What this means is, that for every 1m or 1 foot of fall vertically, there is a certain horizontal distance. If you can picture a triangle



... with the hypotenuse, or the longest side, being the slope. The short vertical represents 1, and the third side is the horizontal distance.

The bigger the number, the gentler the slope. So, a 1 in 14 grade is a gentler slope than a 1 in 2 grade. A 1 in 14 grade means there's 1m of vertical drop or climb, for every 14m of horizontal distance. And a 1 in 2 grade means there's 1m of vertical drop or climb for every 2m of horizontal distance. So, much steeper.

I wanted to explain this a little first, so it helps you understand some of the challenges when it comes to sloping blocks. So, let's look at these now.



CHALLENGES

One of the biggest challenges with sloping sites, is that (more than other site conditions) you really need to think about them in 3 dimensions in order to design well for them.

When it comes to designing for a sloping site - in arranging how rooms and spaces will be positioned on the block and how the house will sit overall - the most difficult thing I see for homeowners is understanding the three dimensionality of it all.

And if you're working with a designer that doesn't use 3D computer tools, then it can be difficult to picture exactly how things will work. In fact, if you have a sloping site, I recommend you find a designer who does work in 3D, and can show and test exactly how your home will be positioned on the slope.

Even the most gradual of slopes can be deceptive when you try to put a flat building on them. When you can model the site in three dimensions, and then model the house in 3D, you can create a solution in the computer that helps you understand the amount of excavation and retaining before ever getting machinery on site. You can really test how things will work in reality to see the best position and level for the home during the design process.

Time and time again, I've seen that any extra money you spend in the documentation phase will save you money during your build. And it can help you minimise risks during construction as well of delays in site preparation with soil removal,



earthworks and services (plus the construction itself).

Whenever I have designed for a sloping block - even the slightest of slopes - I've started in section first.

So, what this means is that I'm cutting cross-sections through the survey plan at various points, and understand what the slope looks like when you put flat levels on it. Where it will work to position the main level of the house, the garage, the outdoor areas, for example. This can be done at a diagrammatic level and is an important first step when wrapping your head around the constraints and opportunities of a sloping block.

Because, and this is another challenge: What are you allowed to do when building codes etc restrict the way that some of the things you can build on your site, and how you can build them?

There are certain limitations in what grades, or slopes, you're allowed to use for various things when it comes to building. A driveway is limited to certain grades so you can physically get a car up or down it, without bottoming out your car. A disabled ramp is limited to certain grades so that it's possible for someone to travel up or down it in a wheelchair.

Of course, the rooms in your home itself need to be level and flat. But what do you



do with levels of getting from the street into the house ... and then the house to the garden? And then deal with how things can sit over the top of each other, and you get from one level to another.

When it comes to sloping sites, and what to position where, the first place I start is the driveway. For the driveway to work, and not bottom out your car as you drive into your garage, it needs to be designed a certain way. There's a maximum slope or steepness for most of the driveway, and then ways that the top and bottom of the driveway need to be designed to graduate the movement onto the street, and into the garage.

When you start with the driveway, you then determine what level the garage needs to be positioned at, and how far back on the block it needs to be set to get the driveway to climb or descend to the level you want the garage at. Starting with the driveway and garage can be important in setting out the position of the home overall.

Another challenge is how you deal with services like water and waste.

If your block is highest at the rear, and falls to the street, then you have gravity to work with in getting waste and water piped to the street, where it connects into local underground infrastructure.



One of your greater concerns will be how you deal with water runoff during storms. When you build or renovate, you have a responsibility to deal with stormwater and run off within your block of land.

So, you'll need to consider during construction how you prevent water running off into the street (and potentially taking dirt off-site with it). And you'll also need to work out how to put drainage in so, once your home is finished, you don't have water running off your site and into the street and neighbour's properties.

If your block is lowest at the rear, and highest at the front, then the challenge for you can be more significant. Getting water and waste to run uphill does not happen naturally, and certain councils will require you to deal with your services in a specific way.

Some councils will allow you to keep your waste and water on site, and deal with it via specific means in your back garden. These can include building a pit or basin that has construction and material requirements to deal with what's going into it, so it doesn't overflow onto other people's properties.

Some councils will require you to pump it to the street and connect into local infrastructure. And some will allow you to coordinate a solution with a neighbour so you can perhaps run your services through their property, if gravity works for you in that way to get it out to a nearby street. However, this will also require a neighbour



to be on board, and you can often have to apply to council as well to get permission to do this, and pay for the privilege of using their land to do this.

So, if this is your scenario, getting this sorted early in your project is key. I've seen lots of homeowners assume they'll be able to do one thing, got their design all drawn up and lodged it for approval, to only find Council put a bunch of conditions on them that will cost tens of thousands of dollars, their budget gets blown, and they can't afford for the project to go ahead.

Another challenge is the one I mentioned at the beginning of the podcast - which option you choose for how you arrange the home.

So, this is whether you float your home over the top of the slope, creating it as an elevated structure. Or, you bench the site - basically excavating and retaining it to create a flat pad, so you can sit a home on it more conventionally. And then there's the in-between, where you terrace the site, or the home, or both, so that the home connects with the site at various points as it arranges itself across the site.

And, as I said earlier, each of these will have a different impact on your budget, the type of home you'll be able to build or renovate, and the outcome you'll create.

It can be difficult to work out which way to go, what is possible and what it will cost. I often suggest to homeowners that if you are trying to decide and confused about



the difference in result and cost for each, that you run a few different options at a design concept stage. Getting some ideas drawn up and tested on paper can help you have far more realistic and concrete conversations with builders about overall costs, and help you avoid choosing one option very early on based on assumptions that may not be correct, or the most suitable solution for your needs.

Another challenge is how you make access into your home simple, and access between levels convenient as well.

When you design for a sloping site, you have to make decisions about how you want to move between levels. And depending on the grade of your slope, you can sometimes be moving quite significantly between the front and rear of your home.

I did a design last year for a home that was on a 1 in 2 slope - so REALLY significant. By the time you entered the home at the street, to getting to the uppermost level of the house, you'd climbed a vertical distance of around 14m. That's around 5 storeys.

So it's incredibly important that you think about how the design will accommodate that so it doesn't feel like you're mountain climbing everyday in your home. I'll mention more about this when I talk about opportunities next.

There's also the practicalities associated with getting groceries from the car to the kitchen, or heading to bed each night, or having guests come into the home and



getting to your main entertaining levels. And if you have very young children, or elderly parents living with you, and stairs aren't the safest place for either of them, then that needs to be considered. Sometimes lifts or dumb waiters are included in people's plans to deal with this - or at least the capacity to build them in later so homeowners can have some flexibility to add them down the track.

Ideally we want a lovely indoor / outdoor connection and flow where we can move simply from the interior parts of our home into the garden.

With a sloping block this can be difficult to achieve unless the home is designed a certain way to accommodate it. And even then, you may only be able to get an indoor / outdoor flow with specific parts of the site. This can be challenging if you're wanting to create a usable garden for easy play space, somewhere to put a trampoline or play set, and be able to supervise it all easily from inside the home.

And one thing I see homeowners often struggle with is when their pool is on a lower level in the garden, but their living areas are on an upper level.

Working out how they can supervise kids and get regular use of the pool is tricky when it's a storey or more away, and someone has to be down in the pool area anytime the kids want to go for a swim. I've seen homeowners build outdoor kitchens on their pool areas, put extra bathrooms on the lower level of their home, and almost do satellite summertime living areas that they can use anytime the pool is in use.



Other solutions have included putting cameras in to supervise pool use from inside the house, which only works when your kids are a bit older and don't need you right beside the pool, but you still want to keep an eye on things. It's a tricky one to solve, and requires some consideration to get right.

As a result of all of this, you can also find there's the challenge to overcome in your home feeling disconnected ...

Disconnected either from the land around it because you're building a flat home on a sloping block ... or if you're terracing it, then the home's spaces themselves can feel disconnected from each other.

Lastly, there's construction challenges around retaining and excavation.

Retaining and excavation can suck huge amounts of your budget, and dictate certain construction methodologies to keep your home waterproof over the long term. And during construction, it can mean big costs in soil removal, preventing soil run off into your street so you don't anger council or your neighbours as well.



OPPORTUNITIES

Let's now look at what sloping blocks have got going for them, because there are some fantastic opportunities for sloping blocks when you know how to approach them, and what to focus on.

Sloping blocks can offer great privacy purely by virtue of not being on the same level as the public domain as the street.

If your site climbs above the street, you can get privacy by having great elevation over the street, and open your home up to views, breezes and light without enabling views in from the street.

If your site sits below the street, you can shelter your home, and protect it from views from the street, as it steps down the hillside away from the front of your block.

This removes a lot of what many standard blocks are dealing with when arranging the spaces in their home to protect from views in, and overlooking from neighbours and those in the street.



Another lovely opportunity is that you can create a lot of difference in the feeling of space in your home - based on the experience of your site and its conditions.

One of the lovely things you an do on a sloping site is really change the way a home feels through how it connects within the home and with the land around it.

Whenever I've seen great outcomes on sloping blocks, it's because they've really embraced how the topography changes your relationship with the site ... in either sitting below the ground, connecting with it, or floating over it. Or providing a glimpse of a view, or natural light, and how that can change across the site as well. There's an inherent changeability to a sloping site that can lend the home the opportunity to change in its feelings as well.

Remember when I spoke last week about achieving privacy through levels? About how many significant buildings are put on a pedestal of steps ... like art galleries, or the opera house ... and you ascend to them? And in doing so, there's a feeling of specialness and separation that happens as you arrive at the building? This is all naturally possible in how you create a home on a sloping block.

On a sloping block, you can often choose where you enter the house at. Perhaps you enter at a mid-level and go up or down based on what views and assets your site has. Perhaps you also descend down to the entry, and the home hugs the site as it rolls



down the hill, giving you a great and grounded, connected feeling to the land around it, and an intimacy of hugging the earth and being protected from the street - almost hidden intact.

You can create a lot of interest in how you choose to approach the design of your sloping block home in this way.

Another opportunity that sloping blocks provide is how levels can enable you to separate out areas really well.

Often when planning a home that's all on one level, we're using walls and other separating devices to create divisions between rooms so it delineates use and space.

With a sloping site, you can actually play with levels to do this. Stepping up or down the block - even by a few steps - can create a feeling of threshold between spaces.

Even without walls between them, a room that is a different level to another, can feel like a separate space without having walls between.

And this leads me onto my next opportunity ...



Sloping blocks enable you to create a sense of exploration and surprise.

Whenever I've worked on the design of sloping sites, the landscape and approach to the home has been a significant part of the conversation.

If you have to climb or descend a certain vertical distance to get to the front door, you want to make it feel like an enjoyable journey. One that has surprises and enjoyment along the way, so you're never quite aware of how far you're climbing.

So it feels like a gradual exploration with moments of joy - rather than a long climb or descent to a front door and through the house itself. You can actually do this in quite a compact space if you are intentional about how you design the journey into and through your home.

There's a home that BASE Architecture, a Brisbane firm did, that's actually the firm's owner's own home. I'll pop a link in the resources so you can check it out.

In that home, Shawn and Natalie made a decision that they would use the same set of stairs everyone to get into the home so there's one set of gradual, terracing stairs, that go from the garage and street, up to the front door.

There's a dumb waiter in the garage to get groceries and heavy stuff up to the main



living area.

The home then has its living / kitchen / dining all on one level, which connects out to the garden at that point. The bedrooms then pivot around this, as well as a second living space for the kids.

One of the traps you can fall into is that the various parts of the home feel disconnected as a result of terracing across the site in different heights and locations.

However, this home does a great job of exploring levels and how to connect gently between them, and the home feeling like one entity at the same time.

You feel like you're exploring the home and site as you ascend into it - rather than climbing to a destination.

The second living space steps up from the main living areas, and actually has some low height walls around it, that provide views through, and a sense of connection, but it feels like a separate space that doesn't encroach the main activity in the home.

This home also put the pool up on the same level as the living areas. It's obviously more expensive to build the pool this way, as an out-of-ground structure, but what



Shawn and Nat did was position the pool on the western side of the home with a battened screen around it.

It shades the home in the hotter months, is a great feature on the street elevation, and sits next to the kitchen and living area, so it's brilliant for visual access.

On a straight comparison, you'll need more budget to build on a sloping site than on a flat one - but the opportunities are there if the budget is to create a fantastically functional home when you really embrace the topography, and use it to your advantage.



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10 QUESTIONS

Let me take you through key questions to ask about your sloping block and the home you're designing for it, or renovating on it.

Answering these questions, or talking through these ideas with your designer or builder, will help you tailor a solution to suit you, your block and your needs, and make the most of the opportunities available.

You can save this PDF locally to your computer, and type in your answers to the grey, interactive boxes. Or print this out and write in your notes and thoughts.



1. What is your orientation and how will you have to specifically design your sloping block home to suit it? This can be a bigger deal to overcome that other block types, because sometimes you're only getting light from 3 sides, not 4, as you step up or down your block. So it's good to have it front and centre in your design approach.



2. How will you drive into your property and into your garage? How does that set up your levels and where your home is located on the block?

3. Is the designer you're working with able to model the home in three dimensions so you can really understand how it's sitting on the site?

4. Do your services need any special consideration about how they'll get out to the street?

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5. Which option will you choose (floating over, excavating a flat pad, or terracing your home) to make the connection with your site, and the type of home design you're seeking?



6. What does that choice mean in terms of the materials you'll build from, and the construction methodology for the home?



7. How will you travel through the different levels as you approach your home, and travel inside it? Can you make this feel gradual and generous so you enjoy it?



8. How can you use levels to create zoning and separation within your home?



9. Early on, do you need to explore a few different options simultaneously so you can make the most informed choice for your home, your site and your budget?



10. And lastly ... How will you arrange the spaces so access between them is convenient and enjoyable even with big level changes between them?



3 SCENARIOS

Finally, I'll take you through some to think about for these 3 scenarios on corner blocks: choosing an off-the-plan home, building a custom designed home, or doing a reno and extension

First, choosing an off-the-plan home to build new on a sloping block

It can be super hard to find a suitable off-the-plan home for a sloping block - especially if you have one with a steep grade on it.

You may be forced to do a custom design for your sloping block. Sometimes you can find a design that can be split simply in the middle as a customisation of a standard plan.

See what opportunities you have to alter an existing design with level changes within if this is definitely the route you need to choose. Alternatively, find a builder who can do an off-the-plan elevated home built up on stumps, as it may be a better option to just float your home over the whole block.

Next, getting it right in a custom home design for a sloping block

For this option, I really do suggest you run a few different scenarios at once to see which is going to be the most affordable and suitable for your needs.



In my mind, the best solution for a sloping block terraces the home across it - so it can create indoor / outdoor physical and visual connections as much as possible.

And so the journey through the home can be gradual and always feel grounded to the site.

I can't emphasise this enough, but getting help in visualising and designing for the home in 3 dimensions is really essential to creating a custom design that's going to work for your sloping block.

It will make a big difference in determining how much dirt needs to come off the site, the extent of retaining, and how internal levels will meet the external ground plane ... all before you build it in real life.

And thirdly, renovating or extending an existing home on a sloping block

Often a renovation on a sloping block will be largely determined by how the existing home has dealt with the slope.

Sometimes, you can look to gain extra space in the home, by digging out underneath to create that additional floor area under it, because it's partly excavated or sloping away already. Things to check first before going down this route are your footings,



and how far down they go, and the work involved in underpinning them if you're excavating further to get the height you need under the house.

Another option I see homeowners explore is raising their existing home to get that space underneath that's almost there, but not legal height. If doing this, examine how much additional excavation and retaining you'll need to do, and how all your new levels will work.

Also consider how you'll handle this aesthetically, and marry the existing home into its new lower floor. Far too often I see these quaint cottages lifted high in the air, with little thought as to how they'll appear scale wise as a big, new, 2 storey home, and they have a massive run of stairs on them to get to the new front door.

A bolt on extension can be a great strategy when extending on a sloping site. Sometimes you can leave the existing house exactly where it is, and then add an extension which sits on the site where it needs to level wise, and connects back into the existing home - with the level transition happening in that connection zone.

I'll pop some links to projects in the resources so you can see examples of how a sloping site has informed the type of home created for its site, and hopefully it will inspire you with some ideas for your block.



OK, so that's it for sloping blocks.

I hope you found this helpful ... and even if you've been listening, and you don't have a sloping block, I hope that some of the ideas, and way I talked through questions and concepts, helped you with your future home.

Check out the rest of Season 6 of Undercover Architect's award-winning podcast for more on "Designing for Difficult Sites", as well as all the other fantastic episodes to help you as you design, build or renovate your home.



RESOURCES

This home renovation used the slope to create a new extension and build in under the existing home for car accommodation >>> https://undercoverarchitect.com/corner-queenslander-renovation/

A corner block as well as a sloping site, this home also used the additional levels available to create extra room at the lower floor >>> https://undercoverarchitect.com/renovating-queenslander-cottage-project-diary-entry-01/

This design explored options as it connected with the sloping site in different ways >>> https://undercoverarchitect.com/family-5-desire-functionality-comfort/

This post on Undercover Architect's Instagram shows just how steep a site is a 1 in 2 grade – and the type of design I did for this client >>> https://www.instagram.com/p/BRsr9TWj5FC/?taken-by=undercoverarchitect

Base Architecture's home designed and built on a sloping block can be found here >>> https://www.basearchitecture.com.au/projects/stonehawke/


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EXTRA NOTES



THE END
(But possibly just the beginning
of your home project!)

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