Australian Institute of Waterproofing

Issue 17
July 2021

PRESIDENT'S ADDRESS

Cladding Replacement Scheme

I was a participant on a VIC Building Authority (VBA) Webinar this week which focused on the Cladding Replacement Scheme. During this webinar they raised concerns of water damage they were uncovering as a result of poor cladding installation and in some cases defective membranes.

This has created awareness by Dan Obrien's team at Cladding Safety Victoria, who are liaising with the Chief Building Surveyor, Andrew Cialini and they are 'talking' about the waterproofing issues.

Andrew and I had a zoom meeting during the Covid shutdown where we discussed the issue and a possible way forward to alleviate the problems. I suggested that the AIW carry out some information sessions with the VBA and from that conversation Andrew put me touch with Anita Dorfer-Mehanic who is the Senior Manager, Special Projects/Audit & Inspections for the VBA. We set up online (Teams) meetings with the entire group of inspectors who are carrying out the site inspections.

After an intro by myself, Byron Landeryou was a great help as he became the AIW front man and presented the information with a few of us in the background answering questions and a short presentation by David Hepworth.

The information delivered was a great asset to the inspectors and Anita was extremely appreciative that all at the AIW would give up their own time to better the industry. We hope to be able to present further sessions (maybe in person) with the VBA and keep the connection 'live'.

Wet Basements

One of the biggest frustrations I see as a contractor and a builder is wet basements being constructed incorrectly and subsequently causing owners a lot of grief after they take ownership of their lovely new apartments.

I get calls every week from people asking, 'How can we stop the water flowing into our basement and causing OH&S issues (mucky water flowing across floors = slippery)?' Now, all of us in the game understand that trying to stop water flows in a wet basement (pier & beam-shotcrete) wall system is fruitless and generally a waste of time and money. If a leak can be stopped, it is usually only for a short time before it moves and starts to leak again or another leak flows from another spot. Water will find a way.
Control (in my view) is the best way to deal with water flows from a wet basement. They are supposed to be set-up, so water is caught at the base of the wall and directed to a pit for removal by pump/s. I see 1 in 20 that have been done correctly! How this (poor construction) is happening and being passed by building surveyors is beyond belief, but it is becoming a much bigger problem. Even so called 'good builders' are not building them correctly in the first place.

I recently had a conversation with one of my 'good' builders who we work for (fixing the problems for him) and asked him why he will not build with a sandwich membrane behind his shotcrete to stop all this flowing water from cracks in the shotcrete. His answer was - money. He would not spend the money up front but ends up paying three times the amount to rectify the problems! Now I'm not an accountant, but I reckon that does not help any builders end-of-financial-year figures.

Here is the question - How can the AIW get the message across that poor building practice needs to stop? If anyone has an answer, I am always ready to listen. I will be approaching the MBAV on this topic, so we will see what happens.

Until then, keep up the good work and show Australia that the AIW cares about what we do and AIW members do it better!

Paul Evans
AIW PRESIDENT

A WARM WELCOME TO OUR NEW MEMBERS FOR MAY AND JUNE.

NEW MEMBER	COMPANY NAME	STATE
Akbar Ali Khan	AJBC Group Pty Ltd	VIC
Joe Zita	Approval Systems	VIC
Jim Mortlock	Asset Sustain	VIC
Dave Mellor	Black Elk Constructions	QLD
Edward Dakhoul	Construction Consultants (PM) Pty Ltd	NSW
Brad Lynch	Herlyn Pty Ltd	VIC
John Vikiarellis	Landlay Consulting Group Pty Ltd	NSW
Charlie Lastrina	Lastrina International Pty Ltd	VIC

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Leaking Concrete Rooftops - Why Waterproofing Should Not Be Ignored or Delayed

Understanding the root cause of roof water leaks and finding a solution is no easy task. By their nature, rooftops suffer from lack of or insufficient maintenance. This is a case of being out of sight and out of mind.

I would like to share my personal insights about water leaks and flat concrete roofs, which dominate multi-storey buildings such as apartments and office towers. As both a Registered Building Practitioner and a waterproofing specialist, I consider building and structural elements when evaluating the complex problem of water ingress. I have seen cases where leaking roofs have been incorrectly diagnosed as a waterproofing matter when, in fact, there were major plumbing issues and structural design elements at play. Where this happens, the underlying causes have not been understood so simply installing a new membrane does not prevent water ingress. At some stage, the roof will invariably leak again. It is important to diagnose the underlying reasons for the leaks. This will lead to the correct approach for permanent rectification however, where structural issues are not understood, rectification decisions may not solve the problem.

In many instances, there may be several options for remediation. And of course, cost is a significant consideration. A leaking roof does not necessarily require a new roof membrane. It comes down to investigation. This is where my so-called 'roof forensics, assessment and investigation' comes into play. Understanding the underlying cause of water leaks helps to determine the best course of action. When we are called in to rectify a leaking roof, we are dealing with older buildings with a membrane at the end of its life cycle. Often, these membranes have been patched up over many years to stem intermittent water leaks. Sometimes, it is possible to carry out temporary work and to delay the permanent solution until later. This can be ideal where factors such as a lack of funding or inclement weather and conditions are at play.

Membranes

Eventually, however, there comes a time when money must be spent and spent well. This means waterproofing rectification works that provide a solution to meet performance criteria in terms of lifetime service, permanent leak resistance, weather resilience. Though product marketing may say otherwise, waterproofing membranes do not always offer lifelong protection against water damage.

Over time, a membrane's effectiveness will diminish. This is especially the case for membranes which are exposed to the rigours of the Australian climate. Knowing when to re-apply or install a new membrane is crucial to maintaining the long-term structural integrity of a building.

Sheet type of roof membranes (strips of bitumen backed material laid out and joined together with flame heated bitumen or sheet rubber like material that is glued at the seams and glued to the roof, etc.) tend to leak at the joins. Membrane joins can be areas of weakness and though supposed to bond to the concrete roof slab, sheet membranes do 'de-bond' (mostly due to poor install methods). Consequences are a 'waterbed' effect when water migrates via the open joints.

In my opinion, roof waterproofing membranes should have the following properties at the minimum:

- **Flexibility** - membrane needs to move with normal climatic fluctuations of roof surface i.e. expansion and contraction.
- **UV Stable** - roof membranes need to be not just UV resistance but UV stable for longevity.
- **Robust Adherence** - membrane requires strong bond to the existing roof surface. If an 'overlay system' that means adherence to any historic surface coatings that remain.

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Did you know that our past newsletters can now be found on the AIW website?

Packed full with industry updates and waterproofing best practice tips they are well worth a read.

Check out what you missed under our 'News' tab --> https://www.waterproof.org.au/newsletters/

•**Ability to Contour to Shape** - rooftops often involve utilities, air conditioning facilities, penetrations etc. Roof membranes must seal and make these watertight.

Coating Systems

A frequently asked question regarding rooftop waterproofing is: 'Can the existing surface be re-coated, or does the damaged membrane need the costly and time-consuming option of total removal?' This is particularly relevant with 'busy' roofs, such as those with mechanical installations and/or rooftop plant deck equipment. Over topping an aging roof with a membrane is less expensive than a 'remove-and-replace' roofing upgrade.
When restoring a rooftop with a new coating system, it is important to understand what the existing roof system is and to ensure that it is indeed suitable for restoration. Performing adhesion tests can help determine if restoration is a good fit. Correct and detailed surface preparation is key and the discovery of a litany of roof coverings make this a challenging exercise. Selection of the correct membrane is difficult as there are many different products available. There are a range of solutions to meet the current performance demands. I would not be so bold as to suggest there is any one product for roof restorations. In general, they are all reasonably good. If not, they would not or should not be on the market. Whatever product is chosen, meticulous application and installation is critical.

Concrete Roofs

The integrity of a roof is also critical. Slow leaks can cause devastating structural damage. Most of this will be unseen as water migrates into the structure itself. For example, if concrete remains wetted (by roof leaks or other), rust on the reinforcing steel will be accelerated. This will lead to swelling of rusted sections and cracking of the concrete. At some point, the outcome will be structural failure.
Wetting of concrete greatly speeds up the process of deterioration - 'concrete cancer'. The Building Code requires buildings to survive for several decades. If structures are not maintained, however, deterioration can begin much sooner. When concrete started to be used in modern construction, the 'specification' was for approximately for 50 - 100 years. This timeline for many buildings in our cities has come and gone. Water ingress via rooftops is part of a slow creeping disease in aging buildings. The answer is to address the integrity of aging roofs for watertightness. If remediation is required, this should happen sooner rather than later.

By Paul Evans
Managing Director: Findlay-Evans Waterproofing
President: Australian Institute of Waterproofing *(AIW)*
Registered Building Practitioner - Vic
(Commercial & Domestic - Unlimited)

Steam rooms A different animal than a shower.

Steam Rooms are not only great places to relax and be healthy; for the professional installer, they are also a special challenge and job great opportunity.

Structural Design, Construction, Building Materials, Technical Equipment - Before Surface Finish Installation.

Steam rooms are designed to be closed rooms within which a special environment and climate exist during operation. They exist parallel to and are different compared to the climate outside that room.

A steam room construction consists of a sloped floor structure with drainage, tile loadbearing wall structures, a tile load bearing ceiling structure (sloped toward walls at 2% minimum), and typically seats or bench arrangements (seating area sloped in a forward direction). While their general design reflects that of a shower in many ways, steam rooms require a completely sealed room design including the added ceiling and a sealed door and door frame arrangement. In addition to water exposure, steam rooms must be able to handle and manage water vapour and high temperature and temperature change exposure.

Generally, all equipment used in steam rooms must be chosen based on their suitability for steam room use. Electric equipment and fixtures must be rated for submerged use and should carry an IP 67 class rating. Lighting may produce heat and such heat should always be projected away from structures. Caution is necessary when working with lighting commonly used in pools. These are often cooled by the pool water, which does not occur in steam rooms. All metal-based equipment and fixtures should be corrosion resistant on the level of stainless steel 316.

The Special Challenges to Prepare the Steam Room for Water, Water Vapour, and Temperature Exposure Management.

Steam is a different animal than water. It has a lower density than air and therefore it rises towards the ceiling, which is the most crucial part of a steam room. Just imagine you play

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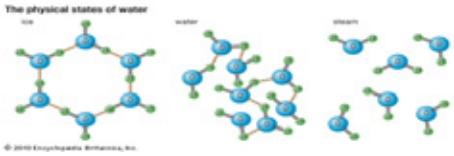
beach volleyball. The volleyball is your water molecule, which contains many molecules connecting and combining. If you throw the volleyball against the net, it will bounce back. You can visualise steam in the form of sand from the beach. If you throw this sand against the net, it will go through. The logical reasoning is that a steam molecule is much smaller and is pressing to penetrate through the net. In a steam room environment, the ceiling is therefore the most pressing area, where the steam finds the smallest pinhole, it will penetrate to the substrate if not sealed and vapour-proofed the correct way.



During a steam room's operation, a steam generator forces water vapour into the steam room and the air is quickly saturated with moisture and up to a level of 98% or more relative humidity. While H2O water molecules are in a state of gas form, they also carry great energy, and move rapidly and randomly. They are not as tightly packed as the same H2O molecules in a liquid state (plain water), in which they also move much slower. Water vapour molecules constantly threaten to penetrate the steam room structures including walls or ceiling but also benches or similar structures, including floors. If that is allowed to happen, the water vapour and, subsequently, the condensation that it forms, may cause damage to framing, subfloors, electrical installations, the adjacent room or equipment and materials outside the steam room.

H2O in its gaseous form (vapour) can penetrate conventional waterproofing membranes. These membranes are designed to withstand the penetration of water in its liquid form. Liquid, plain water presents a larger and tighter mass of H2O molecules and is a less energetic unit in comparison. Particularly, if the vapour molecules escape and meet their dew point inside structures, and then condensate, the condensation remains inside these structures and causes damage that may not be immediately detectable, but massively and continuously present. Wall and roof structures are typically colder, because they are in contact with the outside environment of the steam room. This attracts much condensation on the inside surfaces of the steam room, such as tile. But what is not immediately apparent is, that the water vapour also enters the equally cold grout and tile-adhesive layers until stopped. Insulation inside a wall cavity or structure is therefore important, as it will moderate the climate variation and difference to the outside. This helps prevent excessive condensation and will allow the vapour to circulate more effectively, and it will help save energy.

Temperature, also in combination with moisture, prompts many materials to expand or contract and at varying degrees, which may impact the steam room functionally and cosmetically. Movement in materials of all construction layers and in between connected parts, product and equipment can cause cracks, leaks, and bond issues.

To mitigate the risk from water, water vapour and temperature exposure, the waterproofing and vapour proofing or retarder are placed directly on the inside of the tile underlayment surfaces, where it will now be located directly below the tile adhesive, tile and grout material layers. Insulation is installed behind the tile underlayment.

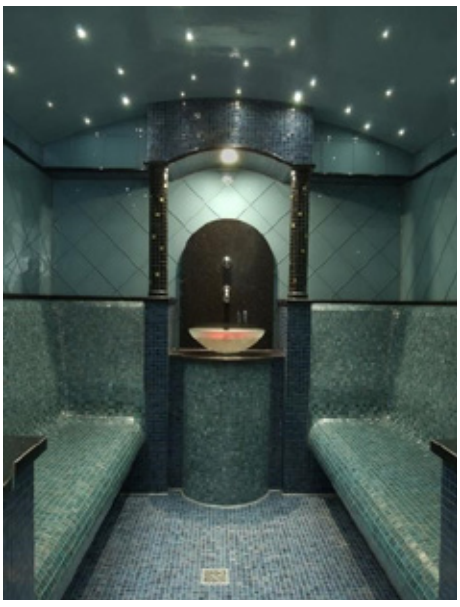
International Testing Methodologies.

There are testing methodologies and requirements set in other countries, which we should not neglect, as steam is the same all around the world. For example, the Tile Council of North America set the requirements as shown in the steam room details SR613 and SR614 in their Handbook for Ceramic, Glass, and Stone Tile Installation.

In their details, the TCNA requires the permeability of a vapour retarder to be below 0.5 perms when tested using ASTM test method E96, Method E, and with test environment set at 90% R.H and 38° C temperature. To achieve this, you may substitute the traditional membrane with equally strong two-component epoxy resins, but you may need to apply a thickness that is hard to achieve with the two-component epoxy resin and you may also need to add quartz sand to the final coat to promote adhesion properties/a rougher surface helping the tile adhesive to bond.

General Product Requirements and Recommendations.

Many of the challenges to structures and products, whether to be shaped on-site or installed as manufactured, are pointed to in the sections above. Many of the truly relevant recommendations were provided. However, it is supremely important the installer or planner of steam rooms choose each detail of design, installation or product only after most thorough research and investigation into the fitness of such products in the environment desired, so they may endure in steam rooms. Equally important, each product must retain its properties and remain unaffected over time as they work in their placement within a system and attached to other product which may affect them (example: they expand or contract at different rates). Ensure each product and the entire concept will be vapour proof, waterproof, and will manage within the temperature range of variations, the climate and cleaning exposure climate.



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The steam room will only work if all components work as a system. It is important that the fitness is verified with manufacturers, and they should warrant the product's performance within the system as planned. While manufacturers will not be able to warrant a steam room system where it includes other products, they can warrant that their product will work when installed in a complete design.

Workmanship, Knowledge and Skill Level Needed.

The installer and planner of steam rooms will have to meticulously verify not only proper design and product choice but the execution of the work on such installation. This is equally as important and requires maximum attention to detail.

Most importantly, the focus is set on eliminating any possibility of breaches or pinholes which would allow vapour to escape the room or migrate deeper than planned into any product or layers. This includes that particular attention must be paid to a vapour proof installation of all protruding equipment including lighting, sprinklers, possible vents, plumbing and shower fixtures, the steam inlet, the door assembly. These installations need to be sealed in vapour tight where the seal can connect with the room's vapour barrier, so the vapour barrier forms a continuous layer. Such seals may not be deferred to topical applications on the tile level such as through sealing in escutcheons. This should be done too, but the vapour will also be present below the tile and therefore, it must be addressed right there. Accidental damage to water or vapour proofing must be avoided and checked. The proper installation is also a significant part of a wholesome steam room concept to work successfully and over time.

Checklist to summarize on how to build a safe steam room.

1) Make sure that the products you use are rated for a steam room. I would suggest following the guideline of the vapour retarder to be below 0.5 perms when tested using ASTM test method E96, Method E, and with test environment set at 90% R.H and 38° C temperature. The majority of international companies have done this test already so just ask for their report and how they recommend building a steam room in other markets such as North America.

2) Tightly seal off any penetrations such as water pipes. All lighting and electrical equipment must be suitable for submerged areas (water and vapour tight, i.e. IP 67 class) and installed in vapour tight design.

3) Design a roof with a fall so that the water can run towards the wall.

4) Have seating with a fall, which eliminates pooling on the benches.

5) Install sealed door systems; doors to open to the outside and must have no locking mechanism.

6) Choose appropriate tile adhesives and grout recommended for installation of the tile or finish material and its design (e.g. grout width) selected, as well as for use in steam rooms or submerged installations. I would recommend for the best practice products: solid epoxy tile adhesive and solid epoxy grout (also withstands aggressive cleaning and many chemicals better than most cement or polyurethane grouts)

7) Choose appropriate tile or stone materials with zero absorption density and a surface easy to clean.

8) Install expansion joints using suitable silicones or premade strips made of flexible but solid materials.

Peter Beckmann
Director wedi Australia & New Zealand

Australian Institute of Waterproofing

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WATER STOPS.
Designed to stop water!

The importance of water stops is often undervalued. Coming from a tiling background, I understand the complexities of having to install water stops at the initial waterproofing installation.

A few of the main issues include:
- the water stop being installed out of square to the tile layout
- the water stop getting kicked or tripped then becoming buckled, or
- the client not wanting the water stop to be visible within the tile layout.

AS3740 mentions several locations where water stops should be installed to prevent the passage of moisture to unprotected surfaces or adjacent rooms.

This article will focus on two in particular:
1. the shower perimeter water stop; and
2. the door perimeter to the internal wet area.

Many internal wet area failures are a result of water stops being installed incorrectly or not being installed at all. One common misunderstanding about the purpose of the shower perimeter water stop is that the water stop is there to stop the water that travels beneath the tiles. That's right beneath the tiles. Moisture develops out of view to the eye, underneath the tiles and ends up damaging unprotected surfaces such as plaster, carpet and timber skirtings, as seen in the pictures below.

Non-compliant bathroom design and no shower or perimeter water stop. This has allowed moisture to damage timber and carpet outside the shower.

HOW THIS HAPPENS

As grouts and some tiles are porous, they allow easy transfer of moisture through to the tile adhesive below the tiles. With continual saturation of the tile bed within the shower enclosure a water table forms under the tiles. This water table swells and subsides continually with each shower use and in a lot of cases may never actually dry out for the entire life of the shower. If no shower perimeter water stop has been installed, this water table can migrate into a mini gutter that is formed between the floor tile and skirting tile and travel outside of the shower along the perimeter of the room until it gets to the timber architrave. Then, unfortunately, the only compliant way to fix this damage, is to start the process again.

It is alarming how many internal wet areas with a hobless or walk-in shower do not have a water stop installed, particularly in Victoria. As many builders and waterproofing sub-contractors have had little and, in some cases, no formal training on the Australian standards for waterproofing, they would not know that this is a crucial compliance and protective provision. In my work attending new job sites, staying at various types of accommodation and following builders/tilers on social media, I see daily posts and situations of walk-in showers that have been

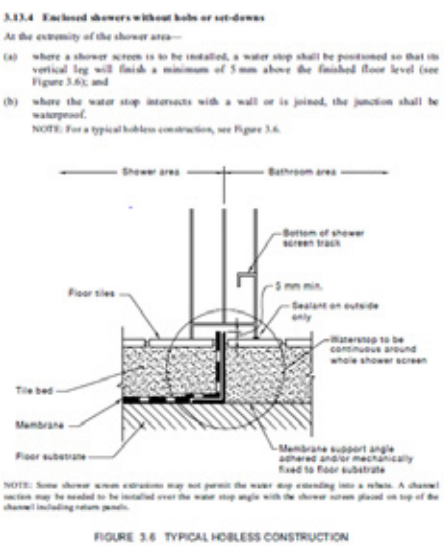

FIGURE 3.6 TYPICAL HOBLESS CONSTRUCTION

tiled with no water stop installed. This is a recipe for disaster based off the hundreds of failures I have seen and continue to hear about.

Under AS3740 for an enclosed hobless shower, the shower should have a water stop sitting underneath the shower screen and protrude 5mm above top of tile height.

Enclosed hobless/walk-in shower

Damaged timber skirting and vanity kickboard in bathroom.

Damaged timber doorjamb to the right and leaching through grout joints.

Carpet pulled back at the doorway to uncover extensive dampness and mould growth.

Sliding the scraper under the screen with little to no resistance is an indication of no water stop 5 mm above FFH.

Picture shows rotting timber floor. Water was found to be coming from the shower that had no shower perimeter water stop and an incorrectly installed perimeter water stop.

The following images are of a property that was under 7 years old and shows how easy it is to get it wrong. The ensuite and bathroom were designed with a hobless enclosed shower that ultimately failed. In these pictures we see the bathroom floor has multiple spots of efflorescence, leaching and water damage to the vanity kick boards, timber doorjamb and skirting and the timber floor outside the bathroom was damp, which lead to mould development under the carpet.
The carpet and timber deterioration in these images was a result from incorrectly installed perimeter water stops. The tile trim that was used by tilers needed to be installed and sealed as a continuation of the membrane system to ensure moisture would not exit the designated wet area and damage adjacent rooms. In many situations the perimeter water stop is installed at the same time as the bathroom floor tiles are being laid and generally only with tile adhesive.

Under AS3740, the standard makes reference to this as a Type 5 perimeter flashing and that the flashing shall be continuously sealed across doorways, with a 50 mm horizontal leg. As tile adhesive is not waterproof and if the tile trim has only been installed with tile adhesive, this would not achieve a continuous seal. Secondly, tile trims are approximately 20 mm on the horizontal surface and would also fail to meet compliance under AS3740 Type 5 perimeter flashing.

So in this case, both bathrooms failed to meet compliance and the home owner was able to get their bathrooms fixed under warranty. The builder repaired both bathrooms with the estimated cost of repairs somewhere between $20,000 - $35,000. All this extensive damage could have been avoided if a couple of $30 tile trims were installed at the time of waterproofing.

Building defects, in particular waterproofing related defects, cost the industry millions of dollars, not to mention damage to the industry's reputation. It is time to upgrade our skill sets and become better at what we do or face the risk of costly repair bills.

Byron Landeryou
Waterproof Awareness - Founder

Australian Institute of Waterproofing

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MEMBER PROFILE

Jim Mortlock is a new member to the AIW. After many years working for big name companies, Jim took a leap of faith opening his own consultancy business during the COVID-19 pandemic. In this piece, we learn more about Jim's achievements, what he specialises in and why he started a business in the middle of a lockdown.

Jim, tell us a bit about your professional background.

I became involved in waterproofing around 30 years ago in the UK after working as a junior draftsperson for a Chartered Engineering practice and then in an Asset Management Role for British Rail. After that, I joined a specialist contracting company specialising in structural waterproofing. For most of the next twenty years, I focused on stopping water from either getting into or out of structures. Inherently, the residential and road/rail side of this was working on below ground structures, be that basement waterproofing or tunnel works as new builds or waterproofing structures where the existing waterproofing was no longer functional. Since 2012, I have worked predominantly in the Australian market, working for leading remediation companies like Savcor, SRG and Duratec, before setting up my own the business in 2020.

What services do you specialise in?

Asset Sustain provides independent support, to contractors, asset management and Commercial clients throughout each stage of project delivery. My services include advice, estimating / bid management, and third-party inspection services, along with project management services.

Tell us about some of your career highlights.

I've been lucky to work in businesses or alongside individuals that have been driving forces in the development of waterproofing systems, techniques and the promotion of best practice and Standards. My UK based employment saw me involved in waterproofing domestic cellars, water treatment plants, London Underground rail tunnels and stations, multistorey carpark parking decks and bridge deck waterproofing.

I've benefited from training sessions in the UK and Switzerland and was involved in projects across the world in Gibraltar, Singapore & Spain. Here in Australia, I am proud to have been involved in many projects including pipeline refurbishments, heritage buildings and the waterproofing of assets for universities, government / defense, body corporates and private clients.

Tell us why you opened your own consultancy?

In April 2020, in the first wave of Covid-19, my job was made redundant. The whole landscape had changed for my then employers so, understandably, the firm had to make the difficult decision to secure the future for the primary industry. At that point, I decided to establish my own company to facilitate the lean and agile provision of out-source services within highly specialist contracting sectors such as structural waterproofing, concrete repair and corrosion protection.

Has Covid-19 impacted your business? If so, how have you worked around it?

The Covid-19 environment is the only climate that I've known as an independent, so I don't yet know what the business will look like in the future. Some of my clients are interstate, and I also have close contacts in the UK and Europe. I am in regular communication with them to see what techniques or solutions might suit the Australian and New Zealand markets. As such, web-based meetings and seminar attendance are likely to remain part of the picture instead of being so reliant on f ace-to-face interactions.

What are your top tips for consultants in the waterproofing industry?

I don't have any top tips, as Asset Sustain is a reasonably young venture, but we must review best practices from both Australia and worldwide and keep abreast of emergent knowledge. To that end, I try to keep my knowledge up to date and learn from adjacent industries. For example, I have recently completed a Level 2 Coating Inspection certification run by the Association for Materials Protection and Performance (formerly NACE International & SSPC). And I don't want to be presumptive about build systems, so I continue to progress through a Cert3 Waterproofing course. In addition, I am about to commence a course for Surveyors focusing on Structural Waterproofing written around the British Standards and, further study via the AMPP is planned.