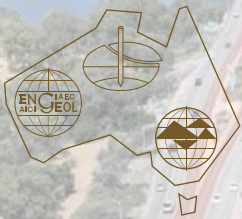


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Cover image: Boorloo Bridge, Perth, Western Australia
Image: Causeway Link Alliance, 2025.
Story: Matthieu Duong and Su Kwong Tan

Cable-stayed pedestrian and cyclist bridge crossing the Swan River in Perth, Western Australia, shown here adjacent to the existing Causeway corridor. The curved deck alignment and pylon geometry reflect traditional heritage elements such as the digging sticks and boomerang, acknowledging local cultural narratives expressed through form. From a geotechnical perspective, the riverine alluvial setting is characterised by spatially variable soils and elevated groundwater, and construction in or near water influenced foundation selection, installation methodology and deformation control. Geotechnical design and construction staging focused on serviceability performance and control of construction-related ground movements and groundwater conditions. Conceptually, the bridge substructure relies on piled foundations, while the approach embankments are supported by ground improvement using rigid inclusions combined with preloading or surcharging to manage settlement.

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VIEW FROM THE CHAIR

MARCH 2026

I concluded some issues ago that these 'View from the Chair' pieces get read by few people. Like most printed pages, there is no feedback loop for immediate gratification or validation to see thumbs up (or thumbs down), but I have occasionally received a message from an AGS colleague or friend (all over 45 years of age) with a question or compliment, which I always appreciate. While I have collected a little more verbal feedback (with emphasis on 'a little'), I recall receiving about 6 total emails or texts relating to what I have written in 8 total 'View from the Chair' editorials for the journal over two years. So my documented feedback has been about 0.75 communications per editorial – the stuff of journalistic dreams – and I would guess based on smelling the air that the average readership would be in the low double figures, perhaps 25 to 50 readers, on average, per editorial. Because several of the pieces have been about AGS governance and strategy – inherently boring topics for most engineers, which I have acknowledged – preparing them has helped me to organise, and to refine my own thinking in a way that wouldn't have happened otherwise. The pieces might just be too long, or they might suffer from too few images of cracked foundations, or not enough paleo-channels, or too many hyphens and too many conjunctions. But I have really enjoyed and have found value in writing what admittedly at times has felt like a personal journal entry relating to my profession. While I may submit more editorials in the future – and the occasional technical paper – this will be my last as the AGS National Chair, hence the above reflection.

On a few occasions I have learned or re-learned that a presentation should start with a summary for the audience of what they're about to hear. So in presentation format, you may be about to read about Engineers Australia (EA), politics in the United States, infrastructure in New York City, China, back to EA and the AGS.

In representation of the AGS, I attended EA's Forums meeting in March 2025 along with representatives of the EA-affiliated learned societies and colleges. For one of the sessions involving around 70 people, we were separated by tables and asked to identify the biggest challenges facing the engineering profession(s). My table discussed climate change, infrastructure resilience, an inadequate supply of future engineers, and one person mentioned the lack of engineers in positions of decision making. I think that last concern deserves consideration and does have relevance, but as ideas from all tables converged, and votes were tabulated, I was surprised to see that the need for more engineers in positions of decision-making (or 'at the table') was getting pushed from all directions and shifted up to become recognised as our biggest

challenge. I had/have my doubts about this and shared my opinion through a microphone that while I think the issue should be on the list, it felt a bit self-indulging to see it at the top.

My high school years in Las Vegas coincided with a lot of local debate relating to Yucca Mountain, a site on federal land roughly 125 km north which in 1987 had been proposed by the federal government as a disposal location for nuclear fuel and high-level radioactive waste. In 1994, and then as a second year Civil Engineering student at Purdue University, I first learned about someone calling-out the lack of leaders educated as engineers in the United States Congress. Norman Augustine was the CEO of Lockheed Martin at the time, and he coupled this observation with commentary about the interactions between engineering and society. He also popularised an expression that 'For every scientific (or engineering) action, there is an equal and opposite social reaction'. I counted six of 535 members of the United States Congress with an engineering degree (the AI tells me now that it was actually nine). There was also a PhD physicist and a handful of other scientists, but the overall limited number of engineers and scientists in political leadership – who ultimately made decisions of far-reaching technical consequence – was curious to me. In 1995 with a few days free from study, I drove from Indiana to Washington DC where extended family offered me a bed and warm meals in support of a visit to the US Congress. I had called in advance and aimed to meet as many of the engineers as possible along with my two non-engineer Nevada state senators. For good measure I also contacted the physicist and another scientist.

The three engineers I ultimately spoke to or corresponded with were all proud of their educational background and readily agreed to the need for more technically minded leaders. John Hostettler (R-IN) had previously made public statements about how his degree in mechanical engineering enabled him to pursue working solutions to problems that others might not see. He welcomed me into his office, which I remain appreciative of, and I asked him about the complexities of social and environmental challenges, and what insight his preparation as an engineer could provide to a scenario like Yucca Mountain. For the sake of transparency, I wasn't then nor am now opposed to nuclear energy – Purdue has its own very small reactor on campus and I had friends who studied it – but the emotions were high, and the 'not in my backyard' effect was strong. Still in the wake of a partial reactor meltdown in 1979 at Three Mile Island in Pennsylvania and the Chernobyl accident in 1986, the public was understandably concerned about safety and it permeated the culture. From Mr. Burns in an episode of the Simpsons: 'Homer, your bravery and quick thinking have turned a potential Chernobyl into a mere Three Mile Island.' The Yucca Mountain debate included not just Nevada, but every state with rail lines where the waste would be transported to Nevada, and the politics reached local television screens between repeats of 'Cheers' to educate everyone on just how unsafe the whole plan was. Or on just how safe. Public safety depended on which ad came up. Our conversation was friendly and I got a better sense of how he engaged with colleagues on matters of technical and policy importance. While I don't think Hostettler had previously implied that engineers can fix anything, I had started to wonder if having more engineers at the table of the Yucca Mountain debates would make any difference at all. And if there were more engineers, would it be a good thing if they all lined up on one side of the issue, likely in support? And if I disagreed with the social politics of an engineer, would I still want to support them for public office?

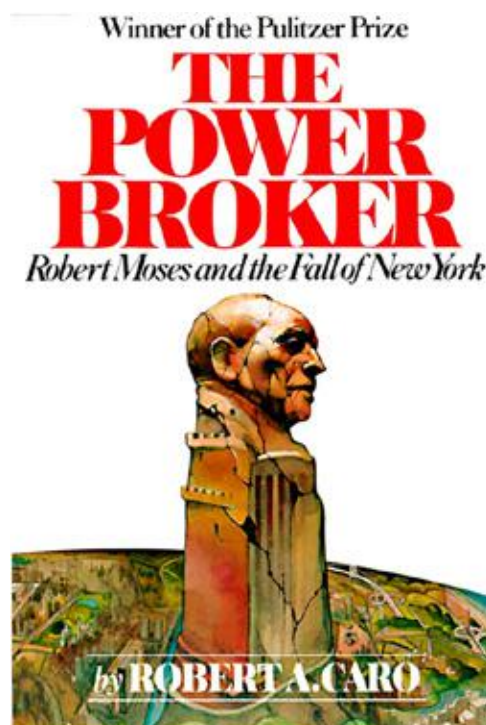
I spoke on the phone with Joe Skeen (R-NM) and corresponded with Jay C. Kim (R-CA), both with engineering degrees. I also spoke with two scientists: Vern Ehlers (R-MI) in his office and Roscoe Bartlett (R-MD) over the phone. To avoid doubt, 'R' is for 'Republican' and a trend was apparent. Eight of the nine representatives with engineering degrees at the time were Republican. I was also able to meet my home senators Harry Reid (D-NV) and Richard Bryan (D-NV) in their respective offices, knowing in advance that both were representing their Nevada state constituents in adamant opposition to the federal government's plans for Yucca Mountain. To avoid doubt again, the 'D' is for 'Democrat'. My suspicion after speaking with them all was that the problem might not be too few engineers and scientists in the US Congress – I did in my conversations hear from most about their engagement with a lot of technical advisors at different levels of government. By the way, Churchill popularised the expression that scientists should be 'on tap, not on top'. Perhaps the problem was too many lawyers. But then a legislature is there to make laws, so why be surprised at so many lawyers? Thirty years later, the number of members of the US Congress with an engineering degree is not much different: the AI tells me in 2026 that it is now ten.

From early 2002 to mid-2004 I spent most of my days logging boreholes somewhere around New York City. I worked in many wonderful neighbourhoods that I would not have sought out at the time if not sent there for a geotechnical investigation. This included a couple of months in 2003 working on the Upper East Side and East Harlem for the Second Avenue Subway Project. One day after finishing I attended a public consultation session for the project and observed members of the public use their right to 2 or 3 minutes to post questions or ridicule a panel of representatives from the project (one member of the public just called them all idiots and didn't post a question, which is what the consultation process enables there and obviously here and in many places and is probably a healthy outlet, if peaceful). Construction of Phase 1 started some years later in 2007, and 2.9 km of tunnel with three new stations opened in 2017.

If you work in or around the Civil Engineering profession in New York City, it is inevitable that you will learn about Robert Moses. Starting as the Parks Commissioner in 1934, and never publicly elected to anything, Moses accumulated a gargantuan amount of administrative power over some decades and drove public works projects at an extraordinary pace. While he didn't want to acknowledge some instances of shifting project plans to address the concerns of the wealthy or well-positioned, he prided himself on not shifting, and on a willingness to construct projects where they best served the public, regardless of who was affected. And therein was the controversy, because undeniably, lower income residents living in dense apartment blocks tended to feel the disruption of his projects most often. Un-checked by New York City mayors and New York State governors as they recognised he held more public sway than they usually did, having steered highways through the hearts of several thriving and often immigrant communities, he finally was stopped in 1971 when trying to build an elevated ten lane highway across Lower Manhattan.

Moses was incredibly energetic and very skilled at overcoming barriers, and at 'getting things done'. An online map entitled 'Achievements of Robert Moses' can clarify the scale of what he did, noting that he had a preference for bridges over tunnels, as he liked visible monuments. While not an engineer himself, he saw the work of engineers in particular

as being at the forefront of unquestionable progress. The power of Moses was critically dissected in a 1974 Pulitzer Prize winning book of more than 1300 pages. 'The Power Broker' by Robert Caro is critical reading for modern New York City history and became one of the most influential books for city planning in the United States shortly after publication. Sub-titled 'Robert Moses and the Fall of New York', the final assessment of Moses was clear to anyone reading the cover. He was an unpleasant person in many regards, but if there was corruption, it was related to the creative wielding of administrative power, and not the lining of his own pockets or those of others with public money. He 'got things done' as an authoritarian with little regard for community consultation and difference of opinion. So, in the last quarter of the 20th century, he became a benchmark in the United States for how not to undertake public works.



In the years following the 11 September attacks, Robert Moses started getting a new look. Despite the human tragedy, a lot of people still questioned why the rebuilt One World Trade Centre didn't open until 2014. And why the Second Avenue Subway – with the Phase 1 design commencing in 2001 – required 16 years for those 2.9 km and three stations to be constructed. The expression 'Robert Moses is rolling in his grave' became commonplace in the media while I lived there up through 2006, and the debate about his legacy in New York City – which includes public parks and pools and Lincoln Center for the Arts and many things that survive beyond highways through communities – has been reborn and is far from settled.

Occasionally I am involved with a project here in Australia that is on the fast track and that struggles to get boreholes or CPTs into the ground at a reasonable time, such that a design must contend with seemingly more uncertainty than the normal uncertainty, making for a whole lot of uncertainty that has to be communicated on time, no delays, because the project, after all, is on the fast track. I realise that communicating my frustration here is a form of preaching to the choir – of probably 25

to 50 singers – but with age I admit to also becoming more sympathetic to more aspects of the legacy of Robert Moses... as well as to accounts of construction progress in China as a direct competitor to the United States.

The rates of construction in China over the last decades are undeniably remarkable. A book that describes it well, and that got a lot of attention in the United States in late 2025 is 'Breakneck: China's Quest to Engineer the Future' by Dan Wang, a Canadian of Chinese origin who attended university in the United States and returned to China for a job shortly before Covid. A short list of notable accomplishments (there are many many more) include:

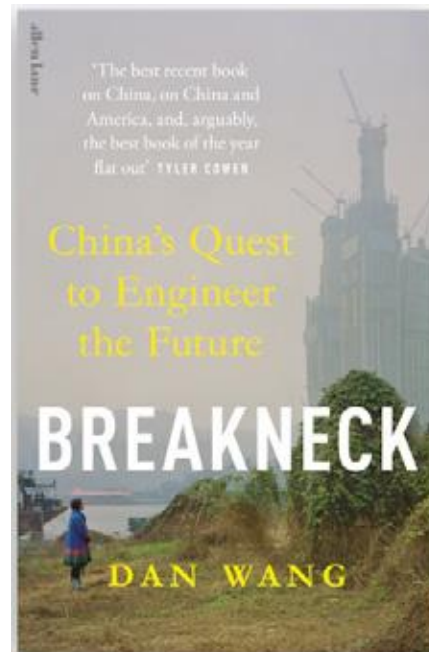
- From 2003 to 2013, Shanghai added as much subway track as all active track exists in New York City. (I looked at Wikipedia and found reference to a sub-period of this timeframe that included expanding the network from 65 km in 2003 to over 400 km in 2010, with the large majority of expansion as tunnel. Compare 335 km in seven Shanghai years to 2.9 km in ten New York City years, or arguably 16 New York City years)
- Within a few decades, China has constructed the longest high speed rail network in the world, ten times the combined length of Spain (second in world) and Japan (third in world).
- One of China's poorer provinces Guizhou has built 45 of the world's 100 highest bridges.

Wang labels China as 'an engineering state' while the United States is 'a lawyerly society'. Of specific interest to the topic at hand: in 2002 all nine members of the Politburo Standing Committee (effectively the head of the Chinese Communist Party and therefore the national leadership) were educated as engineers. Leaders with a preparation in engineering – with varying specialties including infrastructure, manufacturing and aerospace - had become a tradition during the Premiership of Deng Xiaoping in the late 20th Century.

The last bullet point above is revealing for a few reasons. I have never been there, but understand from Wang that Guizhou is very mountainous so high bridges are to be expected. But some of the bridges haven't achieved much, and could be compared to several 'bridges to nowhere' that occasionally appear in the United States and in locations that make no economic sense other than to bring an expensive project to a politician's backyard. So China isn't immune to some of the same political drivers that infect western expenditures. And probably to a much greater degree than Moses, China likes monuments. Around all the roads, bridges, and trains, visitors are still advised not to drink tap water anywhere in China. Water treatment plants don't make good monuments, so the engineering state appears not to have prioritised them in the recent decades of growth.

Despite periodic protests, including during Covid when the population tired of what came to be perceived as government-excess while the world re-opened around it, China has been able to maintain 'the consent of the governed' as Wang refers to it in several chapters of the book, because the government has largely delivered. China objectively has many challenges/problems, but the people can feel the many many

accomplishments, and overall economic vitality. While the starting point of the United States around the turn of the century was quite different, I would agree with Wang's observation that the United States government in this time has largely not delivered for its people. And these decades coincided with the export of massive amounts of manufacturing (and manufacturing capability, which Wang distinguishes) from the United States to China. Consumers in the United States benefitted, but we're seeing the long-term price. While Wang doesn't diverge from the main points of his book, I will momentarily digress in joining the many people who find some connection between these trends and the current state of politics in the United States, the fault of both the 'R' people and the 'D' people.



To be sure, Wang sees the competition between the 'engineering state' and the 'lawyerly society' as not yet decided, if it has to be. And he thinks that for the benefit of their respective populations, each country should try to be more like the other. Wang provides other examples of where the engineering and also scientist leaders of China didn't make the best decisions, sometimes with enormous consequences, and he explains how the 'lawyerly society' – with all its lawyers and attention to rights – had built-in mechanisms to prevent similar outcomes. He also points to some countries in Western Europe that have found a more effective balance between environmental reviews, public consultation, and 'getting things done'.

I recognise a distinction to be made between arguing for more engineers as political leaders, and more engineers at the table where decisions are made, perhaps as organisational leaders at varying levels. On some occasions the argument is in the interest of balance, and of ensuring that an analytical mind is present. Especially when in the public interest as in the case of decisions relating to planning and infrastructure, I am in full agreement with this need, even if I don't believe it to be the number one challenge facing our profession. Raj Aseervatham, EA's former President

who was present at the 2025 Forums meeting (and was also a guest later in May at an AGS National meeting in Brisbane) wrote a related article for 'Create' on 'Why more engineers should be leaders' in which he cites a career experience when he felt some engineers were too focused on their expertise, and less inclined 'to engage more willingly and deeply on the human or societal problem, not just the technical.' I like the anecdote because it hints at the responsibility of engineers to engage, rather than the responsibility of everyone else to engage engineers.

The argument for more engineers in leadership 'to get things done' (full-stop) is perilous unless society is on board and open to the occasional ten lane elevated highway across Lower Manhattan. The United States needs to build more for its people but the argument is best made not so much by engineers as by justifiably frustrated tax payers.

From so much of the discussion in the early chapters of Wang's book - it lacks an index so I couldn't easily search ahead - I anticipated a discussion of Robert Moses and 'The Power Broker'. It arrived in Chapter 7 with the heading 'Learning to Love Engineers'. For Wang, calling 'The Power Broker' monumental would be an understatement. Some of the bad decisions Moses made are undeniable, but the book is now dated. It played a part in the consolidation of 'the lawyerly society' and it helped to teach people in the United States 'to fear and loathe engineers'. Wang is not an engineer, but writers like him will be hugely influential in shifting, if not correcting, perceptions in a way that engineers won't so easily.

Australia is obviously not the United States, and per capita, Australia has built more infrastructure in recent decades. Compulsory voting probably is to credit for moderating the pendulum swings, but the pendulum still swings in its own way around different cities and states. Like most cities that win an Olympics, Brisbane - the new lighthouse of Australian culture - is adjusting to what will be required to deliver, as what worked to execute a large project just a few years ago won't work now. More effective at accelerating construction schedules than just engineers who 'get things done' will be a fixed deadline that everyone can see hovering over the river. Many engineers are already rightly and necessarily engaged and embedded in this process, but there's a lot of staring at that deadline (And some boreholes need to get moving).

To their credit, in September 2025 Engineers Australia, partnering with the Australian Academy of Technological Sciences and Engineering (ATSE), Consult Australia, Science and Technology Australia (STA) and the Australian Council of Engineering Deans (ACED), launched the Parliamentary Friends of Engineering. From the press release, 'the group provides a platform for parliamentarians to engage directly with engineers, universities and research organisations to develop solutions to some of the country's most pressing challenges, making their insights essential for informed policymaking.'

I've been honoured to serve as the National Chair for the AGS over the last two years and a bit. Working mostly with our now General Manager Jon Gibbs and the collective national leadership, I've also been honoured to lead our transition to a new public company limited by guarantee. We've had a number of bumps along the way and I've learned things about organisational and not-for-profit leadership - sometimes through my own mistakes - that I could not have so readily learned through other avenues in my career.

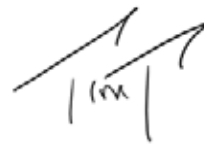
Our small learned society of roughly 3,000 people offers engagement within the profession and beyond. Not just observant of where I might have done something more effectively, I've noted many differing personalities within our membership and chapters: some people struggle to make decisions, some put low relevance minutia ahead of a bigger picture, some have little economic awareness, and some don't like any conflict. Like any organisation, really, but there are opportunities to work on these things.

For the last two years we have been actively sending our chapter leaders, international society vice presidents and representatives, our journal editor, and invited members to the AICD course on 'Governance Foundations for Not-for-Profit Directors'. And we are developing policies and procedures around the constitution to sustain the new organisation. I believe we are doing our part in helping many of our members to grow as leaders and are very much aligned with EA's vision for the profession, which we still hope can be expanded to formally recognise engineering geologists in the future.

As part of our strategic development, we held our first ever all-day strategy session in Brisbane on 6 February with an independent consultant. I want to thank Jon for arguing in favour of an invitation list that extended beyond our Board to include our National Stakeholders Group and a few others. Two days before the event I learned that all five of my predecessors in the National Chair role had confirmed attendance:

- David Lacey: 2022-2023
- Nina Levy: 2020-2021
- Stephen Fityus: 2018-2019
- Hugo Acosta-Martinez: 2016-2017
- Darren Paul: 2014-2015

In chatting with Jon after the event, I appreciated from him how rare it is for any organisation to have 12 years of six consecutive leaders in the same room... for all sorts of reasons (we both laughed). My last honour would be observing the engagement of all five of those predecessors with AGS Limited as I conclude my time as Chair.



TIM THOMPSON

National Chair, Australian Geomechanics Society

2026 AUSTRALIAN GEOMECHANICS SOCIETY BOARD OF DIRECTORS, NATIONAL STAKEHOLDERS GROUP AND ADMIN SUPPORT

BOARD OF DIRECTORS



TIM THOMPSON
Director, Chair of Board

Tim is a geotechnical engineer with EDG Consulting in Brisbane. After graduating from Purdue University in 1997, Tim was a Peace Corps volunteer in Panama where he taught land surveying to high school students. He worked in New York City and London prior to moving to Brisbane in December 2009. Tim launched the Queensland Geotechnical Database with Jared Priddle of FSG in 2017. He is currently undertaking part-time research with the University of Queensland and was the AGS Queensland Chair in 2016-2017.



DAVID LACEY
Director

David is a principal geotechnical engineer with FSG Geotechnics + Foundations (FSG) in Brisbane. After attending The University of Sydney and graduating with both a Bachelor of Civil Engineering (Geotechnical) and Bachelor of Science (Geophysics), David relocated to Brisbane for work in 2006. During his full-time geotechnical consultant career, David undertook a part-time PhD research project at The University of Queensland which was completed in 2016. David was the recipient of Engineers Australia's QLD and National 'Young Professional Engineer of the Year' award in 2016 and has also received the AGS' Don Douglas Youth Fellowship. David has served on the local organising committee for multiple international technical conferences - including ANZ2023 (Cairns), 20th ICSMGE (Sydney), 10th YGPC (Noosa) and 11th YGPC (Queenstown) - whilst also being a member of the AGS QLD Chapter's committee since 2012. David has served upon the AGS' national executive since 2020, and will conclude his term and depart the AGS' inaugural Board of Directors in late March 2026.



AMIR SHAHKOLAH
Director

Amir is the National Technical Manager at Global Synthetics and a Fellow of Engineers Australia. He holds a PhD in geosynthetics/geotechnical engineering, master's degree in environmental engineering, and bachelor's degree in civil engineering. With over 25 years of experience in geosynthetics, geotechnical, and pavement engineering, Amir has worked extensively as a designer, project manager, researcher, and technical lead, and has authored more than 100 publications and technical documents on various geosynthetic applications such as soft soil stabilisation, reinforced structures and embankments, erosion

control, stormwater drainage, waterproofing and barrier systems, landfill design, sustainability, etc.

He currently serves on numerous national and international committees, including as a director of the Australian Geomechanics Society, Industry Board member of the Australian Pavement Research Hub, elected Council Member of the International Geosynthetics Society (IGS), Chair of the International Geosynthetics Society (IGS) Asia Pacific Regional Committee, and member of the IGS Technical Committees TC-R (Reinforcement) and TC-RRA (Roads, Railways, and Airports). He is also the representative of Engineers Australia in Standards Australia Technical Committee CE-020 (Geosynthetics), members of ASTM and ISO technical committees for geosynthetics and sustainability, and guest lecturer at five Australian universities..



JOANNA SYLVESTER
Director

Joanna is an enthusiastic engineering geologist, a native Novocastrian and mother of two young boys. She graduated from the University of Newcastle with a Combined Bachelor of Science/Bachelor of Arts degree, and a subsequent Masters of Engineering Science through UNSW. She has 18 years consulting and 7 years leadership experience with GHD - currently as Manager of the Northern NSW Rail and Geotechnics teams.

Joanna's professional focus is mine subsidence, slope stability, 3D geological modelling, and integrating new technologies to improve outcome. She has a keen interest in developing emerging geotechnics professionals in a diverse, supportive and technically interesting way - and continuing to foster an increase in women and diversity in our industry.



ALI PARSA-PAJOUH
Director

Ali is a Senior Associate Geotechnical Engineer with over 20 years of experience spanning both academia and industry. He earned his PhD in Geotechnical Engineering from UTS in 2014, with an industry-sponsored research focus on soft soil improvement. His expertise covers a broad range of geotechnical disciplines, including numerical modelling, soil-structure interaction, ground improvement, deep excavation, retaining structures, slope stability, and the application of AI in geotechnical practice. Ali leads the design team at JK Geotechnics. Ali has been actively involved in R&D programs addressing complex geotechnical challenges. He is a member of several industry advisory boards, including the UTS Transport Research Centre. Since joining the AGS Sydney Chapter committee in 2016, Ali has held several leadership roles, including Coordinator of the Sydney Chapter Symposium (2018 to 2021) and Chair of the Sydney Chapter (2022-2023). Following his election to the AGS Board of Directors, Ali also chairs the AGS Digital Transformation Working

Party. He represents Australia on the ISSMGE Technical Committee for Numerical Methods (TC103).



DARREN PAUL Appointed Director

Darren is a technical director in engineering geology at WSP Australia with over 25 years' experience. He has had a nearly 20 year involvement with AGS as a member of the Victorian chapter committee and the national committee, including the role of national chair in 2014/2015. He leads the AGS course on landslide risk assessment and has maintained involvement in supporting emerging professionals as a mentor at the Young Geotechnical Professionals Conference and chair of the ISSMGE Young Geotechnical Engineers Conference in 2021. Darren is currently co-chair of the committee to update the AGS guidelines for landslide risk management.

Darren's professional interests include landslides and landslide risk management, risk and uncertainty in geotechnical engineering, engineering geological models and ground characterisation for large projects and planning for geohazards.

NATIONAL STAKEHOLDERS GROUP CHAPTER CHAIRS



DAVIDE GUCCIONE Newcastle (NSW) Chapter Chair

Davide holds both a Master's and a Bachelor's degree in Civil Engineering from the University of Parma in Italy. He received his PhD in Civil Engineering from the University of Newcastle in 2021, where he is currently continuing his research in rockfall-related projects. Davide has won several early career awards, including the AGS NSW Research Award in 2020, the D. H. Trollope Medal in 2022, and the 1st Runner-Up Prize for the NSW Young Geomechanical Professionals' Night in 2024. He is currently an ARC Industry Fellow in collaboration with Rocscience.

Davide's areas of expertise include rock mechanics, rockfall analysis, rock fragmentation, slope monitoring, and photogrammetry.

Since joining the AGS in 2020, Davide has been an active member of the Newcastle Chapter, contributing significantly as a committee member since 2022. In 2024, he was nominated as Secretary, and in 2025, he took on the role of Chair.



JARED PRIDDLE Queensland Chapter Chair

Jared is a geotechnical engineer at FSG, where he has spent most of his career after graduating from QUT in 2012. He has extensive experience in investigation, design, and construction for both major and minor projects, with capabilities spanning geotechnical investigation, interpretation and modelling, earthworks, slopes, soft ground, piling, retaining structures, and temporary works. Jared has served on the QLD Chapter committee since 2017 and is the co-founder and developer of the Queensland Geotechnical Database (qgd.org.au), reflecting his strong interest in GIS, data management, and automation.



LAUREN AMATO South Australia and Northern Territory Chapter Chair

Lauren is a geotechnical engineer at Arup Adelaide with over six years of experience working on major infrastructure projects in Adelaide and interstate. She has extensive expertise in managing and undertaking site investigations, soil and rock slope assessments, foundation design, retaining wall design, earthworks analysis, and construction phase support.

Actively involved with the Australian Geomechanics Society (AGS), Lauren served as Secretary of the South Australian and Northern Territory Chapter in 2023 and 2024. She established the Women of AGS sub-committee in South Australia to promote and support women in geomechanics, reflecting her passion for diversity and inclusion. As Chair for 2025–2026, Lauren is committed to enhancing AGS's collaboration with industry and advancing the geotechnical engineering profession in the region.



MEHDI TAMADON Sydney/NSW Chapter Chair

Mehdi is a geotechnical engineer and team leader at GHD in Sydney Geotechnics and Tunnels Group, with over 15 years' experience. His skills include numerical modelling, soil-structure interaction, deep excavation, deep foundations, and slope stability assessment and design. He has also served as the geotechnical lead designer for infrastructure projects across NSW and Victoria.

Since joining the Australian Geomechanics Society (AGS) committee in 2019, Mehdi has actively contributed to the Sydney chapter, including serving as the Annual Sydney Symposium coordinator and Sydney Chapter Secretary.



ASHLEY DYSON Tasmania Chapter Chair

Ashley is a geotechnical engineer and academic at the University of Tasmania (UTAS), whose research focuses on developing computational and probabilistic methods for slope stability analysis, landslides, and offshore engineering. His work considers practical risk mitigation and resilience strategies for the benefit of the Tasmanian community, especially in relation to debris flow and landslide hazards.

Prior to joining UTAS in 2021, Ashley completed a post-doctoral research fellowship with the Geotechnical and Hydrogeological Engineering Research Group (GHERG) at Federation University Australia, where his research address large open-pit mine stability and rehabilitation. He completed his PhD in 2020, developing probabilistic frameworks to assess the stability of open-cut mines with highly spatially variable geotechnical properties.

Ashley joined the committee of the Tasmanian chapter in 2021, serving as the secretary for three years and was elected to be chair in 2026. He also currently serves on the ISSMGE technical committee TC304 (Engineering Practice of Risk Assessment and Management).



YUQI TAN Victoria Chapter Chair

Yuqi is a geotechnical and dam engineer with proven experience in tailings and embankment investigation, design, construction and operation. He worked on facilities in Australia, Asia and South America. Yuqi is passionate about collaboration between industry bodies. He served multiple roles with AGS and ANCOLD in the past years.

Yuqi has been on the AGS Victoria committee since 2018 and is currently serving as the chair of the AGS Victoria Chapter.



EDDY YONG Western Australia Chapter Chair

Eddy is a geotechnical engineer with Aurecon in Perth. He earned a Bachelor of Engineering and Commerce from the University of Western Australia and has since spent almost all his career working in Western Australia. His interests are in multidisciplinary infrastructure, energy and resources projects, bringing geomechanics to inform design decisions, manage uncertainty and deliver great outcomes. He is passionate about the positive impact engineers and geologists can have on society.

A strong advocate for the geomechanics profession, Eddy sees it as both a rewarding career and a supportive professional community. He has

been involved in the Western Australia chapter since 2019 and is actively committed to advancing the AGS. Eddy was nominated and elected as WA Chapter Chair in 2025.

INTERNATIONAL SOCIETIES REPRESENTATIVES



MUHAMMAD SHAZZAD HOSSAIN ISSMGE Australia Representative

Dr Muhammad Shazzad Hossain is a Professor in Geotechnical Engineering at UWA and a former ARC Future Fellow. He was named as the Woodside Early Career Scientist of the Year 2013 by the Government of WA. He actively leads international collaborations between UWA and industries and academic institutions in South Korea and Indonesia.

Dr Hossain's research focuses on jack-up vessels for offshore renewable energy and anchoring solutions for mooring floating wind turbines, wave energy devices, solar panels, oil and gas platforms, and aquaculture facilities. He is also championing repurposing of Australia's decommissioned subsea infrastructure and contributing engineering measures to protect Australia's ocean territories from plastic pollution.

Dr Hossain has been (i) serving AGS, WA Chapter, as a Committee Member since 2013; (ii) representing Australia on ISSMGE TC209 and TC104 since 2018; (iii) leading ME-092-1 Committee (Australian Mirror of ISO TC67/SC7) for ISO 19905-1 and ISO 19905-4 since 2019; and (iv) serving ISO TC67/SC7/WG7/P4 (Jack-ups) as a Core Member since 2011.



ROBERT BERTUZZI ISRM Australia Representative

Robert graduated from the University of Sydney in 1985 with a bachelor's degree in mining engineering and the University Medal. He completed a masters in rock mechanics (subsidence) at the University of Sydney in 1989 while working in underground and open pit coal mining (Coal & Allied, ACIRL, Mae Moh (Thailand)). He then lost his way and became a tunnelling engineer on the English Channel Tunnel. Having joined PSM in January 1994 where he is now the Chair of its Board, he splits his work between mining and tunnelling.

Robert completed his PhD in 2017 at University of New South Wales with the thesis "Rock mass properties for tunnelling". He is fortunate in having worked on many mining and tunnelling projects in Australia with some outstanding people within the consulting, mining and civil contracting professions.



MEGAN PACKER
IAEG Australia Representative

Megan is a Principal Engineering Geologist with PSM in Brisbane, bringing extensive international and Australian experience to complex civil infrastructure projects. After completing her postgraduate Honours at the University of Queensland she undertook a MSc at Imperial College London, receiving the Lapworth Medal. Megan spent a decade working in the UK before returning home to Australia in 2017, joining PSM and strengthening her commitment to building meaningful connections between Australian practitioners and the global engineering geology community.

Her professional expertise spans dams, tunnels, bulk excavations, pumped hydro schemes, rail and road projects, deep piled foundations, and major earthworks, contributing to large-scale infrastructure across diverse environments. Megan recently served as Organising Committee Co Chair for ACEG2025, the inaugural Australian Conference on Engineering Geology held in Brisbane — a highly rewarding opportunity that deepened her engagement with the broader professional community and reinforced her passion for advancing the discipline.

AUSTRALIAN GEOMECHANICS JOURNAL



HUGO ACOSTA-MARTINEZ
Editor, *Australian Geomechanics*

Hugo is a Technical Director – Geotechnical at WSP Australia. He has more than 28 years of consulting experience, mainly in transport, near shore, resources and renewable energy infrastructure.

In his current role, Hugo provides technical leadership and independent verification on projects across the country. As a passionate advocate for inspiring the next generation of geotechnical engineers, Hugo is involved in mentoring young and emerging professionals and has previously served as the National Chair of the AGS (2016-17). With strong links to academia, Hugo is also a regular peer reviewer of leading geotechnical engineering journals and actively participates in forums that promote industry-academia collaboration.

INVITED MEMBERS



NATALIE QUINLISK
Chair of WIAGS Sub-Committee

Natalie is an Associate Geotechnical Engineer at Jacobs, currently serving as the Section Leader for the Tunnels and Ground Engineering Team across QLD, SA and WA. She has a degree in Civil Engineering from QUT, Brisbane and obtained her Master's Degree in Soil Mechanics and Engineering Seismology at Imperial College, London.

Natalie has been an active member of the AGS QLD Chapter since 2016, holding various executive roles over the past 10 years. In 2026, she will continue to lead the national Women in AGS sub-committee in our mission to increase women's engagement in the AGS community, celebrate their successes and foster an inclusive culture that attracts and retains women!

GENERAL MANAGER



JON GIBBS
AGS General Manager

Jon joined the AGS in July 2022 for a 3-month handover process with Peter Robinson, who officially retired at our Annual General Meeting in October 2022. Jon holds a Bachelor degree in Human Movement Studies through UTS Sydney. He has over 35 years' experience working in retail & international banking, local government leisure services and sports management. He has helped establish and incorporate eight volleyball clubs in NSW and Queensland. As General Manager of Queensland Volleyball Association 2008-19, Jon rebuilt the organisation from financial and operational collapse in 2008 to transform it into the national benchmark on and off the court.

ADMIN SUPPORT



SARA LANESMAN
Advertisement *Australian Geomechanics*

Sara has been the Australian Geomechanics advertising liaison since 2003 and has been corresponding with some of the same advertisers since taking on the role. When not responding to email enquiries or sending out reminders about forthcoming editions and artwork deadlines, Sara works as the Office Manager for a Family Office.

PhD Thesis abstracts for publication in *Australian Geomechanics*



**AUSTRALIAN
GEOMECHANICS
SOCIETY**

The Australian Geomechanics Society invites PhD students to submit an abstract of their thesis completed in 2026 to *Australian Geomechanics*.

This invitation is restricted to PhD theses submitted to Australian universities and accepted as partial fulfilment of the requirements for the degree of Doctor of Philosophy and to PhD theses by Australian students submitted at overseas institutions.

The thesis should have been completed and accepted within one year of the abstract being published in *Australian Geomechanics*.

The invitation is open to all theses related to geomechanics topics. AGS requests promotion of this initiative among PhD students and academic networks.

The abstracts will be published in the March 2027 issue of *Australian Geomechanics*.

The following information is required for publication:

- Author's name (with current affiliation and contact information)
- Thesis title
- Date submitted/approved
- Sponsoring Professor / Academic Supervisor and University (contact address, telephone and e-mail address)
- A brief abstract (strictly max 250 words)
- Scanned page of Title Page of thesis.
- Information should be submitted to the *Australian Geomechanics* Editor, via email: editor@geomechanics.org.au
Please attach as a MS Word document.

Deadline: Friday 5th February 2027

REVIEWERS

AUSTRALIAN GEOMECHANICS REVIEWERS

The following is a list of volunteer referees that have reviewed papers considered for publication in *Australian Geomechanics* in 2025. The Australian Geomechanics Society is very grateful for their assistance. The Editor would like to offer a special recognition to Andy Fourie, David Reid and Daniel King for contributing as associated editors of themed editions of the journal published in 2025.

<i>Mahmoud Ahmed</i>	<i>David Lacey</i>	<i>Zack Tuckey</i>
<i>Giovanny Alvarado-Gutierrez</i>	<i>Allan Lee Goh</i>	<i>Philip Wade</i>
<i>Andrew de Ambrosis</i>	<i>Barry Lehane</i>	<i>Justin Walls</i>
<i>Nelson Amoah</i>	<i>Roger Lim</i>	<i>Dong Wang</i>
<i>Harry Asche</i>	<i>Arcesio Lizcano</i>	<i>Pabasara Wanniarachchige</i>
<i>Cameron Bik</i>	<i>Marcelo Llano-Serna</i>	<i>Douglas Warne</i>
<i>Eduardo Bittar</i>	<i>Dennis Loffell</i>	<i>Bo Xu</i>
<i>Tierney Boulter</i>	<i>Logan Loganathan</i>	<i>Eddy Yong</i>
<i>Chris Bridges</i>	<i>Burt Look</i>	<i>David Zhang</i>
<i>Kim Chan</i>	<i>Mario Martinelli</i>	
<i>Luis Fernando Contreras</i>	<i>Gordon McPhail</i>	
<i>Michael Davies</i>	<i>Desmond Mossop</i>	
<i>Davide Donati</i>	<i>Hamish Nelson</i>	
<i>Matthey Duthy</i>	<i>David Oliveira</i>	
<i>Ricardo Fanni</i>	<i>Kaiwen Ouyang</i>	
<i>David Field</i>	<i>Ali Parsa-Pajouh</i>	
<i>Andy Fourie</i>	<i>Rick Piovesan</i>	
<i>Chaminda Gallage</i>	<i>Harry Poulos</i>	
<i>Camilla Gibbons</i>	<i>Hongyu Qin</i>	
<i>Alexandre Gomes</i>	<i>Joe Quinn</i>	
<i>Sean Goodall</i>	<i>David Reid</i>	
<i>Scott Gover</i>	<i>Joe Rola</i>	
<i>Jason Hellmuth</i>	<i>Hao Shen</i>	
<i>Paul Hewitt</i>	<i>Shuilong Shen</i>	
<i>Yuxia Hu</i>	<i>Mandeep Singh</i>	
<i>Robert Kamuhangire</i>	<i>Kyle Smith</i>	
<i>Mark Jaksa</i>	<i>Sri Srithar</i>	
<i>Graeme Jardine</i>	<i>Jun Sugawara</i>	
<i>Ian Johnston</i>	<i>Ying Tay</i>	
<i>John Kemeny</i>	<i>Ian Thompson</i>	
<i>Daniel King</i>	<i>Yinghui Tian</i>	

AWARDS

AUSTRALIAN GEOMECHANICS AWARD (2025)

The paper “Bayesian calibration of NorSand model parameters using triaxial test data” by Luis-Fernando Contreras, Humberto Rojas-Huaroto, Alexandra Halliday and Marcelo Llano-Serna, has been selected as the winner of the Australian Geomechanics Award for 2025. This award recognises the authors of the best paper published in Australian Geomechanics in each calendar year.

The paper was published in Vol 60(4), pp. 21–37.

DOI: <https://doi.org/10.56295/AGJ6041>



In relation to the papers the authors said:

The motivation for this paper stemmed from a shared recognition that calibrating critical state models like NorSand often relies on subjective and labour-intensive visual fitting. To address this, the authors collaborated to develop a rational, objective framework that integrates experimental triaxial data with Bayesian statistics. By utilising Markov Chain Monte Carlo (MCMC) methods, the study not only streamlines parameter estimation but also quantifies uncertainty and parameter correlations—crucial factors often overlooked in conventional analysis. This work bridges the gap between theoretical soil mechanics and practical application, providing an open-source Python tool designed to enhance the reliability of tailings management and geotechnical risk assessments.



Dr Luis-Fernando Contreras has contributed to the geotechnical engineering field for over 45 years. His areas of expertise encompass risk evaluation for mining project optimisation, open pit design, tunnel engineering, and geotechnical assessment of underground excavations for civil engineering projects. He has worked in diverse geotechnical studies including site investigations, rock-fill and earth-fill dam design, instrumentation design and rock

mechanics analysis of geotechnical structures. His experience covers different stages of project development from conceptual and feasibility studies through to detailed design and specialised advisory during construction. Throughout his career, Luis-Fernando has served as Principal Consultant at SRK in Chile, South Africa, and Australia, focusing on quantitative risk evaluation for mining projects. He holds a PhD in geotechnical engineering from the University of Queensland and is both a Chartered Professional Engineer and a Fellow of the Institution of Engineers Australia. He is currently promoting the application of the Bayesian approach to improve the treatment of uncertainty in geotechnical analysis.



Humberto Rojas-Huaroto, a Civil Engineer specialising in Geotechnics from the National University of Engineering (Peru), began his career as an intern at Anddes Asociados S.A.C. between 2023 and 2024, where he contributed to geotechnical analysis and numerical modelling projects in the mining sector. Since August 2024, he has served as a Geotechnical Staff Consultant at SRK Consulting Peru. His expertise includes analysing and designing

mining-geotechnical structures such as tailings dams, leach pads, and waste rock dumps, emphasising physical stability assessments and stress-strain analysis using FLAC, Plaxis, and Anura3D software. Additionally, Humberto leverages Python programming to streamline processes and enhance data-driven decisions. He is keen on integrating his geotechnical expertise with programming abilities to deliver advanced, comprehensive solutions.



Alexandra Halliday is a Chartered Principal Tailings and Dams Engineer with over a decade of experience across consulting and owner–operator environments in the global geotechnical and mining sector. She specialises in tailings and water storage facility governance, risk management and technical assurance for complex operations. Her experience spans the design, construction and surveillance of tailings and water retaining structures across diverse jurisdictions, with particular expertise in soil mechanics and embankment behaviour. She is actively involved in international industry initiatives aimed at strengthening governance frameworks, technical standards and transparency in tailings management.



Dr Marcelo Llano-Serna is a geotechnical engineer specialising in tailings engineering and dam safety, with interests in statistics, large-deformation analysis of geomaterials, and risk-informed design. His work focuses on high-consequence mining assets, integrating advanced soil mechanics into practical design, performance assessment, and failure investigation. He has contributed to more than 50 projects internationally across the lifecycle of tailings facilities, including design management, Engineer of Record services, third-party reviews, and forensic studies. Marcelo holds a PhD in geomechanics and is a Registered Professional Engineer of Queensland (RPEQ). He continues to promote research-informed approaches to improve dam safety practice.

OBITUARY



It is with great sadness that we share news of the 12 November 2025 passing of inaugural AGS Life Member, Dr William (Bill) Bamford following a decline in his health.

Born in 1936 in Tahiti, Bill spent his childhood in New Zealand and Norfolk Island before moving to Sydney in 1950 where he attended high school. He commenced his civil engineering studies part time at Sydney Technical College in 1953 while working as a cadet engineer at Woollahra Council. He progressed to fulltime study at UNSW in 1955 with National Service in the RAAF at Laverton Base in 1956-57. He obtained his Bachelor of Engineering in Applied Geology from the University of NSW in 1958. He spent a summer at the Snowy Mountains Hydroelectric Authority as a vacation student in 1957 and started fulltime as a graduate in 1958 under the direction of David Stapledon. He worked on the Tumut 1 underground power station and its tailrace tunnel, the Geehi Dam and Murray 1 Underground Power Station investigations, and was resident geologist on the Murrumbidgee-Eucumbene Tunnel. It was whilst drilling deep exploratory diamond drill holes on Broken Back Spur that he became involved in heat-flow investigations being carried out by Professor John Jaeger, a relationship that would later influence the (future) Australian Geomechanics Society award bearing Professor Jaeger's name.

In 1960 Bill accepted a job offer from John Neilson to work at the Geological Survey of Victoria and remained there until 1964. During this

time he was involved in many projects around the state including proving the brown coal resource at Anglesea which fuelled the Alcoa power station that supplied Point Henry smelter. Importantly, he commenced geotechnical investigations for the Melbourne Underground Rail Loop, subsequently transferring to the Victorian Railways Construction Board 1965-67, where he led the geotechnical investigations for the project that would change public transport through the city.

In 1967 he was appointed to the position of Lecturer in Rock Mechanics in the Mining Department at the University of Melbourne. This was the first Lecturer in Rock Mechanics to be appointed in Australia, recognition of the advances in tunnelling being made in Australia over that period. His inaugural student cohort included Jim Enever, Jim Askew and Leigh Clifford. He continued to supervise post-graduates until his final PhD student, Frank Lai, in 2011. While developing the course structure, Professor Jaeger invited Bill to spend some time with him at the Australian National University to discuss teaching and research in the field of rock mechanics. During this visit, Bill witnessed high pressure triaxial testing of Wombeyan Marble shearing along a distinctive 30-degree failure plane. Twelve years later Bill would immortalise Professor Jaeger's tests, when he was asked to prepare an award recognising contributions of the highest order over a lifetime commitment to the geotechnical profession in Australia. Mounted on white marble, the AGS Jaeger Award adopts the shape of the triaxial samples Bill had observed in the ANU laboratory; interestingly, he was unable to reliably replicate the 30-degree surface because the chamfered point tended to break off under slight pressure; as a result the award contains a plane cut at 45 degrees instead. Bill also arranged production of mementos, cut from granite drill core, for presenters at Victorian AGS meetings, affectionately known as 'Bamfords'.

Bill was the AusIMM representative on the National Committee of the AGS from the time it was formed in 1971 until he became National Chair of the AGS in 1975. In 1970 Bill had organised a symposium on tunnelling as an adjunct event to the AusIMM conference in Melbourne; this was the precursor to the Australian Underground Construction and Tunnelling Association (AUCTA), formed in 1972 and subsequently the Australian Tunnelling Society (ATS). At that time AUCTA remained under the auspices of the AGS and so Bill assumed the role of AUCTA Chair as well. He continued to be a member of the National Committee of the AGS from 1971 until 1987 and was a member of the Victoria Chapter committee from 1968 until 2012. During this time he served as Victoria chairman for 3 terms; initially in the mid-70s, again in the mid-80s, and once more in the mid-90s. He also served on the Australian Tunnelling Society National Committee from 1975 until 2002, and on the Victorian Chapter Committee from 2011 until 2015. He was also involved in the International Tunnelling Association (ITA), which included being on the organising committee for the 1987 World Tunnel Congress in Melbourne.

At the completion of his term as AGS National Chairman in 1979, Bill was nominated to be the ISRM Australasian regional Vice-President 1979 to 1987. He contributed to the Commission on Testing Methods, the

Commission on the Teaching of Rock Mechanics, and was the President of the Commission on Swelling Rocks and the Commission on Rock Boreability, Cuttability & Drillability. Under his tenure Australia hosted the 1983 ISRM Congress, for which he was the organising chairman.

Bill was awarded his PhD for his thesis on 'Geotechnical Studies for Machine Tunnelling' at the University of Melbourne in 1983. In 1987 he accepted the position of Director of First-Year Engineering Studies. He was subsequently appointed Associate Dean – Academic for the School of Engineering, a role he maintained alongside a full undergraduate teaching load and postgraduate supervision. He was also generating significant income for the School of Engineering by consulting externally through his rock mechanics laboratory.

By 1996 his commitments to the university started to reduce. As a Principal Fellow and Associate Professor, Bill continued with a partial teaching load, and importantly maintained operation of the rock mechanics laboratory for external consulting.

In 1997 the AGS proposed a joint ISRM, IAEG, and ISSMFE event; GeoEng 2000 - an International Conference on Geotechnical and Geological Engineering, to be held in Melbourne Australia in November 2000. Bill was part of the organizing committee who successfully pitched the event to the 3 international societies, after which he assumed responsibility for organizing the "Underground Works" stream.

Bill was appointed a Senior Principal at Coffey in 2011, moving the lab from the University of Melbourne 44 years after he set it up on campus. Bamford Rock Testing Services (BRTS) was established in 2014, and continues to provide specialist rock testing to clients from around Australia and the world. Bill remained active in overseeing and reviewing test results to the end.

As a final accolade, Bill was awarded the Allen Neyland Tunnelling Achievement Award for 2025, something that pleased him greatly although he regretted not being able to receive it in person.

Over the years Bill has taught many students, supported innumerable societies and committees, established many dedicated clients, and earned many friends. Among other activities, he was also a talented dancer and performed with a number of groups at Hamer Hall as well as the Lygon St Festa. With access to his consulting funds, he arranged for a sprung floor and full length mirrors to be installed in the Frank Tate Building in the University where dance rehearsals could take place.

Bill is survived by his partner Jenny, son David and daughter Barbara.

It has been a privilege to have known Bill as a lecturer, colleague and friend; our careers wouldn't have been the same without him.

Chris Coulson & Andrew Campbell

UPDATE OF THE AGS (2007) GUIDELINES FOR LANDSLIDE RISK MANAGEMENT - PROJECT PROGRESS REPORT

PROJECT PROGRESS REPORT: UPDATE OF THE AGS (2007) GUIDELINES FOR LANDSLIDE RISK MANAGEMENT

The joint AGS and NZGS project to update the AGS (2007) Guidelines for Landslide Risk Management is progressing towards the latter stages of the project, and our four Working Groups (WG), comprised of experts from across Australia and New Zealand, have achieved some important milestones. We have previously provided progress updates at the 1st Australian Engineering Geology Conference (AEGC) in Brisbane (July 2025), at the NZGS Symposium in Auckland (October 2025), and a more recent summary of the project progress in the NZGS Geomechanics newsletter (October 2025). A current project update to January 2026 is provided below.

DOCUMENT STRUCTURE

The revised guidelines will be comprise three main documents: (i) Principles of Landslide Risk Management, (ii) Landslide Mapping, and (iii) Landslide Risk Assessment with a fourth complimentary report on the state of international practice in landslide management. Each of these documents has a specific target audience and aims, but with interrelated content. The revised guidelines are intended to complement other existing documents, including the NSWPWS Guidelines for Quantitative Risk to Life Calculations for Landslides, the NZGS Slope Stability Guidance documents and the NSW RMS Guide to Slope Risk Analysis, which is used by some roading authorities in Australia and New Zealand.

WORKSHOPS

The Landslide Mapping and Risk Assessment working groups each initially held workshops in Melbourne in May 2025, and the Principles of landslide risk management working group held a workshop in Sydney in September 2025. These workshops have supported content drafting and refinement, as well as coordination among authors. In addition, the Steering Committee and WG Chairs held a workshop in July 2025 in Brisbane, coinciding with the 1st AEGC, where participants reviewed progress and draft content, and discussed next steps. These workshops have proven incredibly valuable in progressing the guideline development and further workshops are proposed to incorporate review comments and finalise the guidelines.

Further specific updates for each of the four working group preparing the guidelines are presented below.

INTERNATIONAL PRACTICE

Reports have been received from 12 international experts which summarise landslide risk management practice in their countries. These

reports have been assigned to the WGs for review, feedback, and to support their updates. A separate publication is planned that summarise these international reports. It was noted through the process of engaging experts from around the globe that AGS (2007) is still very well recognised internationally and is looked to by others to provide guidance on landslide risk management.

PRINCIPLES OF LANDSLIDE RISK MANAGEMENT

This WG is developing general guidance on landslide risk management which is primarily intended for a broad range of non-geotechnical stakeholders, including regulators, landowners and land managers. A final draft of the document is now complete and is currently in review. This document will be further reviewed and aligned once the other guidelines are complete and will provide a more general overview to the risk management process written in plain English as well as an important connection to the other more technical documents.

LANDSLIDE MAPPING

The Landslide Mapping WG is developing guidance for geotechnical practitioners on preparing landslide inventories, susceptibility, hazard, and risk maps, along with advice on how to use them for planning and landslide risk management. Some of the key updates to the guideline, compared to the existing AGS (2007) guidelines, will include the consideration of uncertainty in mapping, a new flow chart to set out the methodology and a more data driven approach to developing the maps. The guideline is in the final stages of development and is entering the review stage. It is intended to seek broader AGS/NZGS membership comment before seeking international peer review around mid-2026.

LANDSLIDE RISK ASSESSMENT

The working groups is preparing updated guidelines for geotechnical practitioners setting out best practice for landslide risk assessment. While the current AGS 2007c guideline provides the foundation for the draft, several new topics and guidance on different risk scenarios have been identified for inclusion in this revision. This includes further guidance on the use of engineering geological models in landslide risk assessment and a shift from the previous residential focus to a wider range of applications, as well as additional guidance on uncertainty and probability in landslide risk assessments. The landslide risk management flow chart is being updated to incorporate these updates, and worked examples will be included to support the reader's understanding and application of the guidelines. This guideline is near complete and entering the peer review and editing stage.

NEXT STEPS

The guidelines are reaching the final phase of development where the technical content has been, or will be soon complete. The next stage of the process will include detailed internal review by the project steering committee and working group members to ensure consistency and alignment between the three documents, then industry feedback from within Australia and New Zealand and international peer review. This process is expected to be complete by mid-2026.

We will also take the opportunity to present progress and seek further feedback at the upcoming joint JTC1/JTC3 international workshop on Landslide Risk and Geo-Education (LaRGE2026) in Queenstown, NZ in April 2026.

Technical editing and graphics design is proposed in Q3 and Q4, 2026, with the view to publishing what will become the newly revised ANZ Landslide Risk Management Guidelines by the end of 2026.

Once again, we want to thank all those who have contributed to the project so far. Contributions, queries, comments and discussion is welcome at any time through our queries page on the AGS website: www.australiangeomechanics.org/2024/03/05/ags-technical-committee-for-landslide-risk-management.

DIGITAL TRANSFORMATION WORKING PARTY

Chair: Dr. Ali Parsa-Pajouh

Overview

The Australian Geomechanics Society (AGS) established the Digital Transformation Working Party (DTWP) in early 2025 to coordinate digital initiatives relevant to geomechanical engineering. The formation of the Working Party reflects the increasing role of digital data management, collaborative platforms, and emerging tools in ground engineering practice. As the projects increase in scale and complexity, the profession faces a critical need to enhance data accessibility, improve cross-disciplinary integration, and enable more effective use of historical and real-time geoscientific information.

The DTWP includes representatives from all AGS chapters to support national alignment and information sharing. Its scope focuses on practical aspects of digital practice, including the development and organisation of geotechnical and geological data resources, promotion of standardised digital data formats, and examination of the application of artificial intelligence (AI) and related computational tools in professional workflows. These activities aim to support more efficient knowledge exchange and contribute to the gradual improvement of digital capability across the profession.

To address these areas, the Working Party operates through three dedicated subcommittees focusing on:

- **Nationalisation of the Queensland Geotechnical Database**, contributing toward a broader Australian geotechnical and geological data resource;
- **AGS Data Format Advocacy**, encouraging wider understanding and use of structured digital data exchange approaches; and
- **Application of Artificial Intelligence / Generative AI in Geomechanics**, reviewing and demonstrating practical uses of emerging tools.

During 2025, the DTWP has undertaken a series of activities related to digital collaboration environments, data organisation, and professional engagement. These efforts represent an initial step in supporting more consistent digital practices within the AGS community.

Key Achievements

- **Digital Environment Integration.** Migration to the AGS Microsoft 365 environment has been completed, with SharePoint and Teams channels established to support collaboration and data management. A consistent structure has been implemented across the three subcommittees to facilitate communication and knowledge sharing.
- **Nationalisation of Queensland Geotechnical Database** AG Journal papers (1971–2025) and selected ANZ conference papers (1971 and 1975) have been integrated with spatial

geolocation, supported by an interactive mapping interface. The scope has been extended to include ANZ, YGPC, ACEG and AGS Symposium records. This work represents an initial step toward development of the Australian Geotechnical Database (AGD). A draft flyer is being prepared to describe the database structure, purpose, and intended use.

- **Application of AI / Generative AI in Geomechanics** A technical event titled Practical Applications of Generative AI in Geotechnical Engineering was held in Sydney on 10 September 2025, jointly hosted by Engineers Australia, AGS, and ISSMGE, with more than 350 attendees. The session presented practical examples of AI applications in ground engineering and generated interest in further related activities. A recording of the event and a reflection report are available through EA On-Demand and the AGS website.
- **AGS Data Format Advocacy Group.** Activities include promoting wider adoption of the AGS data format and digital ground engineering practices. A Community of Practice framework has been initiated, together with engagement with asset owners through chapter-led meetings. An industry survey is being prepared to assess AGS data usage, and collaboration with Geoscience Australia, as well as development of a digital geotechnics and AI training course, is under consideration.
- **Knowledge Sharing & Promotion.** Chapters are being encouraged to upload recordings of technical presentations to the AGS website to support broader knowledge sharing.

Next Steps (2026)

Planned activities for 2026 include the launch and promotion of a pilot interface for the Australian Geotechnical Database (AGD), organisation of geo-data-focused events, development of a national training program in digital geotechnics and AI, and continued integration of digital tools and AI workflows into chapter activities and member resources.



AGS Sydney Session on Generative AI in Geotechnical Engineering, 10 September 2025.

AUSTRALIAN PHD THESIS ABSTRACTS 2025

The purpose of this compilation is to bring to the notice of readers of *Australian Geomechanics* some topics in geotechnical engineering which are currently, or have recently been, subjects of research at universities in Australia.

The abstracts are arranged in alphabetical order; firstly by university and then by surname.

BIKASH DEVKOTA **ADELAIDE UNIVERSITY**

Reactive soil movement under current and future climate, and their influence on geotechnical structures

Expansive soils are widespread globally and undergo significant volume changes with moisture content variations, causing effective stress changes and substantial ground movement. Lightweight structures such as residential footings built on such soils are highly vulnerable in certain climate zones. Structures built today may experience additional stresses in the future due to climate change.

The effect of climate change on expansive soil behaviour was investigated using two distinct approaches to account for climate variables in numerical investigation. Data from a monitored research site were used to validate the reliability of the numerical model. A research site was established in the southern suburbs of Adelaide, Australia, where extensive instrumentation was employed. Field investigation continued over five years and included sub-soil exploration, near-surface movement measurement (at 64 locations), monitoring of soil moisture (8 locations, up to 6 m depth at 0.5 m interval), and observation on the development and propagation of cracks. A weather station was also installed near the site to capture meteorological variables. In addition, two soakage trenches were installed at the research site to evaluate how the installation of a soakage trench influences the moisture dynamics around it and the resulting ground movement. Interactions at the soil-vegetation-atmosphere (SVA) boundary and other physical and hydraulic boundary conditions were analysed to evaluate moisture movement, related suction changes, and vertical ground movement.

Climate change and cracked conditions are likely to negatively affect the moisture dynamics and, thus, vertical ground movement. Such conditions need to integrate into geotechnical design to develop climate-resilient structures.

Supervisors: A/Prof Md Rajibul Karim, Prof Md Mizanur Rahman and Dr Hoang Bao Khoi Nguyen

SAGUN SHRESTHA **ADELAIDE UNIVERSITY**

Evaluation of geosynthetic stabilised pavements (GSP) for mitigating pavement damage on expansive soil

Expansive soil is a clayey material that undergoes substantial volume change with variation in moisture content and is termed reactive soil in Australia due to this moisture sensitivity. These soils occupy extensive areas worldwide and a significant proportion of Australian surface soils, leading to widespread infrastructure distress. Seasonal wetting and drying induce differential ground movements that particularly affect lightly loaded, shallow-founded structures such as residential buildings, footpaths and pavements. In pavements, exposed edges experience cyclic heave and settlement, longitudinal cracking and reduced service life, imposing a considerable maintenance and rehabilitation burden.

This research evaluates the performance of geosynthetic-stabilised pavements (GSP) constructed over expansive subgrades using complementary field and laboratory programs. Three full-scale trial roads were established across Metropolitan Adelaide, each comprising two GSP sections with different geosynthetics and one unstabilised control section. Biannual condition surveys following Austroads procedures, together with International Roughness Index (IRI) measurements from a smartphone-based inertial profiler, were used to characterise in-service performance. Undisturbed samples enabled assessment of subgrade reactivity, while performance metrics such as the Longitudinal Crack Index (LCI) and Crack Mitigation Ratio (CMR) were developed to link cracking with reactivity and roughness.

Laboratory tests (shrink-swell, Atterberg limits, suction, CBR, DSS) showed strong correlations between soil reactivity and pavement performance. Large-scale box tests confirmed that geosynthetics reduced surface deformation and swelling pressures, with higher longitudinal strains in the machine direction. Overall, field and laboratory results demonstrated that GSPs exhibit superior resistance to moisture-induced damage compared with untreated sections.

Supervisors: Prof Md Mizanur Rahman, A/Prof Md Rajibul Karim and Dr Khoi Nguyen

XILIN CHEN
MONASH UNIVERSITY

**Sustainability of underground infrastructure:
digitalisation-based embodied carbon assessment
and design optimisation**

Decarbonising underground infrastructure is essential for achieving Net Zero targets, yet embodied carbon in tunnelling remains poorly quantified due to inconsistent system boundaries, fragmented data, and the complex interaction between excavation methods, structural design, and material usage. This study develops an integrated, digitalisation-based framework for embodied carbon assessment and low-carbon design in mechanised tunnelling and underground stations.

A unified methodology is proposed that combines Building Information Modelling (BIM), life cycle assessment (LCA), geotechnical analysis, and multi-objective optimisation. Generalised construction components and tunnel-specific lifecycle boundaries are established to enable consistent accounting across projects. Automated BIM-embedded workflows are developed to calculate embodied carbon in lifecycle modules A1–A5 and to visualise emissions by material, construction activity, and design parameter.

Case studies of rail and road tunnels demonstrate how key variables, such as lining thickness, concrete strength, reinforcement ratio, and TBM operational parameters, affect embodied carbon performance. Through convergence–confinement modelling and parametric studies, the thesis quantifies the trade-offs between structural safety and carbon reduction, generating Pareto-optimal design solutions under varying geotechnical conditions.

A digital decision-support toolbox, TunCO², is introduced to integrate carbon accounting with structural evaluation and optimisation analytics, enabling practitioners to explore and compare low-carbon design strategies.

The proposed framework improves the transparency, consistency, and applicability of embodied carbon assessments for underground works. It provides a scalable foundation for future benchmarking efforts and supports early-stage, data-driven decisions for sustainable and resilient underground infrastructure.

Supervisors: A/Prof Qianbing Zhang and Prof Yu Bai

PENGXUAN JI
MONASH UNIVERSITY

**Fracturing characteristics in geomaterials with
circular hole and flaws under various loading
conditions**

Different types of discontinuities significantly affect the stability of rock during underground excavation. Crack growth from flaws can lead to engineering failures. Therefore, a deep understanding of the initiation, propagation, and coalescence of cracks in rock masses with natural discontinuities or artificial fractures is important. Seismic activities are widely used to evaluate infrastructure stability. Micro-seismic (MS) monitoring and laboratory-based acoustic emission (AE) techniques provide effective means to investigate fracture characteristics at different scales.

This study explores the fracturing behaviours of defected geomaterials. The event automatic classification is applied to an MS dataset. To overcome the limitations of in-situ MS monitoring, a series of quasi-static biaxial compression tests is conducted in the laboratory on geomaterials with pre-existing defects. Coupled static and dynamic loading tests are also performed. Measurement techniques used in the tests include digital image correlation (DIC), AE monitoring, and X-ray computed tomography (CT). The laboratory tests demonstrate the feasibility of the integrated measurement framework, and indicate the effects of defect geometry, flaw–hole interactions, loading conditions and impact velocity on the fracturing characteristics of defected samples. Furthermore, AE characteristics are explored using deep learning to enable automatic event processing. Multi-scale numerical modelling is employed to extend laboratory tests to field-scale simulations. This approach validates experimental findings and facilitates the prediction of critical zones in engineering applications.

Supervisors: A/Prof Qianbing Zhang, Prof Jian Zhao and Dr Gisela Viegas

YUXI LIU
MONASH UNIVERSITY

**Underground structure stability compatibility
analysis and support optimisation**

As global population growth and urbanisation accelerate, demand for underground space continues to rise, highlighting the importance of structural stability and resource efficiency. Complex structures, mixed ground conditions, and weathered or bedded rock increase uncertainties and may lead to deformation or instability. Tunnel projects along Australia's East Coast illustrate these complexities and emphasise the need for quantified support design and stability assessment to optimise

processes and manage uncertainty effectively.

This thesis reviews underground support design and stability assessment methods and identifies certain limitations, including insufficient quantitative compatibility measures, the lack of a unified stability framework for complex geological conditions, and constraints in high dimensional optimisation. For simple geological conditions, analytical methods were applied to establish compatibility indexes for support strength and stiffness, while sensitivity and reliability analyses were used to assess their applicability. The results indicate that the compatibility index helps identify key parameters governing support performance and reduces the likelihood of over-design or under-design. For mixed-ground complex geological conditions, numerical modelling was employed to develop a stability index for three dimensional underground structures. Excavation depth, soil layer depth, and the angle between bedding orientation and the structural axis were identified as the governing factors, demonstrating multi-parameter interaction effects. Two high-dimensional optimisation methods, surface fitting combined with chaotic search and an MLP-BP neural network, were applied to identify influential parameters, improve design efficiency, and determine optimized parameter combinations through stability visualisation and weight analysis.

Supervisors: Prof Jian Zhao and A/Prof Qianbing Zhang

YAOLAN TANG **MONASH UNIVERSITY**

Gradation-dependent constitutive modelling of crushable granular materials

Particle breakage, together with the resulting evolution of grain size distribution (GSD), fundamentally modifies the stiffness, strength, and dilatancy of granular materials such as calcareous sand and rockfill when subjected to high stress. To address these coupled mechanisms, this thesis establishes a unified gradation-dependent constitutive modelling framework that explicitly incorporates GSD evolution into stress-strain formulations. The study begins by deriving a breakage-based yield criterion from elastic potential energy contours and formulating a hardening parameter that links yield surface expansion to the crushing degree and void ratio, thereby producing a constitutive model capable of reproducing the essential behavior of crushable materials. Building on this foundation, a gradation-state-dependent elastoplastic model is developed by integrating a GSD evolution law with state-dependent dilatancy and strength, supported by a family of critical state lines and modified compliance matrices to capture stiffness degradation and dilation-contraction responses observed in laboratory tests and DEM simulations. To overcome the complexity and parameter richness of the elastoplastic formulation, the final stage introduces a gradation-dependent hypoplastic model that retains the core mechanisms of GSD

evolution and critical state modification while substantially reducing the number of calibration parameters. Enhanced density functions and correction terms further enable accurate simulation of undrained and hydrostatic responses. The resulting framework, evolving coherently from elastoplastic to hypoplastic formulations, provides a practical and robust tool for modelling particle crushing in geotechnical applications

Supervisor: Prof Jian Zhao

FENG XIAO **MONASH UNIVERSITY**

Subsurface fluid injection and induced fault reactivation with hydro-mechanical coupling simulation

Scientific research is crucial for addressing societal challenges like the transition to renewable energy and climate change mitigation. Subsurface systems are central to these efforts, making the prediction and control of fluid processes in fractured geological environments a critical research area. This work investigates three key applications: pressurised tunnel design, hydropower tunnel stability, and hydraulic fracturing.

For pressurised tunnels, a design and CO₂ assessment framework is proposed, using multi-level BIM to integrate parametric modelling with numerical analysis. 3DEC simulations analyse the mechanical response of segmental linings under high water pressure, optimising design and waterproofing in complex geology.

A hydro-mechanical coupling framework, integrating TOUGH and FLAC3D, assesses the long-term stability of hydropower tunnels. Applied to fault reactivation scenarios, it demonstrates that impermeable linings reduce pore pressure diffusion, mitigating the risk of fault slip and structural instability.

In hydraulic fracturing, numerical simulations examine how pressure- and temperature-dependent CO₂ properties influence fracture propagation. Using the Span-Wagner and Fenghour equations of state, results show supercritical CO₂ provides the most efficient fracturing, enabling rapid pressurisation and complex fracture network development.

Overall, this research advances the understanding of subsurface hydro-mechanical processes, offering valuable insights for optimising underground infrastructure and promoting sustainable engineering.

Supervisors: A/Prof Qianbing Zhang, Prof Jian Zhao and Dr Saeed Salimzadeh

YIMO ZHU
MONASH UNIVERSITY

Assessing lifetime resilience of underground infrastructure to multi-hazard based on unified modelling and sustainable optimisation

Underground infrastructure plays a pivotal role in modern society, supporting critical functions in transportation, utilities, energy, and storage. Its lifecycle, spanning design, construction, operation, and maintenance, necessitates a robust framework for effective management and risk mitigation. The increasing complexity of multi-hazard scenarios, driven by interdependencies between natural and anthropogenic hazards, underscores the need for a unified approach to resilience and sustainability assessment. This thesis addresses these gaps by proposing a comprehensive framework for resilience assessment and optimisation of underground infrastructure under multi-hazard conditions, grounded in unified modelling and lifecycle performance evaluation. The research begins with a statistical analysis of risk sources, focusing on construction-phase accidents and operational-phase hazards. Subsequently, a dynamic cumulative damage model is developed to capture the behaviour of geomaterials under static, dynamic, and creep conditions, enabling simulation of damage progression under complex multi-hazard conditions. A unified approach is then applied for quantified resilience assessment, integrating abrupt hazards with long-term deterioration in circular tunnels and embedding hazard impacts and restoration strategies. Finally, a framework combining resilience and sustainability is developed, where lifecycle cost-analysis helps select optimal strategies that align resilience outcomes with economic and environmental objectives. This research demonstrates the critical role of resilience quantification in the lifecycle assessment of underground infrastructure. The findings provide a comprehensive framework for evaluating risks, quantifying recovery, and optimising infrastructure performance under complex multi-hazard conditions. By addressing the interdependence between resilience and sustainability, the thesis contributes to the advancement of adaptive and durable underground infrastructure systems.

Supervisors: A/Prof Qianbing Zhang and Prof Jian Zhao

AYESH DUSHMANTHA GUNATHILAKA
PEELLWATHTHA GAMARALALAGE
QUEENSLAND UNIVERSITY OF TECHNOLOGY

Use of real-time measured pavement moisture to assess the pavement's suitability to allow traffic after a flood event

Flooding poses a critical threat to road infrastructure, particularly for unbound granular pavements that are highly sensitive to moisture ingress. In flood-prone regions such as Queensland, Australia, elevated moisture levels within pavement layers significantly reduce resilient modulus, accelerate permanent deformation, and compromise structural integrity, often necessitating prolonged road closures. These closures, while essential for asset protection, result in substantial socio-economic disruption. This study presents a scientifically grounded, moisture-based decision-making framework to support timely and safe post-flood road reopening. The research integrates real-time field monitoring, predictive modelling, laboratory testing, and performance-based decision analysis. A flood-prone road section was instrumented with embedded moisture sensors, thermocouples, and a weather station, generating over two and a half years of continuous data. Pavement moisture variation was modelled using three complementary approaches: (i) an analytical climate-informed model, (ii) traditional machine learning algorithms, and (iii) numerical seepage modelling using SEEP/W. Laboratory testing, including soil-water characteristic curves, permeability, and repeated load triaxial experiments, quantified the influence of Degree of Saturation (DoS) on resilient modulus and plastic strain. A novel Pavement Suitability Index (PSI), combining elastic stiffness and deformation accumulation, was developed to link moisture state with pavement performance. Critical and ultimate DoS thresholds were identified, enabling classification of traffic operation into safe, cautionary, and critical zones. The resulting PSI–DoS–ESA framework provides a practical tool for estimating allowable traffic under varying moisture conditions. Field validation demonstrated strong agreement between predicted recovery trends and observed pavement behaviour, highlighting the framework's effectiveness for real-time, evidence-based flood recovery decision-making.

Supervisor: A/Prof. Chaminda Gallage

CLARENCE JOHN BUTCHER
UNIVERSITY OF NEWCASTLE

Application of StADSS to large in-situ rock discontinuities: practical challenges and theoretical developments

Predicting the shear strength of large in situ rock discontinuities remains a

longstanding challenge in rock mechanics, primarily due to scale effects. This thesis advances the Stochastic Approach for Discontinuity Shear Strength (StADSS), an emerging methodology that bypasses the effects of scale by making predictions of shear strength at full scale. Addressing the gap between laboratory validation and field implementation, the research undertakes three major investigations to enable the practical application of StADSS to natural discontinuities. First, a field ready digitisation workflow was developed to extract discontinuity seed traces from photographic imagery. The study quantified the influence of camera orientation, resolution, and post processing on trace accuracy, demonstrating that errors can be constrained within $\pm 10\%$ when using a ground sampling distance below 1.4 mm/pixel and maintaining a near perpendicular imaging angle. Secondly, rock strength variability was investigated through an extensive testing program on various rock materials to find economic methods for determining strength variability. A Monte Carlo algorithm was presented to capture the influence of material strength variability in predictions of shear strength by StADSS. Finally, StADSS was applied to a large limestone discontinuity, predicting peak and residual shear strengths of 442.9 kPa and 16.0 kPa respectively. For comparison, an experimental full-scale pull test resulted in an in situ measured shear strength of 27.1 kPa. While peak predictions could not be validated due to prior displacement, residual predictions aligned closely with observed stability, confirming the feasibility of applying StADSS at field scale. The thesis identifies key avenues for refining roughness digitisation and expanding in situ validation of StADSS.

Supervisors: Prof Olivier Buzzi, Prof Anna Giacomini, Dr Robert Bertuzzi and Prof Vaughan Griffiths

XIN LI **UNIVERSITY OF NEWCASTLE**

Discrete element modelling of soil-buried pipe interaction problems

Accurate modelling of soil-pipe interaction is essential for the stress analysis of buried pipelines exposed to differential ground movements. In practice, this is done using beam-on-nonlinear Winkler spring models. However, methods in current piping guidelines for calculating spring parameters rely on simplifications, such as shallow embedment depths, specific ground movement directions (vertical, axial and lateral), and neglect of scale effects. While previous studies have attempted to address these gaps by physical and continuum-based numerical modelling, large-scale experiments are costly and continuum-based methods face challenges in simulating large deformations of granular backfill.

This thesis presents a Discrete Element Method (DEM)-based numerical methodology for analysing sand-pipe interactions. DEM contact parameters are calibrated using a Bayesian framework based on the

simultaneous integration of independent triaxial and one-dimensional compression tests, resulting in a unique parameter set that accurately reproduce the macroscopic behaviour of granular material across varying densities, stress paths, and stress levels. The methodology is validated against independent element tests and published 1-g physical model tests for pipe uplift, vertical penetration and lateral dragging. Computational techniques are also developed to efficiently simulate deeply buried and/or large-diameter pipes.

Predictions from the rigorously calibrated DEM models provide insights into: i) The mechanics underlying the critical embedment depth for pipe uplift, beyond which the normalised reaction does not further increase with pipe embedment; ii) Scale effects on the peak lateral soil reaction; iii) The variation of the peak reaction on the pipe with the direction of imposed ground movement. Outcomes are further analysed to refine current state-of-practice methods for calculating Winkler spring parameters.

Supervisor: A/Prof. George Kouretzis

ADAM DAVID LINES **UNIVERSITY OF NEWCASTLE**

Transversely isotropic brittle enhanced representation (TIBER) for better capturing the impact of discontinuity stiffness and damage initiation on extent of failure

Accurately simulating brittle failure in sedimentary rocks requires improved characterisation of damage thresholds and stiffness properties. Although numerical models have advanced significantly, their predictive capability remains limited by assumptions applied to key input parameters, particularly crack initiation thresholds and shear stiffness. This thesis addresses these limitations through experimental testing, constitutive criterion development, and numerical modelling.

The research first investigates crack initiation thresholds in sedimentary rocks by examining their relationship with unconfined compressive strength (UCS). A database of more than 500 UCS tests on sandstone, siltstone, and coal was compiled, with crack initiation identified using the Volumetric Strain Response Method and analysed through lognormal correlation and regression. The results show that crack initiation is strongly lithology-dependent, however maintains a consistent ratio to UCS within narrow ranges. These findings provide a robust statistical basis for estimating crack initiation in coal measure rocks.

The second component examines shear stiffness as a function of applied effective normal stress using direct shear tests on bedding-parallel fractures. Traditional assumptions were evaluated against experimental data that explicitly accounted for seating displacement and intact rock response. Results demonstrate that shear stiffness increases non-

linearly with effective normal stress and is best represented by a stress-dependent function.

These findings were implemented in FLAC2D models to assess their influence on failure extent. Models incorporating stress-dependent shear stiffness produced failure extents that matched observed field behaviour, validating the approach. Overall, this research links laboratory-derived parameters directly to numerical modelling inputs, improving the failure predictions for roof support design and stability analysis.

Supervisors: A/Prof Klaus Thoeni, Prof Olivier Buzzi and Prof Anna Giacomini

MAHNOUSH GHAREHDAGHI **UNIVERSITY OF NEW SOUTH WALES**

Analytical and numerical modelling of consolidation and strain localisation in unsaturated soils

Unsaturated soils are commonly encountered in geotechnical applications, such as roads, embankments, dams, and retaining walls. Their behaviour is governed by the coexistence of air and water phases, and the interactions between the pore fluids and the soil matrix strongly influence their hydro mechanical response. Understanding phenomena such as consolidation and strain localisation in unsaturated soils is therefore essential for evaluating the performance and stability of geo structures.

This research presents analytical solutions to determine the pore air and pore water pressure parameters of unsaturated soils under undrained conditions, formulated within the effective stress framework. The solutions consider the effect of hydraulic hysteresis on the effective stress parameter and the soil water characteristic curve. Validation against experimental data and discussions on the effects of the initial degree of saturation, hydraulic hysteresis, and soil compressibility on the pore pressure parameters are provided. An analytical consolidation framework is further established, yielding two simplified diffusion type equations analogous to Terzaghi's formulation, enabling prediction of pore pressures evolution and settlement in unsaturated soils.

Additionally, a fully coupled numerical model is introduced for analysing strain localisation in unsaturated soils, based on the concept of effective stress and incorporating a novel viscoplastic constitutive formulation based on the consistency condition. Implemented in COMSOL Multiphysics, the model captures rate dependent behaviour in geomaterials and regularises strain localisation problem, effectively mitigating mesh sensitivity. Through a series of simulations, the effects of permeability, strain rate, confining pressure, drainage conditions, and initial suction are studied on the strain localisation in saturated and unsaturated porous media.

Supervisors: Prof. Nasser Khalili and Dr. Babak Shahbodagh

ARTURO JIMENEZ HUAMANLAZO **UNIVERSITY OF NEW SOUTH WALES**

CPT results and liquefaction of variably saturated tailings

This research investigates the saturated and unsaturated behaviour of one silty Platinum and one sandy Copper tailings to assess their susceptibility to static and dynamic liquefaction. The cone penetration test (CPT) is employed to characterise their properties under saturated and unsaturated conditions, focusing on loose, contractive states with high degrees of saturation.

Water retention properties were determined using filter paper and pressure plate tests. A novel empirical method is proposed for rapid estimation of the Water Retention Curve (WRC), incorporating void ratio dependency. This method links fractal and other Particle Size Distribution (PSD) characteristics to the WRC parameters, demonstrating good agreement with experimental data for both soils and tailings.

The stress-strain behaviour was established via saturated triaxial, closed-system triaxial, and oedometer tests. The closed-system condition, relevant for rapid post-failure deformations where pore air and water become trapped, was modelled using a bounding surface plasticity framework. This constitutive model integrates Boyle's Law and hydraulic hysteresis to simulate the coupled variations in pore pressures, suction, and volume change, achieving validated simulations against triaxial results.

CPTs conducted in calibration chambers and shear stacks utilized cavity expansion analysis, incorporating the closed-system behaviour via the bounding surface model (for air volume fractions below ~15%). This analysis yielded charts correlating normalised cone resistance to the initial state parameter across a range of air volume fractions, enhancing CPT interpretation.

Shaking table tests enabled the development of Critical State-based correlations between Cyclic Stress Ratio (CSR) and Arias Intensity with cone tip resistance to assess liquefaction triggering and settlement under seismic loading.

Supervisor: Prof Adrian Russell

SANA SHAHOVEISI **UNIVERSITY OF NEW SOUTH WALES**

A fully coupled hydro-mechanical model for the analysis of fractured porous media

This thesis presents a comprehensive study of hydraulic fracture propagation in poroelastic media using advanced numerical techniques. This work proposes two numerical frameworks: (i) a hydromechanical fully coupled, dynamic phase-field model, and (ii) a Physics-Informed Neural Network (PINN) framework for elastic fracture analysis.

First, a novel phase-field formulation is developed to simulate fluid-driven fracture propagation. The model introduces a new strain-based crack width formulation, offering improved numerical stability, ease of implementation and enhanced estimation of fracture aperture and permeability. Implemented in COMSOL Multiphysics, the formulation captures the dynamic response of fractured porous media by incorporating inertial effects and a fully coupled treatment of fluid pressure and solid deformation. The phase-field model is first verified against the classical KGD solution. Additionally, dynamic fracture propagation in a concrete gravity dam is modelled. The model is extended to simulate multizone hydraulic fracturing and multi-layered porous media with varying mechanical and hydraulic properties. The model is further applied to simulate hydraulic fracturing in multi-layered media containing pre-existing (natural) fractures enabling the simulation of branching, coalescence, and asymmetric growth paths.

Next, a PINN framework based on NVIDIA Modulus is developed as a mesh-free and flexible alternative for elastic fracture modelling. The framework is extended by employing adaptive loss weights to improve training efficiency and accuracy, particularly in regions with sharp stress gradients near crack tips. Extensive verification studies, including two-dimensional inclined single cracks, heavily fractured domains, and three-dimensional single and multiple penny-shaped fractures, demonstrate strong agreement between the PINN predictions and high-fidelity finite element results.

Supervisors: Prof. Nasser Khalili, Dr. Babak Shahbodagh and Dr. Mohammad Vahab

PENGHAO ZHANG **UNIVERSITY OF NEW SOUTH WALES**

Efficient simulation of quasi-brittle cracking in concrete and rock using the phase field method and scaling theory

Engineering structures made of rock and concrete may fracture, often due to extreme external loads arising while in service. Understanding and simulating accurately the fracturing processes assists with the optimization of structural design and enhances reliability. Numerical models based on continuum and fracture mechanics are employed extensively to simulate and interpret these fracturing processes. However, many mesh-based continuum methods have mesh-dependent limitations. This study presents a new and enhanced phase-field fracture mechanics model,

and novel scaling laws that are implemented within it, to address these critical issues. First a new dimensionless framework of basic phase-field models is proposed. New scaling laws for the fracture toughness and characteristic length are proposed that enable the non-dimensionalized model outputs to be rescaled and made applicable to any size as long as the structure and load configuration similarities are maintained. An enhanced phase-field fracture model that incorporates the damage constitutive law is also proposed. This model is capable of simulating the quasi-brittle fracturing process, size effects and compressive-shear cracking phenomenon in concrete samples and rocks at laboratory and field scales. Finally, the proposed fracture mechanics model is used to simulate failures caused by tunnel excavations in rock masses. The crack initiation and ultimate macroscopic failure features at the tunnel scale are reproduced. The proposed scaling theory for characteristic length and mesh size minimizes computational resource consumption when applied to tunnel excavation case studies. Accurate and efficient simulations of the failure patterns and depths, and corresponding deformations induced by excavation, are attained.

Supervisors: Prof Adrian Russell and A/Prof Kurt Douglas

AAYUSH KUMAR **UNIVERSITY OF QUEENSLAND**

Thermo-mechanics of asphalt mixes with crushed waste glass aggregates

The growing focus on sustainable pavement construction has encouraged the use of synthetic alternative aggregates such as crushed waste glass (CWG) in hot mix asphalt (HMA). As the topmost and most expensive layer, asphalt must withstand traffic loads, temperature variations, and rainfall. Therefore, understanding its fracture and thermo-mechanical behaviour under combined stresses is crucial, especially when new materials like CWG are used. This study investigates the fracture behaviour and thermo-mechanics of dense-graded HMA mixes with varying CWG contents (2.5–42.5%) replacing natural fine aggregates. Standard and advanced testing methods were employed to evaluate stiffness, cracking resistance, and deformation under simple and complex stress states. Aggregate morphology—including sphericity, roundness, angularity, and surface roughness—was characterized using image analysis, 3D profilometry, and fractal analysis. Specimens designed using the Marshall method were tested using IDEAL-CT and Brazilian tests, coupled with stereo high-speed photography at -20°C , 0°C , and 60°C to capture crack initiation, propagation, and speed. Thermal properties (conductivity, diffusivity, and specific heat) were measured using the Transient Plane Source method; while rutting and moisture susceptibility were evaluated via Hamburg Wheel-Tracking tests. Further, ultrasonic pulse velocity (UPV) tests identified crack thresholds during uniaxial and biaxial loading. True triaxial test results, fitted to Mogi-linear, Mogi-power, and Drucker–Prager criteria, showed CWG's influence on

stiffness and failure characteristics. Overall, the study demonstrates that CWG enhances rutting resistance and mix stiffness yet offers a sustainable and mechanically distinct alternative aggregate for asphalt mixtures.

Supervisors: Dr Mehdi Serati, Ian van Wijk, A/Prof Prashanth Vangla and Prof G V Ramana

KEITH MANDISODZA **UNIVERSITY OF QUEENSLAND**

Tailings dam design process, parameters, and risk assessment

The engineering of modern Tailings Storage Facilities (TSFs) is struggling to keep pace with increased mineral waste production, relying on static, deterministic procedures inherited from water dam design. TSFs are complex, dynamic systems, yet current design specifications critically fail to account for the inherent knowledge uncertainty in key design parameters (e.g., material properties, site conditions) and operational changes. This reliance on simplified methodologies (like static Fault Tree Analysis, FTA) often leads to suboptimal, costly designs or, critically, catastrophic failures like Mount Polley and Brumadinho.

This thesis comprehensively critiques the current TSF design process, risk tolerability standards, and traditional risk assessment methods. It introduces Bayesian Networks (BNs) as a dynamic, probabilistic framework to improve the treatment of these uncertainties. The methodology involves mapping the FTA models from historical failure expert panel reports (Mount Polley, Fundão, Cadia, Brumadinho) into BNs.

This process enables quantitative dependency analysis, allows for the inference updating of prior probabilities upon receiving new monitoring data, and facilitates predictive accident analysis. The findings lead to the proposal of a streamlined, risk-informed design method that integrates uncertainty analysis. This optimisation approach minimises uncertainty in input parameters, thereby ensuring that TSF designs are neither over-designed nor under-designed, significantly improving dam safety and economic efficiency.

Supervisors: Emeritus Prof David Williams

ZHONGYU XU **UNIVERSITY OF QUEENSLAND**

Large ring test for restrained shrinkage cracking in concrete and shotcrete

The Restrained shrinkage is a common cause of early-age cracking in shotcrete tunnel linings. This thesis develops and evaluates an upscaled

concentric ring test to investigate restrained shrinkage at practical scales.

The study commenced with parametric analyses to inform specimen geometry and drying conditions. A large concentric apparatus was procured and comprehensively instrumented. The experimental programme evolved from half to full Wheatstone bridge configurations, incorporating calibration procedures and temperature cancellation. These measures enabled stable, multi-week measurements and reliable crack detection.

Experimental and numerical studies demonstrated that interface friction governs both the magnitude and angular distribution of restraint. Four series of large-ring tests examined the effects of instrumentation, drying mode, sealing, and interface preparation. Numerical models reproduced these effects and showed that peak stresses localise within high-friction or bonded sectors, while subdivision and symmetry of stick-slip regions mitigate stress concentrations.

An energy-based interpretation was developed by distinguishing between the reference elastic energy associated with free shrinkage and the elastic energy inferred from steel-ring strain measurements. Application to large-ring data indicates that early-age behaviour is dominated by relaxation loss, while stored elastic energy increases as concrete stiffness develops and shrinkage rates decline.

The thesis concludes with practical recommendations on test geometry, instrumentation, boundary control, interface preparation, and data interpretation, and outlines future work on thick-ring calibration and field correlation. Together, these contributions establish an upscaled ring methodology that enhances the reproducibility and diagnostic value of restrained-shrinkage testing for tunnel linings.

Supervisors: Dr Jurij Karlovšek, Dr Harry Asche and Dr Lucija Hanzič

SHIMA ENTEZAM **UNIVERSITY OF SOUTHERN QUEENSLAND**

Load transfer mechanisms of composite rock bolts for strata reinforcements

Fully grouted rock bolts are central to strata reinforcement in underground mining and civil excavations. Still, their reliability depends on how the load is transferred through the rock bolt-grout-rock system as bonding degrades. Due to limited research on axial load transfer in fibreglass reinforcement, this thesis examines composite rock bolts. It develops practical pathways and advanced manufacturing technologies to improve the performance of fully grouted rock bolts. A systematic review consolidates research on the axial and shear loading mechanisms of fully grouted rock bolts and identifies gaps in test standardisation, the interpretation of bond-slip response, and the integration of data-driven modelling. Laboratory pull-out tests on fully grouted fibreglass rock bolts then quantify the effects of embedment length, confinement diameter,

rock bolt diameter, grout strength, water-to-grout ratio and curing time on peak load capacity and post-peak load-displacement behaviour. Using the experimental database, machine-learning models are developed to predict the axial load-bearing capacity of fibreglass and steel rock bolts and the grout uniaxial compressive strength. An ensemble framework with SHAP-based interpretation shows that curing time, grout strength and water content dominate capacity, providing transparent, physically consistent guidance for grout optimisation and rock bolt selection. Then, a new generation fibreglass rock bolt is manufactured using a hybrid pultrusion-braiding process with nano graphene-modified epoxy. Large-scale mechanical testing, including single- and double-shear, pull-out, tensile, and torsional tests, demonstrates improved shear capacity, ductility, and stability compared with conventional fibreglass rock bolts. Thesis outcomes deliver an integrated mechanistic, predictive and manufacturing pathway for corrosion-resistant composite rock bolts.

Supervisors: Prof Ali Mirzaghorbanali, Prof Kevin McDougall, Prof Warna Karunasena and Prof Naj Aziz

BEHSHAD JODEIRI SHOKRI **UNIVERSITY OF SOUTHERN QUEENSLAND**

A step toward better understanding rock bolt technology

This thesis advances rock bolt technology through a coordinated program of systematic review, laboratory testing, three-dimensional numerical simulation, machine-learning-based prediction, and the development of fibreglass rock bolts. A systematic review of axial load-transfer research identified persistent gaps related to grout-controlled behaviour, realistic installation deviations, and the absence of reliable predictive frameworks for assessing rock-bolt performance under practical design conditions. Controlled laboratory pull-out testing generated datasets for axial capacity, beginning with 34 tests in which curing time (CT) and water-to-grout ratio (W/G) were varied, and predictive performance was evaluated using multiple linear regression, multilayer perceptron neural networks, Bayesian-regularised neural networks, generalised feed-forward neural networks, and extreme gradient boosting. The modelling framework was subsequently expanded to incorporate grout type, grout uniaxial compressive strength (UCS), fly ash content, and confinement diameter, and to couple gradient-boosting ensembles with metaheuristic optimisation algorithms to improve robustness and generalisation. To investigate the mechanical behaviour of grout, 253 UCS tests were conducted on Australian commercial grouts across a range of CT and W/G values, enabling the development of ANN- and CatBoost-based predictive models. Installation realism was addressed through pull-out testing of fully resin-encapsulated systems with varying levels of eccentricity and inclination, together with validated three-dimensional ABAQUS finite-element modelling to examine stress redistribution and the development of interface damage; peak load reductions of up to

69.6% were observed at the highest eccentricity. Also, a new prototype of fibreglass rock bolt was manufactured and assessed through single-shear testing, demonstrating a 26% increase in shear capacity compared with conventional ones.

Supervisors: Prof Ali Mirzaghorbanali, Prof Kevin McDougall, Prof Warna Karunasena and Prof Naj Aziz

REEM OMAR ALQAISI **UNIVERSITY OF TECHNOLOGY SYDNEY**

Engineering characteristics of expansive soils stabilised with eggshell powder and lime/cement: a sustainable approach

Expansive soils, characterised by low bearing capacity and significant volume changes due to moisture fluctuations, pose major challenges for construction projects such as pavements, highways, foundations, and canal linings. These soils are widespread in regions including South Africa, Australia, India, and the United States, where shrink-swell behaviour can cause serious structural damage. With increasing global construction activity, effective stabilisation is essential to improve their engineering performance. Chemical stabilisation using lime or cement is commonly applied to enhance strength and reduce swelling. This study investigates eggshell powder (ESP), a calcium oxide-rich bio-waste, as a supplementary additive to hydrated lime or cement for expansive soil stabilisation. ESP was produced by rinsing, crushing, and sieving discarded eggshells, offering a sustainable and cost-effective alternative. While ESP has been used in bricks, concrete, and alkali-activated binders, limited research has examined its combined use with lime or cement in expansive soils.

An experimental program evaluated electrical, physical, mechanical, and microstructural properties of stabilised soils, supported by numerical modelling of embankment performance on treated soft soils in Australia. Artificial expansive soil composed of kaolinite, bentonite, and fine Sydney sand was tested. Electrical conductivity results identified optimal ESP-lime or ESP-cement ratios. Mixtures of 5% lime with 5% ESP and 6% cement with 6% ESP significantly improved CBR, UCS, and G_{max} compared with lime or cement alone. Numerical modelling in Ballina, NSW, confirmed reduced settlement and lateral displacement, demonstrating ESP as an effective sustainable stabilisation additive.

Supervisors: Prof Hadi Khabbaz and Prof Behzad Fatahi

MARLISIO OLIVEIRA CECILIO JUNIOR UNIVERSITY OF TECHNOLOGY SYDNEY

Shear behaviour of saturated infilled rock joints under cyclic loading in the hollow cylinder apparatus

The proper estimation of stresses generated by train passage is of fundamental importance for the serviceability and longevity of railways; however, limited knowledge is available where the track substructure is built on a jointed rock mass. The present study introduces an analytical solution for estimating the three-dimensional ground stresses arising from moving wheel loads, applied to a jointed rock subgrade to determine the normal and shear stresses acting along a specific discontinuity plane. A discussion is presented on the experimental investigation of the shear behaviour of saturated, undrained, infilled rock joints, with particular emphasis on realistic laboratory simulation of cyclic loads induced by train passage. The Hollow Cylinder Apparatus is identified as the most suitable device for this purpose, following key adaptations including the installation of mini pore pressure transducers directly at the joint and the fabrication of a bottom platen extension, together with other minor innovations. Numerical models based on the Distinct Element Method are developed to simulate jointed samples, aiming to anticipate laboratory behaviour and support pre-established hypotheses. A series of static tests is first conducted on clean joints with planar, saw-tooth, and natural profiles, as well as on saturated infilled joints, to validate the applicability of the HCA for rock joint testing, particularly with respect to pore water pressure application, maintenance, and measurement within the infill soil. Finally, dynamic cyclic tests are performed on saturated, undrained, infilled rock joints using loading histories derived from the proposed analytical solution, simulating realistic Australian railway traffic patterns and assessing the influence of joint orientation on the experimental response.

Supervisors: Prof Buddhima Indraratna and Prof Cholachat Rujikiatkamjorn

RAMESH GEDELA UNIVERSITY OF TECHNOLOGY SYDNEY

Bioremediation of soft subgrade for enhanced performance of rail infrastructure

The demand for faster and heavier railway transportation has increased axle loads and train speeds, intensifying subgrade instability problems in soft coastal soils in Australia. These soils frequently experience mud pumping and excessive deformation under unfavourable cyclic loading and drainage conditions, resulting in high maintenance requirements. Although conventional ground improvement methods exist, a sustainable solution for mitigating subgrade instability remains limited. This study

investigates the potential of the biopolymer Xanthan Gum (XG) as an eco-friendly stabilisation method for low-plasticity subgrade soils under railway loading. The soil was obtained from an active railway site with a history of mud pumping. A series of laboratory tests were conducted to evaluate the influence of fines content and XG dosage on soil strength, stiffness, critical state behaviour, and undrained cyclic response. The effects of loading parameters, including cyclic stress ratio and loading frequency, on treated soils were also examined. The results indicate that an optimum XG content of approximately 1.5–2.0% by dry soil weight significantly enhances stiffness, strength, and residual resistance, while reducing strain softening. Increasing fines content further improved soil performance. Under cyclic loading, XG-treated soils exhibited reduced excess pore water pressure generation and plastic strain accumulation compared with untreated soils. The treatment effectively limited internal moisture migration and suppressed upward fines movement, thereby mitigating subgrade fluidisation. Overall, XG treatment provides apparent cohesion through interparticle bonding, substantially improving resistance to cyclic loading and offering a promising sustainable solution for railway subgrade stabilisation.

Supervisors: Prof Buddhima Indraratna, Dr Subhani Medawela, Dr Thanh Nguyen and Prof Behzad Fatahi

LAKSHMI NAIR UNIVERSITY OF TECHNOLOGY SYDNEY

Subgrade soil behaviour under a three-dimensional stress state, including principal stress rotation

The increasing demand for sustainable railway transportation has highlighted the vulnerability of soft subgrade soils with low to medium plasticity when subjected to high cyclic stresses and inadequate drainage. Such conditions often lead to instability phenomena such as mud pumping, driven by the rapid accumulation of excess pore water pressure (EPWP), particularly under heavier and faster train operations where principal stress rotation (PSR) becomes significant. This study investigates the combined effects of cyclic vertical stress and torsional shear stress on the load–deformation behaviour of low-plasticity subgrade soil using a hollow cylinder apparatus. Soil specimens were retrieved from a coastal railway site affected by mud pumping. Continuous and multi-stage intermittent cyclic loading tests, incorporating drained and undrained rest periods, were conducted to examine EPWP evolution and multidirectional strain responses. The results demonstrate that strain accumulation is strongly influenced by the interaction between vertical and torsional stresses, with increasing torsional stress significantly accelerating instability. A critical torsional-to-vertical stress ratio was identified, beyond which soil instability is triggered. To characterise this behaviour, a stiffness degradation index (δ_0) accounting for PSR effects

is proposed as an early indicator of instability. In addition, a normalised torsional stress ratio (NTSR) is introduced to quantify the influence of torsional loading, with higher NTSR values leading to premature failure. The findings further highlight the crucial role of drainage and loading history in controlling subgrade stability. Finally, a constitutive model based on the multilaminate framework with bounding surface plasticity is proposed to predict cyclic soil behaviour under PSR.

Supervisors: Prof Cholachat Rujikiatkamjorn, Prof Buddhima Indraratna and Dr Thanh Nguyen

ABU SADAT MOHAMMAD RIYAD **UNIVERSITY OF TECHNOLOGY SYDNEY**

Geotechnical characteristics of a rubber-mixed granular medium under monotonic and cyclic loading

Improving the safety and resilience of transport substructures is crucial for ensuring long-term durability. As transportation infrastructure grows to meet the demands of developing communities, the need for raw materials, often sourced from natural quarries, continues to increase. Traditional railway substructure materials, however, are prone to breakage and require more maintenance compared to recycled alternatives. In response, environmental agencies are promoting eco-friendly practices, advocating for the use of repurposed waste materials as a sustainable alternative. Previous studies have explored the potential of combining rubber crumbs and mining waste as a replacement for conventional substructure materials, particularly for railway capping layers. This study focuses on coal wash and rubber crumb (CWRC) mixtures as a sustainable alternative for railway infrastructure, specifically targeting the capping layer. The monotonic behaviour of CWRC mixtures was analysed under single-stage and multi-stage triaxial loading conditions. The results reveal that a 10% rubber crumb (RC) content provides optimal deformation, strength, and energy dissipation, consistent with previous studies. A semi-empirical model was also introduced to describe the single-stage monotonic triaxial behaviour of CWRC mixtures, considering the compressibility of RC. Additionally, the study examines the influence of single-stage cyclic triaxial loading on CWRC mixtures, investigating shear performance, fatigue behaviour, disturbance, and modulus degradation. The research also explores the shakedown behaviour of CWRC mixtures with 10% RC content under multi-stage cyclic triaxial loading, reflecting the varying stress levels that railway substructure materials are subjected to over time. The findings will support more accurate material evaluations, enhancing long-term performance predictions for railway substructures.

Supervisors: Prof B Buddhima Indraratna, Prof Hadi Khabbaz, Dr Yujie Qi, Dr Chathuri Madhusanka Kulappu Arachchige

JUNSIK BAE **UNIVERSITY OF WESTERN AUSTRALIA**

A new frontier in dynamically installed anchors

Dynamically installed anchors offer a cost-effective alternative to conventional anchoring systems, as they are installed by freefall penetration without the need for external energy, making them suitable for deep-water applications. This thesis presents an integrated investigation into the development, optimisation, and validation of a novel dynamically installed anchor (DIA), referred to as the maverick anchor, for mooring offshore floating facilities.

The anchor geometry was systematically developed using large-deformation finite element (LDFE) analyses in clay and computational fluid dynamics (CFD) simulations in water. Key design features include a narrow tip angle, sloped shaft, optimally positioned trapezoidal main fins, and trailing fins to enhance stability, embedment depth, and diving potential. A novel frictional algorithm was also developed to more accurately capture velocity-dependent anchor-soil interface behaviour during installation.

Water tank tests and CFD simulations demonstrated that the maverick anchor achieves higher freefall velocities and a lower drag coefficient than existing dynamically installed anchors. LDFE analyses indicated significantly deeper penetration, and an improved analytical framework based on cavity expansion theory was proposed to better predict embedment depth. Loading analyses further revealed enhanced diving and keying behaviour, leading to higher holding capacity with reduced loss of embedment.

Finally, centrifuge model tests conducted in Gulf of Mexico clay and North-West Shelf calcareous silt were used to validate the numerical results. The maverick anchor achieved deeper embedment and higher capacity than the reference anchors tested under the same conditions, indicating its improved performance across the examined soil types and loading scenarios.

Supervisors: Prof Muhammad Shazzad Hossain and Dr Youngho Kim

PUORYA KAZEMI ESFEH **UNIVERSITY OF WESTERN AUSTRALIA**

Numerical modelling of vibratory pile installation in sand

Vibro-driving has emerged as a promising alternative to conventional impact hammering for pile installation, particularly in sand, offering faster and quieter installation. However, despite its growing adoption, key uncertainties persist regarding the vibro-driveability of open-ended piles and their post-installation behaviour. This PhD research aims to address

these uncertainties by numerically investigating the soil mechanisms governing pile vibro-driving in saturated sand. The findings underscore the significant influence of vibratory parameters, such as the dynamic-to-static force ratio and frequency, and soil permeability on total soil resistance, penetration rates, soil state evolution, and excess pore pressure generation during installation.

Supervisors: Prof. Britta Bienen and Prof. Fraser Bransby

BINGCHANG ZHANG
UNIVERSITY OF WESTERN AUSTRALIA

Scour-induced span elongation and associated hydrodynamics

Scour-induced span development and elongation beneath subsea pipelines and power cables can significantly affect their on-bottom stability and structural integrity. Although several predictive models for free-span development exist, they are all derived from small-scale laboratory tests, and the associated scaling effects remain insufficiently understood. In addition, the spatiotemporal evolution of scour and the governing hydrodynamics remains insufficiently understood.

Motivated by these knowledge gaps, this PhD thesis documents a series of laboratory experiments undertaken to investigate scaling effects on span development and elongation beneath a model pipeline. The results revealed that bed ripple formation under live-bed conditions is an important scale effect, offering a clear explanation for the variability in span elongation rate commonly observed in previous studies. This scaling effect was further examined through experiments conducted across a wide range of model scales in one of the world's largest flume facilities. The outcomes confirmed the influence of bed ripples and enabled the development of a new predictive model for span elongation that explicitly accounts for scaling effects.

The study also provided systematic characterisation of the spatiotemporal evolution of three-dimensional scour features near the span shoulder. Complementary numerical simulations, incorporating realistic scour-hole geometries, were performed to investigate the underlying mechanisms of span elongation and the hydrodynamic processes acting on the free span.

Overall, this research delivers a comprehensive understanding of scour evolution and span development across scales ranging from laboratory models to field conditions. This understanding improves our ability to extrapolate laboratory observations to full-scale subsea pipelines and power cables, better informing pipeline and cable design and the adoption of more robust span mitigation strategies.

Supervisors: Dr Hongwei An and Prof Scott Draper

ABDULLAH MUHAMAD ALI AL-RAWABDEH
UNIVERSITY OF WOLLONGONG

Experimental and numerical modelling of helical pile foundation

Helical (screw) piles are an advanced foundation system that uses a steel foundation with a helical bearing plate attached to be driven into the ground. Helical piles use has grown rapidly due to advantages such as quick installation; cost effectiveness; high tensile and compression bearing capacities; and carrying loads immediately after installation. Despite these advantages, conventional design approaches idealise the helix as a flat disc, disregarding its actual 3D geometry and its influence on performance. The impact of helix shape on key parameters such as torque, capacity, and soil–structure interaction remains insufficiently understood. Furthermore, helical pile finite element models have largely neglected the complex deformations induced during installation and often overlook the role of helix geometry in altering the load-transfer mechanism. This study aims to fill these critical gaps by investigating the effects of helix geometry and shape on the installation process and axial-bearing performance of helical piles. A large-scale apparatus was developed to conduct laboratory experiments incorporating a variety of novel and conventional helix shapes to examine their influence. A robust 3D FE model, leveraging the Coupled Eulerian Lagrangian approach developed to analyse Key factors such as installation torque, soil disturbance, and load transfer mechanisms. The experimental and numerical simulations provide a comprehensive understanding of the influence of helix shape on the behaviour of helical piles and help to develop equations to enhance the predictive accuracy of installation torque–capacity relationships and refine empirical and numerical methods of predicting the helix shape effect on helical pile ultimate capacity.

Supervisors: A/Prof Jayan S. Vinod, Prof Timothy McCarthy and Dr Martin D. Liu

CHAPTER NEWS

NEW SOUTH WALES

2025 NSW Research Award Night

Event Mentors: Stefano Pirrello (Deep Foundation Solutions), Dr Pan Hu (Western Sydney University), and A/Prof Jianfeng Xue (University of New South Wales)

The 2025 NSW Research Award Night on 13 August, hosted by the Sydney NSW and Newcastle Chapters of the Australian Geomechanics Society (AGS), was a resounding success, showcasing the cutting-edge research of emerging geotechnical professionals from across New South Wales. Held in Sydney and Newcastle, the event provided a vibrant platform for postgraduate students to present their work to a broad audience of industry experts, academics, and fellow engineers.

This prestigious annual event reflects AGS's ongoing commitment to supporting academic institutions and fostering the next generation of geotechnical leaders. The award aims to highlight outstanding research in Geotechnical Engineering and Engineering Geology, encouraging knowledge exchange between universities and the professional community.

The evening was expertly coordinated by Stefano Pirrello, Pan Hu, and Jianfeng Xue, whose efforts ensured a seamless and engaging experience for all attendees. Their dedication to promoting academic excellence and industry collaboration was evident throughout the event.

AGS extends its sincere thanks to Arcadis, and in particular Dr Jim Yang and his team, for generously hosting the event. Their support provided a welcoming and professional environment that helped make the evening both enjoyable and impactful.

Five exceptional finalists were selected to present their research, each offering unique insights into the challenges and innovations shaping the future of geotechnical engineering:

Winner: Guilherme Barros (University of Newcastle) presented his PhD research on dynamic coupling of boundary and discrete element methods for large-scale geotechnical simulations. His work in computational mechanics advances the accuracy and efficiency of numerical modelling in geomechanics.

Isabella Novais Silva (University of Technology Sydney) shared her work on enhancing railway infrastructure resilience, focusing on soft soil behaviour, soil stabilisation, and sustainable ground improvement using recycled materials. Her research has already earned international recognition, including the ISSMGE Bright Spark Lecture Award in 2024.

Maria Julieta Rottemberg (University of New South Wales) presented her research on energy tunnels and the thermo-hydro-mechanical behaviour of energy geostructures. Her advanced numerical modelling offers a practical framework for integrating geothermal energy into underground infrastructure, contributing to climate-adaptive urban planning.

Farshad Bahootoroody (University of Newcastle) discussed his work on geotechnical risk management of scenic rock cliffs. With a strong publication record and international research collaborations, Farshad's research addresses safety and sustainability in natural hazard-prone environments.

Sajjad Vaseghi (University of Technology Sydney) showcased his expertise in unsaturated soils and soil dynamics, with applications in transportation geotechnics and underground infrastructure. His research bridges academic theory and engineering practice, contributing to safer and more efficient geo-infrastructure design.

Each finalist delivered a compelling presentation tailored to an audience of practicing geotechnical engineers, demonstrating not only technical excellence but also the relevance of their work to real-world challenges.



Winner: Guilherme Barros, Finalists: Farshad Bahootoroody, Sajjad Vaseghi, Maria Julieta Rottemberg, Isabella Novais Silva, Event host: Stefano Pirrello (From left to right)

2025 AGS GOLD50+ Presentation

Event Coordinator: Dong Wang (PSM)

On Wednesday, 8 October 2025, the AGS Sydney Chapter proudly hosted the Gold 50+ Membership Talk at Engineers Australia, featuring Mr. Tim Sullivan presenting on "Complex Systems in Slope Engineering." Drawing over 750 registrations, it was one of the year's most attended AGS Sydney events.

Tim shared insights from his five decades of geotechnical experience, combining technical expertise with a reflective perspective on slope behaviour. He explored how applying complex systems thinking can deepen understanding of natural slopes, drawing lessons from fatal landslides, mine river diversions, and large open-pit slopes. Tim emphasised that many failures arise not from incompetence but from underestimating the dynamic, interconnected, and evolving nature of slopes.

Through vivid case studies, he illustrated key principles of complexity science. Natural slopes are open systems, constantly exchanging energy and matter, never in true equilibrium, and subject to gradual entropy. Minor instabilities can quietly develop over years, ultimately triggering

catastrophic failures under conditions unforeseen by traditional analysis.

Tim also highlighted the nested and interlinked nature of slope systems, where small changes in one subsystem can trigger abrupt shifts in stability elsewhere. He encouraged engineers to embrace uncertainty and adopt a systems perspective, explicitly considering entropy, system boundaries, coupling, self-organisation, and emergent behaviour. While risk can never be entirely eliminated, engaging with complexity enhances understanding, informs design, and reduces the likelihood of catastrophic failures.

Attendees responded enthusiastically, appreciating Tim's approach to blend rigorous technical insights with real-world lessons and reflective thinking. His presentation reminded engineers of the limits of prediction in geotechnical practice, while inspiring a broader, systems-focused approach to slope engineering.

The AGS Sydney Chapter thanks Mr. Tim Sullivan for sharing his wisdom and experience and expresses gratitude to the committee and volunteers whose efforts made this landmark event a success.



2025 AGS Gold 50+ event, from left to right: Ali Aref Nia, Cholachat Rujikiatkamjorn, Louise Sullivan, Tim Sullivan, Dong Wang

AGS Sydney Reactive Soils and Site Classification Course 2025 Event Mentors: Manuel Neves (Fortify Geotech)

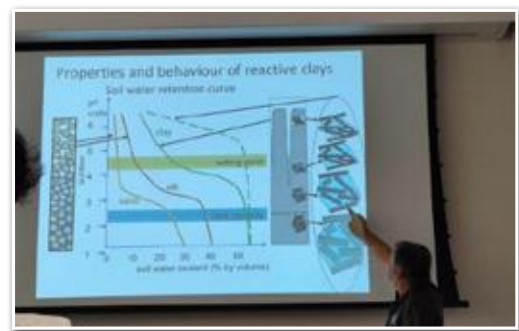
Building on the continued demand for high-quality professional development across the industry, the AGS Sydney Chapter hosted the first edition of the Reactive Soils and Site Classification Course on 22 October 2025. Delivered by renowned educator Dr Stephen Fityus, the course provided attendees with a clear and practical understanding of reactive clay behaviour and the application of AS 2870 – Residential Slabs and Footings for site classification.

The one-day program blended theory with practical examples, giving participants valuable insights into the origins of soil reactivity, the key properties and behaviours of reactive clays, and how these factors influence foundation design. The course also explored the primary drivers of soil movement, common causes of residential foundation distress, and the principles of effective site investigation—including appropriate methods for testing soil reactivity.

Dr Fityus's clear explanations, real-world case studies, and engaging teaching style were standout features for many participants.

The session attracted a strong mix of early-career professionals and experienced practitioners seeking to refresh their understanding of reactive soil behaviour—highlighting the ongoing importance of robust site classification within the Australian geotechnical industry.

The AGS Sydney Chapter extends its appreciation to Dr Fityus, the event volunteer Manuel Neves, and all participants for contributing to another successful professional development event. We look forward to continuing to offer valuable training opportunities throughout the coming year.



Dr. Stephen Fityus explaining the impact of soil moisture variation in the volumetric expansion of different soil types

2025 AGS Sydney Symposium

Event Coordinator: Alice Clark (Aurecon), Ali Parsa (JK Geotechnics), Hadi Khabbaz (UTS), Cholachat Rujikiat-kamjorn (UTS), Saman Zargarbashi (WSP), Sam Mirlatifi (Arcadis), AHM Kamruzzaman (TfNSW), Mehdi Tamadon (GHD), Mehrnaz Alibeikloo (WSP), Hamid Mortazavi Bak (Beca), Ali Aref Nia (Intrax), Pan Hu (Western Sydney University).

On Friday, 14 November 2025, the AGS Sydney Chapter proudly hosted the 29th Annual AGS Sydney Symposium at the Australian National Maritime Museum. With over 150 attendees, this flagship event focused on the theme “Climate-Responsive Ground Engineering” and brought together practitioners, researchers, and industry leaders to explore how geotechnics is both adapting to and driving solutions for a changing climate.

The program featured four themed sessions, two keynote presentations, and two invited speakers. International guest speaker Professor Slobodan Mickovski (Glasgow Caledonian University) delivered a compelling keynote on the use of vegetation and nature-based solutions for slope stability and resilience. Later in the day, Jim Yang (Arcadis) presented case studies highlighting how climate change is reshaping assumptions in design and construction across major infrastructure projects.

Across the event, speakers presented on a wide spectrum of climate-

relevant challenges. Topics included post-flood site reclassification, the coastal-geotechnical interface, rockfall risk simulation, and the reuse of landfill waste for infrastructure. Additional presentations explored the performance of temporary anchors beyond design life, reclassification and integration of uncontrolled fill, and the use of monitoring tools to optimise design. Afternoon sessions introduced attendees to interesting infrastructure case studies and emerging technologies in energy geotechnical structures.

The event reinforced the value of systems thinking, adaptive engineering, cross-disciplinary integration, and the need for climate-aware design frameworks. Throughout the day, Q&A discussions, networking breaks, and the post-event balcony drinks helped spark meaningful dialogue between professionals across sectors.

The Symposium concluded with a preview of next year's theme:

“Geotechnical Forensics: Lessons learnt from projects, courtrooms, and expert witnesses.”

The AGS Sydney Chapter extends its thanks to all speakers, attendees, volunteers, and to Platinum Sponsor MM Geomechanics for their generous support. Special thanks also go to the organising committee for delivering a timely and energising event.



AGS Sydney Symposium registration desk



AGS Sydney Symposium speakers' trophies

AGS Sydney Debate Night

“Modern Codes for Modern Problems: Is Eurocode 7 the Solution to Australia’s Geotechnical Design Challenges?” Event Coordinator: Mehdi Hajian (GDA)

The AGS Debate Night on 10 December brought together four experienced geotechnical professionals to critically examine whether Eurocode 7 (EC7) offers a suitable framework for addressing Australia’s evolving geotechnical design challenges. Rather than a simple “yes or no” outcome, the discussion highlighted that EC7 provides valuable lessons but is not a direct plug-and-play solution for Australian practice.

Each panellist provided their view as follows:

Eurocode 7: Ambition, Strengths, and Practical Challenges

Jamie focused on the structure and evolution of Eurocode 7, noting its ambition, breadth, and strong emphasis on harmonisation across Europe. He also noted recent EC7 updates were recognised for improvements in ground modelling, parameter selection, and design value assessment

However, concerns were raised about the complexity and length of the code, extensive cross-referencing, and the separation of design from construction execution. It was argued that, in some areas, valuable practical knowledge embedded in older standards may have been diluted or lost. The discussion also highlighted limitations in EC7 regarding performance monitoring, particularly the difficulty of directly monitoring ultimate limit state performance in geotechnical systems.

Reliability- and Risk-Based Design as the Real Gap

Ramtin argued that the core issue is not the absence of codes, but the lack of explicit reliability calibration in many Australian geotechnical standards. Geotechnical design was framed as an uncertainty-dominated discipline, where traditional ASD and LRFD approaches are reaching their limits for complex problems.

He noted that risk-based and reliability-based design were presented as essential tools for modern practice, enabling engineers to quantify uncertainty, consequences, and cost-of-risk more transparently. It was suggested that second-generation Eurocodes demonstrate a clear shift in this direction and offer a useful reference for the future evolution of Australian standards.

Ondrej emphasised that Australia already has a successful example of a reliability-based geotechnical standard in AS2159 (Piling). AS2159 was highlighted as a code that has been implemented very effectively and has performed well over many years, providing a practical balance between reliability, constructability, and industry usability. This was cited as evidence that reliability-based frameworks can work well in Australian practice when they are well calibrated, clearly written, and aligned with construction realities.

Lessons for Australian Codes — Not Direct Adoption

Sam's contribution emphasised that Eurocode 7 is not necessarily "the solution", but it does provide important insights. Australian geotechnical codes were seen as needing to evolve over the next decade in a way that is evidence-based, locally calibrated, and mindful of constructability and cost-effectiveness

The panel reviewed current Australian standards (including AS2159, AS4678, AS5100.3, AS2870, and AS1726), identifying gaps in reliability calibration, inconsistencies between load and resistance factors, and limited guidance for complex problems such as embedded walls and slopes.

Then debate started and panellists answered questions from their own viewpoints.

Overall Conclusion

Rather than reaching a single conclusion, the debate deliberately highlighted the complexity of modern geotechnical design and code development. The discussion reinforced that questions around Eurocode 7, reliability-based design, and Australian standards do not have simple answers.

The debate underscored that Australia already has examples of effective, reliability-informed practice, while also facing clear challenges around consistency, calibration, and guidance for complex problems. Eurocode 7 was viewed neither as a solution nor as something to dismiss outright, but as a reference point to provoke discussion, comparison, and critical thinking.

Ultimately, the session achieved its aim of stimulating informed debate, encouraging the profession to reflect on how geotechnical codes should evolve to address uncertainty, risk, constructability, and future demands — with the understanding that this conversation is ongoing and far from settled.

QUEENSLAND

This report includes the Queensland Chapter news from November 2025 to February 2026. The activities included multiple evening technical presentations and our annual Brisbane Symposium. Please visit the AGS Queensland Chapter webpage for future events.

New Diaphragm Wall Construction Method for Micro Sites and Underground Applications **Thursday 6 November 2025**

Over 40 members gathered at the WSP Brisbane office to hear James Morris reveal insightful details, construction methodologies, and recent advancements in diaphragm wall construction on highly constrained sites and further showcasing international examples.



James Morris delivering his presentation on diaphragm walls at the WSP Brisbane office.



Speaker dinner, Left to Right: Burt Look, Jaime Wilson, Mark Chapman, James Morris, Vincent Blanchet, Arsh Kaur.

Brisbane Symposium - From Setbacks to Success: Geotechnical Lessons Learned **Tuesday 25 November 2025**

The AGS Brisbane Symposium was successfully held for the very first time at The Star ballroom, in the recently completed Queens Wharf precinct. The theme was opened by keynote speaker and local legend John Wagstaff and further supported by eminent industry speakers from various organisations including consultancies, infrastructure agencies, principal contractors and specialist contractors.

The AGS Brisbane Symposium prides itself as an annual platform for knowledge sharing and promoting technical excellence as well as a great networking opportunity.

The event was a huge success and broke all previous records with 280 attendees, making it the largest AGS annual symposium event ever. This success was possible by the unwavering dedication and hard work of the organising committee, comprising, Dr Arsh Kaur (Symposium Chair), Natalie Murphy, Dr Bindu Aery, Dr Amir Shahkolahi, Vincent Blanchet, Any Doe, Jared Priddle, Dr Chris Bridges, and Jaime Wilson Moya.



AGS Brisbane Symposium 2025 at The Star

The program started with a brief QLD Chapter AGM by Vincent Blanchet (QLD Chair), supported by Dr Arsh Kaur, sharing both national and chapter updates, which was followed by technical presentations including:

- Whispers from the Earth: Six Decades Navigating the Complexities of Soil and Rock. Keynote Lecture by John Wagstaff from Wagstaff Piling.
- Ground risk due to underground anomalies – A case study of failure and remediation of a water tank by Dr Sujatha Manoj from Tetra Tech Coffey.
- Lessons from ongoing tailings dam failures by Em. Prof. David Williams from The University of Queensland.
- Building failures caused by adjacent construction activities by Prof. Harry Poulos from Tetra Tech Coffey.
- Site-specific seismic hazard assessment and its implications in design by Dr Narges Khajavi from GHD.
- Lessons learnt from failure of MSE retaining walls by Dr Amir Shahkolahi from Global Synthetics.
- When soil-structure interaction goes wrong – lessons learned from a Structural Engineer by Evelyn Storey from Aurecon.
- Geo-calamities – three short stories of projects gone badly wrong by Allan McConnell from Insitu Geotech Services.
- The Best-Laid Plans...Often Go Awry – Tales From a Mega-Project by Jaime Wilson Moya from FSG.
- Results of the 2025 TMR Geotechnical Working Group and the way forward by Dr Jun Sugawara from Transport and Main Roads.
- The perils of the GIR by Ian Shipway & Sally Roberts-Kelly from EDG Consulting.
- Case studies on the ABCs of design compared with the DEFG . . . WXYZ of construction by Dr Burt Look OAM from AGTRE.

We were also joined by AGS Director Joanna Sylvester from Newcastle who provided an update on National-level AGS initiatives and what the volunteer committees are doing in the background to make a difference

within the industry. Joanna also presented Honorary Life Membership awards to John Wagstaff and Allan McConnell who have been strong pillars within the geotechnical industry both nationally and internationally, but especially in Queensland over the past 60 years.

The Symposium was once again very well supported by a wide range of sponsors including Diamond (Wagstaff Piling Pty Ltd), Platinum (Ischebeck Titan, Black Insitu), Gold (IGS, Macquarie Geotech, Geomotion, Menard), Silver (Insitutek, BGC Engineering, Kurloo, Infinity Studio, Geofabrics, Global Synthetics, O'Sullivan) and Bronze (Tensar, Engeo, Tablogs, Rockwell Drilling, Chadwicks and Conetec).



Speakers, Organising Committee and Sponsors of the AGS Brisbane Symposium 2025.



Honorary Life Members, John Wagstaff and Allan McConnell with AGS Director Joanna Sylvester.



The Brisbane Symposium crowd.

Significant recent advances in insitu testing of very soft soils and other gooeey stuff
Tuesday 10 February 2025

Over 80 members and non-members gathered at Rydges Fortitude Valley to hear Allan McConnell share significant advances in insitu testing of soft and very soft soils, with a focus on CPT, DMT, and vane shear testing. Allan is a respected figure both locally and internationally with nearly six decades of geotechnical experience and over 20 years specialising in insitu testing. Allan highlighted multiple recent paradigm-shifting developments that challenge long-held assumptions in industry standards and practice with a particular focus on calibration requirements and design improvements in commercially available equipment to accurately test soft and very soft soils.



Allan McConnell delivering his presentation on significant recent advances in insitu testing.



Dinner with Allan McConnell, Left to Right: Jaime Wilson, Jared Priddle, Allan McConnell, Vincent Blanchet.

SOUTH AUSTRALIA AND NORTHERN TERRITORY

Chapter Events

In October 2025, we hosted our biannual symposium at the National Wine Centre, themed “Geotechnical Challenges and Lessons Learnt.” The event featured 17 speakers and welcomed 70 attendees, offering a

series of insightful presentations on topics such as the implementation of generative AI, strategies for managing unexpected issues and various project case studies.

Dr Jack Pappin delivered a compelling keynote exploring legal considerations in geotechnical projects that have gone wrong. His presentation unpacked real-world cases, emphasising how early decision-making, documentation, and professional responsibility can shape outcomes when challenges arise. Delegates appreciated the practical relevance of Jack’s insights, reinforcing the importance of proactive risk management and clear communication across project teams.

Allan McConnell, Founder of Insitu Geotech Services, followed with an engaging keynote on recent advances in in-situ testing, with a particular focus on CPT technologies. Allan challenged long-held assumptions around test accuracy and reliability, illustrating how evolving methodologies, improved calibration, and critical review of results are redefining modern site investigation practices. His reflections highlighted how proper site characterisation remains fundamental to successful geotechnical design.

The event highlighted for us to anticipate new challenges, learn from setbacks, and share experiences with our peers, because theory alone can only take us so far. It was a strong reminder to find smarter and more sustainable ways of working, and encourage others to join and grow within this field. The day was a wonderful opportunity to come together and strengthen our local and interstate connections within the AGS and the broader ground engineering community.

A big thank you to our presenters, sponsors and organising committee, who’s contributions and support make this prestigious event possible.



Adelaide 2025 Symposium – Group Shot



Adelaide 2025 Symposium – National Wine Centre



Adelaide 2025 Symposium – Q&A

To round out an already exceptional event season, the Chapter also hosted its 2025 Rooftop Social and Congress on 4 December, held at the WGA office rooftop with sweeping views over the Adelaide CBD. The evening brought together members for a relaxed celebration of the year, combining open networking, and a warm atmosphere that encouraged reflection on the collective achievements of 2025. The Congress meeting provided an opportunity for Lauren Amato, Chapter Chair, to share annual highlights and updates from the committee, and an opportunity to acknowledge contributions, and look ahead to the next year of Chapter initiatives.



Congress Chair's Report – Lauren Amato

In true SA/NT spirit, we stepped into 2026 with a warm committee lunch to reconnect, welcome new and continuing members, and set the tone for another exciting year ahead. Looking forward to seeing what 2026 holds for the SA/NT Chapter.

Lauren Amato; SA/NT Chapter Chair

VICTORIA

As we move into the first quarter of 2026, the Victoria Chapter continues to plan and deliver events and initiatives across our key focus areas: technical CPD content, digital engineering, Women in AGS, and industry–academic engagement.

Before recapping the final events of 2025, we would like to thank the outgoing committee members, and in particular our previous chapter chair, Clare Bridgeman (Douglas Partners), for her contributions.

The new committee, led by chapter chair Yuqi Tan (ATC Williams), has now taken the reins. Shiao Huey Chow (University of Melbourne) joins as Deputy Chair, with Mike Shackelton (CGC) serving as Secretary.

We are delighted to welcome our brand-new committee members: Andrew McIntyre (Douglas Partners), Glenn Daniel (EDG), Susan Sam (Arup), Wai Leung Ng (Coffey TetraTech), and Wendy Greatbatch (Tonkin and Taylor).

Returning members include Jay Lee (GS E&C), Kathryn Jones (Coffey TetraTech), Liuxin Chen (James Cook University), Marvin Bedary (GHD), Mohammad Saberian (RMIT), Negin Yousefpour (University of Melbourne), Stuart Pennington (Intrax), and Yunlong Tang (Tonkin and Taylor).



Last Victoria Chapter committee meeting of 2025 at UoM

Jack Morgan Young Geotechnical Practitioners Award 2025

On Wednesday, 13 August 2025, the AGS Victoria Chapter hosted the Jack Morgan Young Geotechnical Practitioners Award 2025, bringing together members to celebrate emerging talent within the Victorian geotechnical community. First presented in 2009, the biennial award recognises an outstanding Victorian geotechnical practitioner under the age of 35. Following a call for abstracts issued to members in May, four finalists—Shashika Gajanayake, Paddy Beasley, Reza Asadi, and Yunlong Tang—were selected to present on their chosen technical topics. Presentations were assessed based on the applicants' contributions to geotechnics and their understanding of key geotechnical issues, with Jack Morgan in attendance to select the winning presentation. The event showcased the high calibre of young practitioners within the profession and provided an excellent forum for technical discussion and professional development.



Reza Asadi receiving the Jack Morgan Young Geotechnical Practitioners Award 2025.

AGS 2025 Victoria Chapter Symposium Retention Solutions: Innovations, Challenges, and Future Directions

On Thursday, 25 September 2025, the AGS Victoria Chapter successfully hosted the AGS Victoria Symposium 2025 at the State Library of Victoria. The sold-out event brought together industry professionals, academics, and students for a full day of technical presentations, discussion, and collaboration. The Chapter extends its sincere appreciation to all keynote speakers, presenters, sponsors, volunteers, and attendees whose contributions made the symposium a resounding success.

The Symposium featured keynote presentations by James Martin (Spark Consortium), Professor Samantha Liyanapathirana (Western Sydney University), and Rob Day (Arup Australia).

Special thanks are extended to Symposium Co-Chairs Mohammad Saberian and Marvin Bedary, and to the Symposium Sub-Committee: Yunlong Tang, Mike Shackleton, and Liuxin (Lucy) Chen, for their leadership, dedication and extensive efforts in planning and delivering the event.

The Chapter also acknowledges the invaluable support of its volunteers, whose behind-the-scenes assistance ensured the symposium ran smoothly, and thanks AGS Victoria Chair Clare Bridgeman for her guidance and continued support throughout the symposium's development and delivery. Thanks to our sponsors: Chadwick Geotechnics (Platinum), Insitu Geotech Services Pty Ltd (Gold) and Global Synthetics Pty Ltd(Gold), and Intrax Consulting Group (Silver), Menard Oceania(Silver), and Black Insitu Testing(Silver).



AGS Victoria Symposium 2025, State Library of Victoria

61st Rankine Lecture Constitutive Modelling in Computational Geomechanics

On Wednesday, 15 October 2025, the AGS Victoria Chapter hosted a viewing of the 61st Rankine Lecture, Constitutive Modelling in Computational Geomechanics, presented by Emeritus Professor John Carter. The event attracted strong attendance and provided members with an insightful overview of the development of constitutive models in computational geomechanics, highlighting the fundamental role of soil and rock behaviour in supporting reliable geotechnical analysis and design. The Chapter thanks all attendees for their participation and for the valuable technical discussions that followed the lecture.



Emeritus Professor John Carter presenting at University of Melbourne on 15 October 2025

2025 AGS Victoria AGM & Annual Dinner

On Tuesday, 25 November 2025, the AGS Victoria Chapter hosted 2025 AGS Victoria Annual General Meeting and Annual Dinner. The event was a resounding success, bringing together members for an evening of professional engagement, reflection, and celebration. The AGM formally concluded with the successful election of the AGS Victoria Committee and Executive Committee for 2026, with the Chapter extending its thanks to all members who participated in the nomination and voting process, reinforcing the strength and vitality of the Victorian Chapter. The Annual Dinner was fully subscribed, reflecting strong member support and providing an excellent opportunity for networking among both long-standing and new members. The evening included a comprehensive overview of the Chapter's activities and achievements throughout 2025, presented by Chair Clare Bridgeman. Attendees were also treated to an engaging keynote presentation by Rob Wilson, formerly Senior Principal Engineering Geologist at Coffey / Tetra Tech, who shared insights from his distinguished career spanning more than 35 years across Australia and internationally. The Chapter sincerely thanks all attendees and contributors for making the event a memorable success and looks forward to another productive year under the newly appointed 2026 Committee.



Rob Wilson presenting at the AGM dinner on 25 November 2025

Women in AGS Victoria – Walk & Talk Series

As a way to connect with members and broader The AGS Victoria Chapter launched the Walk & Talk series, a relaxed and energising way to connect with peers across the geotechnical community. The inaugural event was held on Thursday, 21 August, with a follow-up on Thursday, 4 December 2025.

Participants enjoyed a scenic walk along the Yarra River and through the Royal Botanic Gardens, with complimentary morning coffee provided by AGS Victoria. The series offered an informal environment for conversation, networking, and professional connection.

The Chapter thanks the local organising group of Women in AGS, including Subcommittee Chair Negin Yousefpour and event organiser Kathryn Jones (Coffey TetraTech), for their efforts in delivering these events.



Rob Wilson presenting at the AGM dinner on 25 November 2025

Upcoming AGS Victoria events in 2026 include: -

- Monday 23 March - EH Davis Memorial Lecture Professor Anna Giacomini (University of Newcastle)
- Tuesday 21 July– Course on Implementation of Deformation-based Support Design in Geo-engineering and Rockburst Hazard Assessment at Mining Operations
- Tuesday 21 until Friday 24 July– Australian Conference on Rock Mechanics

- Wednesday 19 August - Victoria PhD Research Award

Special thanks to Marvin Bedary, Clare Bridgeman, Yuqi Tan and Negin Yousefpour, for their assistance in preparing this article.

WESTERN AUSTRALIA

It is already 3 months into 2026 and reflecting on the latter part of 2025, the AGS WA Chapter hosted multiple technical seminars and its annual symposium.

Technical seminars

A technical seminar in August 2025 by Tristan Menzies from WSP showcased how engineering geological models were important in supporting decision making. The seminar titled 'The Value of Software Driven Engineering Geological Models' provided examples of ground models and their applications in evaluation of geological, geomorphological and hydrogeological conditions that could impact projects and engineering characteristics.



Tristan Menzies explaining the importance of engineering geological models.

In September 2025, Joe Rola from SRK presented a case study spanning nearly 7 years, from concept through to design on a tailings dam embankment lift. Firsthand account of the challenges and solutions for the case study were shared in the seminar titled 'Case study: Tailings Dam Stabilisation (ground improvement) Project – from options to implementation'. The talk raised discussion on the role of engineers on tailings storage facility stabilisation given recent catastrophic tailings dam failures.



Joe Rola sharing lessons from a case study of a tailings storage facility.



WA Symposium 2025 held on 24 October 2025

Later in October 2025, Jess Dalton and Ken Chen (both) from WSP delivered a presentation on the Yanchep Rail Extension, highlighting its numerous geotechnical and geological complexities. The seminar titled ‘Strain Softening and Navigating Karstic Risks in the Design and Construction of Large Retaining Walls’ explored key considerations in both the design and the construction phases of such structures. Ken Chen discussed how strain softening was implemented in modelling for retaining wall design, while Jess Dalton provided a pragmatic approach during project construction when encountering karstic conditions in Tamala limestone.



Ken Chen (left) and Jessica Dalton (right) presenting on retaining walls in Yanchep Rail Extension.

AGS WA Symposium 2025

The AGS WA Symposium 2025 was held in October with the theme “Managing Geotechnical Risk and Complex Ground Conditions – Challenges, Solutions and Lessons Learned”. The symposium brought together the WA and interstate geomechanics community to explore geotechnical risk. The symposium highlighted the identification and management of geotechnical risks, presenting challenges, solutions and key lessons from across the industry.

Keynote speakers provided great insights including David Kinlan from Inframara on contracts in ‘Foundations of Trust: Ground Condition Issues in Construction Contracts’, Richard Kelly from SMEC Australia on ‘Balanced Decision Making in the Face of Uncertainty’ and Kim le Roux from Rio Tinto Iron Ore on whole of life mine decisions in ‘Today’s Design Decisions Impact Long Term Operational and Closure Options’.

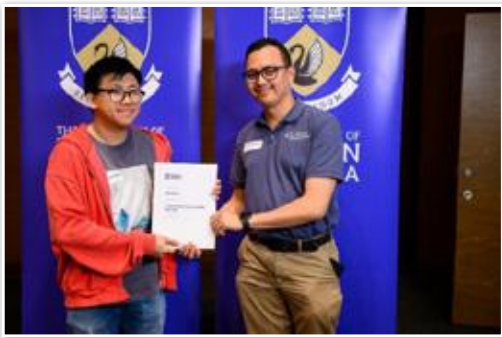
The symposium also showcased a further 10 speakers, covering a range of topics, including:

- Hudson Moore from CMW Geosciences on ‘Managing Geotechnical Risk for the Fitzroy Crossing Bridge Replacement’
- Terry Waters from Local Geotechnics on ‘Managing Geotechnical Challenges in the Western Australian Residential Environment’
- Simon Burgmans from in2Dredging on ‘Site Investigation for Dredging: Informing Destructive and Reconstitutive Soil Mechanics’
- Vince Gingoyon from CMW Geosciences on ‘Optimized Temporary Crane Platform Designs and use of Observational Approach over Very Soft Complex Soils for the Boorloo Pedestrian & Cyclist Bridge, Perth, Western Australia’
- Babak Hamidi from Menard Oceania on ‘The Application of Cut-off Walls for Contaminated Sites in Australia’
- Alex Petty from PTG Consulting on ‘Development of a Semi Quantitative Risk Management Framework for Rockfalls’
- Ryan Singh from HATS Consulting on ‘Performance Envelopes – Risk-informed Approach to Tailings Dams Safety’
- Ian Gray from Sigr Pty Ltd on ‘Air lifted wick drains – a novel technology for tailings dams consolidation’
- Sudheer Prabhu from Red Earth Engineering on ‘Geotechnical Risk and MPM: A New Standard in Tailings Assessment’
- Wensong Zhang from Rio Tinto Iron Ore on ‘A Case Study of Open Pit Slope Design Optimisation in Complex Ground Conditions’

The success of the event was supported by nine sponsors across various categories, including Probedrill as the platinum sponsor, and gold sponsors with Monitel, Geomotion Australia and Sovereign Hydroseal, along with silver sponsors from CMW Geosciences, Menard, Rockfield, WML Consulting Engineers and in2Dredging.

Australian Geomechanics Society Prize, University of Western Australia

AGS continues to support the AGS Prize at the University of Western Australia, awarded to the engineering student who presents the best combination of thesis (or technical report) and a seminar on a geotechnical topic for the degree of Bachelor of Engineering, or the Bachelor of Engineering component of a combined course. This year the prize went to Rachel Lim.



Vince Gingoyon (right) on behalf of the AGS presenting the AGS Prize, UWA, accepted on Rachel Lim's behalf.

33rd GFWA Prize in Geomechanics and WA Chapter Annual General Meeting

The GFWA Prize in Geomechanics sponsored by GFWA Pty Ltd, is awarded by the AGS to the author of the best finalyear student paper in Geomechanics at universities in Western Australia. The 2025 event was held in November and featured presentations from two students from Curtin University and two students from the University of Western Australia (UWA), each showcasing their research to a wider audience.

The finalists this year included Ronin Maximus O'Connor and Cameron Birkholz from Curtin University and Tara Smith and Jordan Moscarda from UWA. Their topics demonstrated applicability of the university research in current geomechanics issues including shaft friction in clays, microbially induced carbonate precipitation to prevent coastal erosion, mine slip failures and microbially induced magnesium carbonate precipitation in rammed earth.



Tim Palmer from GFWA (far right) with the finalists in the 33rd GFWA Prize in Geomechanics, from left to right, Tara Smith, Jordan Moscarda, Cameron Birkholz, Ronin Maximus O'Connor

The winner for this award was Ronin Maximus O'Connor from Curtin University who presented outcomes from varying calcium-to-magnesium ratios in microbially induced carbonate precipitation for resisting wave erosion and its potential future applicability. In addition, he was voted by the audience as the recipient of the "Best Presentation" award.

For the WA Chapter Annual General Meeting, Andrew Lim, (now) immediate past WA Chapter Chair, signed off on 2025 and his term as the WA Chapter Chair with thanks to the 2025 WA committee members, in particular, Amy Tsagopoulos (now former WA Chapter Secretary). Andrew provided positive reflections on the range of interesting technical seminars, workshops and symposiums that the AGS has provided the geomechanics community. Andrew and Amy will continue on the WA Committee in 2026.

Eddy Yong, AGS WA Chapter Chair

CONFERENCE CALENDAR

APRIL 2026	
16-17	8th International Conference on Geotechnics, Civil Engineering and Structures (CIGOS), Ho Chi Minh City, Vietnam https://cigos2026.sciencesconf.org/
27-3 May	Landslide Risk & Geo-Education (LaRGE) - First International Joint Workshop of JTC1 and JTC3, Queenstown, New Zealand https://landsliderisk.nz/ AGS SUPPORTED EVENT
MAY 2026	
11-13	8th Asia Pacific Meeting on Near Surface Geoscience & Engineering (NSGE), Bandung, Indonesia https://eage.eventsair.com/8th-asia-pacific-meeting-on-near-surface-geoscience-engineering
15-21	World Tunnel Congress (WTC2026) - Connecting Communities through Underground Infrastructure, Montréal, Canada https://www.tunnelcanada.ca/wtc2026.php
24-27	16th International Conference "Under https://www.ucprague.com/
26-27	2026 ICOLD International Symposium - Water, Energy, and Society: The Evolving Role of Dams in a Changing World, Guadalajara, Mexico https://www.icoldmexico2026.com/
JUNE 2026	
1-3	Geohazards 9 - 9th Canadian Conference on Geotechnique and Natural Hazards, Edmonton, Alberta, Canada https://www.geohazards9.ca/
11-14	8th International Young Geotechnical Engineers Conference (8iYGEC), Graz, Austria https://www.tugraz.at/institute/ibg/events/8iygec
14-19	21st International Conference on Soil Mechanics and Geotechnical Engineering, Vienna, Austria https://www.icsmge2026.org/en/
21-24	60th US Rock Mechanics / Geomechanics Symposium, Tucson, Arizona, USA https://armarocks.org/tucson-2026-symposium/
22-24	12th International Conference on Bearing Capacity of Roads, Railways, and Airfields (12 BCRRA 2026), Ljubljana, Slovenia https://bcrra.si/
JULY 2026	
13-17	13th U.S. National Conference on Earthquake Engineering (13NCEE), Portland, Oregon, USA https://13ncee.eeri.org/
21-24	Australian Conference on Rock Mechanics (ACRM), Melbourne, Australia https://australiangeomechanics.org/meetings/acrm2026/ AGS EVENT
AUGUST 2026	
6-10	12th International Symposium on Field Monitoring in Geomechanics 2026, Indore, India https://isfmg2026.com/
11-13	Caving 2026, Ulaanbaatar, Mongolia https://www.acgcaving.com/
14-16	10th International Conference on Geoscience Education (GeoSciEd X), Adelaide, Australia https://eventsstudio.eventsair.com/geoscoed-conference-2026/
24-25	4th International Conference on Geotechnical Engineering - Resilient Geotechnics for a Sustainable Future, Colombo, Sri Lanka https://icgecolombo2026.org/
24-26	International Conference on Advances and Innovations in Soft Soil Engineering, Delft, Netherlands https://www.issmge.org/events/international-conference-on-advances-and-innovations-in-soft-soil-engineering-2026
26-28	X Latin American Congress on Rock Mechanics - an ISRM Regional Symposium, Brasilia, Brazil https://isrm.net/conference/show/6388
SEPTEMBER 2026	
7-8	3rd International Conference on Construction Resources for Environmentally Sustainable Technologies (CREST 2026), Cambridge, UK https://engage-events.ifm.eng.cam.ac.uk/IC-CREST2026#/
12-16	GeoQuébec 2026 - 79th Canadian Geotechnical Conference, Québec, Canada https://geoquebec2026.ca/en/
13-17	13 ICG - 13th International Conference on Geosynthetics - "Legacy, Evolution & Revolution in Geosynthetics", Montreal, Canada https://www.13icg-montreal.org/
15-19	Eurock 2026 - Risk Management in Rock Engineering - an ISRM Regional Symposium, Skopje, North Macedonia https://isrm.net/conference/show/6376
16-18	Fourth International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites, Athens, Greece https://tc301-athens.com/
20-23	The 5th International Conference on Coupled Processes in Fractured Geological Media: Observation, Modeling, and Application, Uppsala, Sweden https://www.coufrac2026.com/

CONFERENCE CALENDAR

OCTOBER 2026	
13-16	6th International Conference on Information Technology in Geo-Engineering, Graz, Austria https://www.icitg2026.com/
22-25	7th International Conference on Environmental Geotechnology, Recycled Waste Materials, and Sustainable Engineering (EGRWSE-2026), Surat, India www.egrwse2026.com
26-29	Slope Stability 2026 - Slope for Safety Performance, Lima, Peru https://www.slopestability2026.com/en
30-6 Nov	XV IAEG World Congress, Delft, The Netherlands https://iaeg.info/event/xv-iaeg-world-congress/
NOVEMBER 2026	
4-6	International Conference on Performance-Based Design in Earthquake Geotechnical Engineering (PBD), Puerto Varas, Chile https://www.pbd-v-chile.com/
22-27	14th Asian Rock Mechanics Symposium - Rock Mechanics for the Next Generation – Innovations, Sustainability, and Resilience, Fukuoka, Japan https://www.ec-convention.com/ARMS14/
26-27	6th International Conference on Geotechnics for Sustainable Infrastructure Development, Hanoi, Vietnam https://geotechn.vn/
MARCH 2027	
17-19	7th International Conference on Grouting and Deep Mixing, Florence, Italy https://dfi.org/events/upcoming-events/
17-19	Geotechnics for Mountain Infrastructure, GeoMandu 2027, Kathmandu, Nepal https://geomandu.ngeotechs.org/
APRIL 2027	
12-14	International Symposium on Ground Improvement (IS-GI Lyon 2027, TC-211 Symposium), Lyon, France https://www.menard-group.com/isgi-lyon2027/
23-29	World Tunnel Congress (WTC 2027), Antwerp, Belgium https://about.ita-aïtes.org/future-events
MAY 2027	
11-13	5th International Conference on Shaft Design and Construction (SDC2027), London, UK https://www.iom3.org/events-awards/5th-international-shaft-design-construction.html
11-14	IFCEE 2027 International Foundations Congress and Equipment Expo, Grapevine, Texas, USA https://www.geoinstitute.org/events/ifcee-2027-international-foundations-congress-and-equipment-expo
12-14	International Symposium Cone Penetration Testing CPT '27, Vancouver, British Columbia, Canada https://www.cpt27.org/
SEPTEMBER 2027	
21-24	11th European Conference on Numerical Methods in Geotechnical Engineering (NUMGE 2027), Graz, Austria https://www.tugraz.at/events/numge2027/
OCTOBER 2027	
17-23	16th ISRM International Congress on Rock Mechanics, Seoul, Korea http://isrm2027.website.or.kr
JANUARY 2028	
9-12	12th International Symposium on Geotechnical Aspects of Underground Construction in Soft Ground (IS-Doha 2028), Doha, Qatar https://www.issmge.org/news/is-doha-2028-early-announcement
MARCH 2028	
26-29	18th Panamerican Conference on Soil Mechanics and Geotechnical Engineering and Geo-Congress 2028, Chicago, Illinois, USA https://www.geocongress.org/
JUNE 2028	
25-30	Eurock2028 - Advances in rock mechanics and rock engineering to cope with increasingly extreme conditions, Aix-en-Provence, France https://isrm.net/conference/show/6396
AUGUST 2028	
21-25	19th European Conference on Soil Mechanics and Geotechnical Engineering (ECSMGE 2028), Istanbul, Türkiye https://zmgm.org.tr/tr
SEPTEMBER 2029	
1-5	6th International Conference on Transportation Geotechnics, Southampton, United Kingdom https://inconference.eventsair.com/cmspreview/ictg-2029

AGS advises that the status of events at any time should be checked using the links to the event websites.

CORPORATE MEMBERS

The Australian Geomechanics Society gratefully acknowledges the contribution made by its Corporate Members.

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Arup Australia Services Pty Ltd	Level 26, 123 Albert St	BRISBANE CITY	QLD	4000	0482 420 152
Aitken Rowe Testing Laboratories Pty Ltd	PO Box 5158	WAGGA WAGGA	NSW	2650	(02) 6939 5555
Alliance Geotechnical Pty Ltd	10 Welder Road	SEVEN HILLS	NSW	2147	0427 197 575
Anora Foundations Pty Ltd	PO Box 3282	DARRA	QLD	4076	(07) 3279 7966
Aurecon Australasia Pty Ltd	Level 2, 116 Military Rd	NEUTRAL BAY	NSW	2089	(02) 9465 5386
BGC Engineering Pty Ltd	Level 3, 31 Merivale St	SOUTH BRISBANE	QLD	4101	(07) 3709 7034
Barrason's Engineers	Level 2, 66 Victor Cres	NARRE WARREN	VIC	3805	(03) 5940 2638
Butler Partners Pty Ltd	79 Doggett St	NEWSTEAD	QLD	4006	(07) 3852 3800
CMW Geosciences Pty Ltd	60 Kingsford Smith Drive	ALBION	QLD	4010	(07) 3320 8503
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Civiltest Pty Ltd	PO Box 537	MORNINGTON	VIC	3931	(03) 5975 6644
CONETEC Pty Ltd	6 Chapman Place	EAGLE FARM	QLD	4009	0473 923 084
Douglas Partners Pty Ltd	96 Hermitage Rd	WEST RYDE	NSW	2114	(02) 9809 0666
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Fortify Geotech Pty Ltd	39 Sydenham Road	ALEXANDRIA	NSW	2204	(02) 9188 4033
Fugro Australia Pty Ltd	Level 1, 1060 Hay Street	WEST PERTH	WA	6005	(07) 8942 3335
GB Geotechnics Pty Ltd	Unit 28, 7 Salisbury Rd	CASTLE HILL	NSW	2154	0447 022 755
Geofabrics Australia Pty Ltd	83-93 Canterbury Road	BRAESIDE	VIC	3195	(03) 8586 9100
GEOFIRST Pty Ltd	Unit 2, 7 Luso Drive	UNANDERRA	NSW	2526	0433 184 319
GHD Pty Ltd	Locked Bag 2727	ST LEONARDS	NSW	1590	(02) 9462 4859
Geobruigg Australia Pty Ltd	PO Box 2468	MALAGA	WA	6944	(08) 9249 9939
Geomotion (Australia) Pty Ltd	9/31-33 Chaplin Drive	LANE COVE	NSW	2066	0438 700 356
Geotechnique Pty Ltd	PO Box 880	PENRITH	NSW	2751	(02) 4722 2700
Geotesta Pty Ltd	Unit 6, 31-37 Howleys Rd	NOTTING HILL	VIC	3168	(03) 9562 8808
Global Synthetics Pty Ltd	41 Sammut St	SMITHFIELD	NSW	2164	(02) 9725 4321
Ground Recruitment	Level 28 - AMP Tower, 140 St Georges Tce	PERTH	WA	6000	0499 988 011
HAWK GEO Pty Ltd	42 Douglas Farm Road	KURRAJONG HILLS	NSW	2758	0448 086 608
Intrax Consulting Engineers Pty Ltd	35 Banks St	MELBOURNE	VIC	3205	(03) 8371 0100
Ischebeck Titan (Australia) Pty Ltd	197 Queens Road	KINGSTON	QLD	4114	0414 838 891
JC Geotechnics Pty Ltd	Suite 3A, Level 3, 1C Grand Ave	ROSEHILL	NSW	2142	(02) 8066 0665
JK Geotechnics Pty Ltd	115 Wicks Road	MACQUARIE PARK	NSW	2113	(02) 9888 5000
Jacobs Group (Australia) Pty Ltd	452 Flinders St	MELBOURNE	VIC	3000	0424 446 277
KCB Australia Pty Ltd	Level 3, 150 Mary St	BRISBANE CITY	QLD	4000	(07) 3518 0907
MM Geomechanics Pty Ltd	Unit 2, 19 Chaplin Drive	LANE COVE WEST	NSW	2066	0400 393 008
Mott MacDonald Australia Pty Ltd	Level 17, Tower One, Collins Square, 727 Collins St	MELBOURNE	VIC	3008	(03) 9037 7575
Norwegian Geotechnical Institute Pty Ltd	Level 7, 40 St Georges Tce	PERTH	WA	6000	(08) 6559 6491
PSM Holdings Aust Pty Ltd	G3, 56 Delhi Rd	NORTH RYDE	NSW	2113	(02) 9812 5000
Piling and Concreting Australia	PO Box 1605	RUNAWAY BAY	QLD	4216	(07) 5500 5898

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SCT Operations Pty Ltd	131a Kembla St	WOLLONGONG	NSW	2500	(02) 4222 2777
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SMEC Australia Pty. Ltd	Level 5 20 Berry St	NORTH SYDNEY	NSW	2060	(02) 9925 5555
Scherzic Ground Investigations	PO Box 555	HOBART NORTH	TAS	7002	(03) 6273 6565
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