



WESTERN SYDNEY
UNIVERSITY

URBAN LIVING FUTURES AND SOCIETY:

PEOPLE, CULTURE, ECONOMY & THE BUILT ENVIRONMENT

RESEARCH THEME REPORT: 2020-2022

The research theme Urban Living Futures and Society: People, Culture, Economy and the Built Environment is proud to present a summary of its activities for the years 2020-2022.

Despite the COVID-19 pandemic, Urban Living Futures and Society has funded twenty pilot research projects, and has been a key driver of the new Western Sydney University Urban Transformations Research Centre. This report focuses on the seven different areas of thematic interest for Urban Living Futures and Society, highlighting key issues, future challenges and research projects being undertaken.

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ACKNOWLEDGEMENT OF COUNTRY

Western Sydney University acknowledges the peoples of the Darug, Tharawal, Eora and Wiradjuri nations.

We acknowledge that the teaching, learning and research undertaken across our campuses continues the teaching, learning and research that has occurred on these lands for tens of thousands of years.

MAY 2023

The Urban Living Futures and Society research theme is led by our two Research Theme Champions – Professor Olivia Mirza and Associate Professor Nichole Georgeou.



Professor Olivia Mirza is Associate Dean, Engagement for the School of Engineering, Design and Built Environment at Western Sydney University. In addition, Olivia is the President of Engineers Australia and the Deputy Chair for the Australian Research Council (ARC) Industrial Transformation Training Centre (ARC-ITTC) Advanced Technologies in Rail Track Infrastructure. Olivia holds a PhD in Structural Engineering (Western Sydney University) and a Bachelor of Civil and Environmental Engineering (Honours) (UNSW).

Olivia is internationally recognised for her industry-led research projects. Her expertise focuses on composite steel and concrete structures, rehabilitation and strengthening of railways and bridges within Civil/Structural Engineering.

As a strong advocate for equity and diversity, Olivia has mentored for Women in Engineering, and was involved in creating the Athena Scientific Women's Academic Network (Athena SWAN) Bronze Award for gender equity. Olivia has also held the position of Chair, Equity and Diversity Working Group at the School of Engineering, Design and Built Environment at Western, and currently contributes to developing two major infrastructure projects: Second City-Parramatta and Western Sydney Aerotropolis.



Associate Professor Nichole Georgeou is Director, Humanitarian and Development Research Initiative (HADRI) at Western Sydney University where she is Associate Dean, International in the School of Social Sciences. Nichole holds a PhD in Development Sociology, a Master of Social Change and Development (Research) and a Bachelor of Creative Arts from University of Wollongong, as well as a Diploma of Education from University of Newcastle.

Nichole's research crosses three main areas (1) international development volunteering; (2) gender and human security, and (3) Pacific Islands food security. Her expertise in development volunteering was internationally recognised when she was invited to the United Nations Volunteers Headquarters, Bonn Germany in July 2015 to develop a vision and strategic global research agenda on 'volunteering for sustainable development'.

Nichole has been part of several competitive international grants including with the Australian Centre for International Agricultural Research (ACIAR) on food systems in the Pacific Islands. She undertakes regular research consultancies in the Greater Western Sydney area, including for the Community Migrant Resource Centre (CMRC). She brings her strong background in social sciences methods and research to focus on the effects of social adaptation in cities as we attempt to move to a just transition from fossil fuels to a sustainable economy

CONTENTS

SUMMARY	5
FOCUS AREAS	10
Focus Area 01: Connectivity-Transport	10
Focus Area 02: Connectivity-Digital	12
Focus Area 03: Sustainable Design & Construction	14
Focus Area 04: Housing Diversity	16
Focus Area 05: Social & Cultural Wellbeing	18
Focus Area 06: Green-Blue infrastructure	20
Focus Area 07: Sustainable & Socially Responsible Enterprises	22
RESEARCH SHOWCASES AND THEME STORMS	24
Prioritising Healthy Placemaking after Covid-19: Workshop Outcomes & Practitioner Insights	24
Green Infrastructure and Open Spaces	24
Social planning and community services	24
Wicked Urban Challenges in Western Sydney	25
Zero Carbon Emission and Disaster Response: Development for the Future of Australia workshop	28
Future Initiatives	28
APPENDIX 1: 2020 RESEARCH PROJECTS FUNDED	29
APPENDIX 2: 2021 RESEARCH PROJECTS FUNDED	30
APPENDIX 3: 2022 RESEARCH PROJECTS FUNDED	31

SUMMARY

Western Sydney University's Research Theme Urban Living Futures and Society: People, Culture, Economy and the Built Environment addresses the complex challenges of finding the balance between development, environmental preservation, resource utilisation and social and cultural well-being. Our aims and objectives support global climate and development initiatives, including the United Nations Sustainable Development Goals (SDGs). In supporting the SDGs our research theme attempts to make our cities and human settlements more inclusive, safe, resilient and sustainable. Failure to achieve the targets set by the SDGs will likely cause increased environmental catastrophes such as natural disasters, increased social unrest and severe economic downturn.

Urban Living Futures and Society research and publications contribute directly to helping the Western Sydney community, as well as communities in other cities in Australia and across the world, confront the greatest challenge facing mankind—the shift from a fossil fuel-dependent economy towards renewable energy sources that support sustainable development with social equity.

In 2021 in Australia the urban population was over 86%,¹ and globally some 57% of all people now live in cities.² In 2018 the UN estimated there were 33 cities with populations over 10 million, and this was set to rise to 43 by 2030. In 2018 some 1.7 billion people lived in cities of over 1 million, a figure that represented 23% of the world's population. Greater Tokyo has over 37 million people and is the largest urbanised area in the world. It is predicted that Delhi in India will soon surpass Tokyo, as by 2030 Delhi is projected to have a population of just under 39 million.³

By 2020 Sydney's population had reached 5.4 million,⁴ with over 2.2 million people living in the culturally diverse Western Sydney Local Government Areas (LGAs). One in four people in NSW lives in Greater Western Sydney, and between 2011-2021 the population grew by 20%, which was double the average for the rest of the state.⁵

Extreme weather events such as bushfires in 2019-2020, and flooding disasters in 2021 and 2022,⁶ underscore the importance of improved urban design and planning to support the SDGs, especially in areas such as climate change mitigation through improved housing design, water systems, public transport options and social and cultural well-being.

Such a technologically ambitious and 'just transition'⁷ will require holistic solutions that combine engineering design with insights from the social sciences as urban settlements like towns and cities are human habitats, so studying how to build better cities has both technical and social aspects.

Urban Living Futures and Society promotes integrated cross-disciplinary research while acknowledging the interdependence of economic, environmental, social, health, cultural and well-being factors. Against the backdrop of so many varied and evolving dynamics, many of our research topics address policy responses to social issues, in addition to developing technology-driven solutions.

1. 'Australia - Urban Population (% of Total)', Trading Economics. Available at: <https://tradingeconomics.com/australia/urban-population-percent-of-total-wb-data.html>

2. 'Share of Urban Population Worldwide in 2022, by continent', Statista. Available at: <https://www.statista.com/statistics/270860/urbanization-by-continent/>.

3. 'The World's Cities in 2018', United Nations. Available at: https://www.un.org/en/development/desa/population/publications/pdf/urbanization/the_worlds_cities_in_2018_data_booklet.pdf

4. E. Visontay, *The Guardian*, 4 April 2021. Available at: <https://www.theguardian.com/australia-news/2021/apr/04/melbourne-is-getting-closer-to-overtaking-sydney-in-population-what-does-it-mean-for-both-cities>

5. 'Our vision for Western Sydney', NSW Government. Available at: <https://www.budget.nsw.gov.au/budget-papers/western-sydney/our-vision-western-sydney>

6. 'Australia: After the bushfires came the floods', UN Environment Programme. Available at: <https://www.unep.org/news-and-stories/story/australia-after-bushfires-came-floods>

7. 'Just Transition: A Report for the OECD', May 2017 OECD. <https://www.oecd.org/environment/cc/q20-climate/collapsecontents/Just-Transition-Centre-report-just-transition.pdf>

The articulation between the Urban Living Futures and Society research theme and the SDGs and is clearest with SDG 11: Sustainable Cities and Communities, however, our research also supports all the other SDGs, especially SDG10: Reduced Inequality, SDG5: Gender Equality, SDG6: Clean Water and Sanitation, SDG12: Responsible Consumption and Production, and SDG17: Partnerships for the Goals.

The Urban Living Futures and Society Research Theme Champions facilitate research projects led by Western’s academics in a number of University-defined priority areas shaped by the SDGs. Our research is organised into seven focus areas [Figure 1].

Between 2020-2022 Urban Living Futures and Society provided seed funding of between \$2,500 and \$10,000 to support 20 research projects (a total of \$94,000), four of which were co-funded with other research themes. For details of all funded projects please see Appendix 1 (for 2020 projects), Appendix 2 (2021 projects) and Appendix 3 (2022 projects).

Urban Living Futures and Society operates with an organisational logic that:

- » Promotes interdisciplinary research;
- » Mentors early and mid-career researchers;
- » Establishes cross-theme initiatives;
- » Fosters strong working relationships between Western Sydney University’s Schools, Clusters, Strategic Research Initiatives (SRIs) and Centres; and importantly
- » Links with industry and community partners in the private, government and community sectors.

Figure 1: Focus Areas



Our aim is to contribute to the development of a collegial and collaborative culture among Western’s researchers and external partners, and to foster the development of strong research partnerships. To this effect, Urban Living Futures and Society researchers work collaboratively within and outside of WSU, with community members and industry partners, as collaborative partnerships are crucial in developing solution-oriented approaches to the complex challenges faced by contemporary society.

Current private and government partners include: BarChip, Wagners, Premier Steel, Lendlease, Infrastructure NSW (INSW), Transport for NSW, and the global sustainable engineering solutions company WSP. Some of the collaborative projects so far have focussed on topics such as:

- » Technology driven safety measures for women;
- » Using technology to improve health and well-being;
- » Building a digital repository on out-of-home care (OOHC) for young people;
- » Providing guidance for optimising building shapes in urban areas to improve air quality;
- » Providing housing solutions to women released from prison;
- » Developing a framework for gender inclusion;
- » Investigating racism during the Covid-19 pandemic; and
- » Identifying factors promoting social inclusion and cohesion.

LEADERSHIP OF URBAN LIVING FUTURES AND SOCIETY

The Urban Living Futures and Society Research Theme is led by Theme Champions. From 2019 to July 2022 Professor Nicky Morrison was Theme Champion, together with Professor Alana Maurushat (until March 2021) and then with Associate Professor Anna Cristina Pertierra (March 2021–December 2021). From July 2022, Professor Olivia Mirza and Associate Professor Nichole Georgeou were Research Theme Champions, and Dr Naama Blatman was appointed as Research Theme Fellow.

In her role as Urban Living Futures and Society Theme Champion, one of Professor Nicky Morrison's main achievements was building institutional, business, government and community support for a high-level research centre to transform the ways in which we live, travel and work. Professor Nicky Morrison is now the co-Director (with Professor Greg Morrison and Professor Yixia (Sarah) Zhang) of the [Urban Transformations Research Centre](#) which was officially [launched](#) on 4 November 2022 by the Honourable Rob Stokes, NSW Minister for Infrastructure, Cities and Active Transport, at the University's Parramatta Engineering Innovation Hub on Hassall Street, with the official recording [here](#).

According to Professor Nicky Morrison, the new centre's transdisciplinary teams will work across three interrelated research and innovation programs: systems innovation and demonstration; people-centred sustainable precinct design; and resilient construction and infrastructure.⁸



Urban Transformations Research Centre was officially launched on Friday 4 November, 2022 by NSW Minister for Infrastructure, Cities and Active Transport, Rob Stokes at the University's Parramatta Engineering Innovation Hub, where the centre is located. The Minister is pictured with outgoing Urban Living Futures and Society Theme Champion Professor Nicky Morrison.

- » Systems innovation and demonstration will aim to address the complex interconnected aspects of energy, water, transport, and resource systems. Drawing on systems expertise from across the university, this program places emphasis on life cycle and circular economy assessment, net zero analysis and urban metabolism modelling. It contributes to net zero buildings and precincts by guiding the use of materials and their provenance towards education programs for waste, reuse, and recycling at scale.
- » People-centred sustainable precinct design focusses on the delivery of healthy, inclusive, and resilient urban places. Drawing on the university's interdisciplinary excellence—from geography and urban planning, culture and society, design thinking, health, and environmental science disciplines—the program contributes to the effective integration of sustainable design principles into planning practices, thereby enabling the creation of sustainable development outcomes at scale.
- » Resilient construction and infrastructure focusses on developing safe infrastructure, with enhanced resilience to extreme weather and natural disasters. Drawing on the university's established strengths in the areas of construction sustainability, structural engineering, infrastructure safety, advanced engineering materials, advanced manufacturing, and construction management, this program contributes to improved and sustainable building materials and construction methods adopted at scale.

8. N. Morrison, 'WSU's new Urban Transformations Research Centre', 8 November 2022. Available at: <https://thefifthestate.com.au/columns/spinifex/wsus-new-urban-transformations-research-centre/>



Professor Morrison led the publication in April 2021 of an article in the [Conversation](#) arguing that the needs of public health should shape development policy in the areas where we live and work.⁹ She also led the Urban Living Futures and Society theme storm that was later published as the November 2022 report *Wicked Urban Challenges in Western Sydney: Researchers Respond*.¹⁰

During her tenure, previous Research Theme Champion Associate Professor Anna Cristina Pertierra collaborated with academics from the Institute for Culture and Society (ICS) on a project that included the online panel and community engagement forum *Living with Border Closures: Western Sydney Migrant Stories*.¹¹ This event brought together community members and leaders from government, advocacy, media and academia to discuss the impacts of border closures on Western Sydney's migrant communities. Anna is currently engaged in a partnership with the Think+Do Tank Foundation, which led to an Australian Research Council (ARC) Linkage Grant application submitted in December 2022, also supported by ICS.

Since taking up their co-leadership positions as Research Theme Champions in July 2022 Professor Olivia Mirza and Associate Professor Nichole Georgeou have organised a workshop on *Zero Carbon Emission and Disaster Response: Development for the Future of Australia* in November 2022,¹² an event attended by representatives of the construction industry, business, local government and academia. The workshop focussed on looking for innovative social and technological solutions to a variety of problems associated with urban living, including the provision of water, recycling building materials, heating and cooling homes, and developing transport systems to support urban communities.

During 2020-22 Urban Living Futures and Society provided seed funding for a total of 20 projects that adhere to our aims and support the achievement of the UN SDGs. We also

organised several other high-profile research events for the Western Sydney community.

The projects and themes supported by Urban Living Futures and Society aim to strengthen industry linkages, and to lead conversations around fostering sustainable, healthy and resilient communities. Our work is a crucial reminder of what it means to create vibrant, inclusive, equitable, sustainable and resilient cities. Through our research Urban Living Futures and Societies aims to solve current problems and to create solutions for future challenges.

In this report we outline the main achievements of our researchers between 2020-2022. For each focus area we highlight one to two research projects as well as profiling a Western Sydney University researcher who is engaged in solving a complex problem.

9. N. Morrison, G. Paine, R. van der Nouwelant & S. Thompson, 29 April 2021, *The Conversation*. Available at: <https://theconversation.com/planning-shake-up-needed-to-help-those-whose-job-it-is-to-make-nsw-a-healthy-place-159638>

10. N. Morrison, C. Cmielewski, A. O'Mara, P. O'Neill, S. Pfautsch, E.R. & Power, *Wicked Urban Challenges in Western Sydney: Researchers Respond*. Available at: <https://doi.org/10.26183/kcxm-be37>

11. 'Video and Audio', Institute for Culture and Society. Available at: https://www.westernsydney.edu.au/ics/publications/video_and_audio

12. 'Zero Carbon Emission & Disaster Response: Development for the future of Australia', 4 November 2022, eventbrite. Available at: <https://www.eventbrite.com.au/e/zero-carbon-emission-disaster-response-development-for-the-future-of-aus-tickets-384375887627>



RESEARCHER PROFILE:
DR NICKY MORRISON

Professor of Planning, Geography, Tourism & Planning
School of Social Sciences

Nicky Morrison is Professor of Planning at Western Sydney University, Senior Visiting Fellow at Cambridge University and Senior Fellow at Global Urban Development. She leads the Urban and Regional research programme at WSU and now serves as co-Director of the [Urban Transformations Research Centre](#). She is the academic driving force behind the new Penrith Sustainable Innovation Community ([PSIC](#)), that integrates Western's campuses in the Penrith region and which is aligned with Global Urban Development.¹³

Nicky has more than 27 years of experience managing interdisciplinary teams on significant international planning and housing research projects. She has led and worked on projects that have attracted significant competitive external funding from the European Commission, Shelter Homeless Charity, the Joseph Rowntree Foundation, and the governments of Norway, the UK, and NSW, as well as local governments. Nicky has been asked by senior government leaders and NGOs from all over the world to serve as their advisor. She recently led and contributed to the publication *Wicked Urban Challenges in Western Sydney: Researchers Respond*, funded through Urban Living Futures and Society.

13. "Living Lab' Showcases Sustainable Neighbourhood', Western Sydney University *Future-Makers*. Available at: <https://www.westernsydney.edu.au/future-makers/sdgs-issue/living-lab-showcases-sustainable-neighbourhood>

FOCUS AREAS

FOCUS AREA 01: CONNECTIVITY-TRANSPORT

ACTIVE, SUSTAINABLE, INNOVATIVE, SAFE, ACCESSIBLE, AND EQUITABLE TRANSPORT OPTIONS

UN SDG 11 Sustainable Cities and Communities Target 11.2 notes that UN member states should: “By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons”.¹⁴

Accordingly, a city’s transport systems should be designed to ensure the mobility of all of its citizens and residents. Such implementations will require an in-depth evaluation of the unique characteristics of various social groups in terms of their travel patterns.

The New South Wales government supports innovations in low emission and cost-effective transportation systems,¹⁵ and in 2022 the Commonwealth government committed to net zero emissions by 2050.¹⁶ This policy guidance promotes research into the sustainable aspects of transportation systems. In this age of globalization and modern technology, there is a natural tendency to seek technological solutions to social problems, however this often ignores the social and cultural aspects of these same problems.

Under this focus area of connectivity-transport, Urban Living Futures and Society funding support was provided to a research initiative that critically analysed technology-based-data-driven government accelerators to improve women’s safety in urban areas of Sydney from the viewpoint of technological ‘solutionism’.

The research discussed the predominant worldview of viewing social problems as opportunities for technological solutions, a view that is often based on a reductive and limited vision of societies where problems are treated as systems that can be made better with technology. The funded project outlined that this approach to solving social problems with technological solutions involves the possible widening of social inequalities, and can in fact lead to new problems. In the future, Urban Living Futures and Society will continue to encourage diverse views of complex problems to find a way forward to improve the connections between culture, society and technology.

SELECTED SUCCESS FOCUS AREA 1

Title: Technology-based-data-driven government accelerators to improve women’s safety in urban areas of Sydney

Research Team: Jenna Condie, Roger Dawkins, Calvin Frith and Stephanie Strilakos

The project identified fundamental problems in the connections between culture and society leading toward technological solutionism in areas such as women’s safety.

14. ‘Goal 11: Sustainable Cities and Communities’, UNEP. Available at: <https://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-11>

15. ‘Future Energy Action Plan 2020-2025’, NSW Government. Available at: https://www.future.transport.nsw.gov.au/sites/default/files/2022-07/future_energy_action_plan.pdf

16. ‘Australia’s energy strategies and frameworks’, Department of Climate Change, Energy, the Environment and Water (Australian Government). Available at: <https://www.energy.gov.au/government-priorities/australias-energy-strategies-and-frameworks>

**RESEARCHER PROFILE****DR JENNA CONDIE****Senior Lecturer in Digital Society, Anthropology & Sociology**

School of Social Sciences

Dr Jenna Condie is a community-based researcher who works in transdisciplinary teams to instigate societal shifts towards more socially just futures. Her research projects are focused on the linkages between social media, community organising, and social action. She examines the intersections of social media and community organising through a number of different contexts including housing, childcare, and climate justice. She is passionate about research methods that are participatory, creative, activist and digital. Jenna is engaged in critical educational scholarship through her curriculum development work as a 21C Project Future Thinkers Champion (2020-2022) and as the co-lead of the Critical Pedagogies Research Group in the School of Social Sciences (2023-). She is a School-based Research Fellow with the Young and Resilient Research Centre.

FOCUS AREA 02: CONNECTIVITY-DIGITAL

SMART PLACES: INTEGRATING DIGITAL TECHNOLOGIES INTO THE BUILT ENVIRONMENT

With new technologies emerging it has been a key focus area of the New South Wales government to create 'Smart Places' by utilising technological innovation. Smart Places uses technology and information to improve social, economic and environmental outcomes for people and places.¹⁷

While smart places solutions will not upend the existing built environment overnight, they will improve accessibility, quality of life and well-being, as well as reducing emissions and environmental impacts.¹⁸ The SmartNSW Roadmap identifies Smart Places as an enabler to provide the right operating environment to deliver connected infrastructure and services across the state, with implementation planned from 2022 to 2027.¹⁹

In order to provide NSW inhabitants with improved services that are data-driven and sustainable, Smart Places integrates digital technology into the physical environment. Therefore, implementation of the idea of Smart Places requires digital transformation. Unlike the popular perception of just adopting new technology, digital transformation involves innovative concepts and combines different domains.

Our researchers are excelling with such 'out-of-the-box' innovations, exploring the possibility of connecting the built environment with the health and well-being of the city's inhabitants. One of our selected successes aims to build sensor-enabled smart living and working spaces utilising the Internet of Things (IoT). This research is aimed at enabling individuals to assist independent living and providing remote health and wellness monitoring mechanisms within their living and work environments. Urban Living Futures and Society funding facilitated the development of a prototype—an open-source home automation platform that can be later modified to add more services.

Another funded project—My Place: An app for young people in out-of-home-care (foster care) and their carers and case workers—attempts to address the most critical issue in integrating digital services: securing private information. The project investigated the role of digital technology at the individual level to support and encourage positive identity, belongingness, self-determination, well-being and resilience in young people in foster care during periods of disruption.

SELECTED SUCCESS FOCUS AREA 2

Title: Sensor-Enabled Smart Living and Working Spaces

Research team: Jim Basilakis, Heidi Bjerling, Bahman Javaid and Anupama Ginige

Project description: Utilising IoT, research is aimed at enabling individuals to assist independent living and providing remote health and wellness monitoring mechanisms within living and work environments.

17. 'Smart Places'. NSW Dept of Planning and Environment. 31 August 2022. Available at: <https://www.dpie.nsw.gov.au/our-work/strategy-and-innovation/smart-places>

18. 'How Smart Places work'. 25 February 2022, NSW Dept of Planning and Environment. Available at: <https://www.dpie.nsw.gov.au/our-work/strategy-and-innovation/smart-places/how-smart-places-work>

19. 'SmartNSW Roadmap 2022-2027'. 5 August 2022. NSW Dept of Planning and Environment. Available at: <https://www.dpie.nsw.gov.au/our-work/strategy-and-innovation/smart-places/smartnsw-roadmap-2022-2027>



RESEARCHER PROFILE

DR JIM BASILAKIS

Senior Lecturer, Health Informatics Computing & Information and Communications Technology (ICT)

School of Computing, Data and Mathematical Sciences

Dr Jim Basilakis is currently Senior Lecturer in Digital Health at the School of Computer, Data and Mathematical Sciences at Western Sydney University. He has postgraduate qualifications in Internal Medicine, Biomedical Engineering and has a PhD in Computing. His interests include Clinical AI/Decision Support, Cloud Computing, Telehealth, and Applied Cryptography. He is the author or co-author of 50 articles on Digital Health.

FOCUS AREA 03: SUSTAINABLE DESIGN & CONSTRUCTION

INCORPORATING INTERDISCIPLINARY RESEARCH IN SUSTAINABLE DESIGN AND SUSTAINABLE CONSTRUCTION MATERIALS

The construction industry made up 13% of global GDP in 2018²⁰ and has ingrained itself in contemporary communities all over the world, including in New South Wales. As a result, the construction industry upgrades the socio-economic aspects of a community setup. Yet, 36% of the world's energy consumption and 39% of carbon dioxide (CO₂) emissions are still tied to building and construction,²¹ making it one of the key contributors to global warming and climate change. Therefore, ensuring sustainability in construction is imperative.

Despite the common perception that only technological involvement can minimise resource utilisation, sustainable construction should focus on occupants' health and comfort, urban heat island effects, and resilience of the infrastructure under extreme events. Accordingly, finding the delicate

balance between socio-economic growth and environmental impact requires a transition from an individualistic case-by-case approach to an interdisciplinary and holistic approach. As one of Australia's top research and teaching institutions, Western Sydney University is excited by the critical role that it can play in advancing this transition both rapidly and smoothly.

Urban Living Futures and Society has identified that conducting interdisciplinary research is a necessity that has to be strongly encouraged. One of our funded projects examines the possibilities of the optimisation of building shapes in urban areas to improve air quality so as to create breathable spaces for residents. By bringing the health aspects and building designs together a Computational Fluid Dynamics (CFD) model for simulating air pollutant dispersion around an isolated building was developed and validated by experimental data.

SELECTED SUCCESS FOCUS AREA 3

Title: Optimisation of building shapes for the breath of residents and cities

Research team: Kejun Dong and Kenny Kwok

Project description: Providing guidance for optimising building shapes in urban areas to improve air quality utilising a CFD model for isolated houses.

Air pollution kills millions of people every year and is spread by tiny particles carried in the wind, which are difficult to trace. In the project below, the team combined numerical (CFD) and experimental (wind tunnel) techniques to study air pollutant dispersion in urban areas. The study revealed that during an outbreak of air pollution near a building, the exposure of building residents depends on the emission location and the building shape, which are closely related to complicated wind-building interactions.²² There are windward and leeward critical emission regions from which the pollution outbreak will be most dangerous to people in the building. Interestingly, using circular buildings rather than square ones can mitigate the risk by reducing the leeward region wind circulation. The research can help design Sustainable Cities and Communities (SDG 11) and support Good Health and Well-being (SDG 3).

20. 'Why construction matters', Ryfan. Available at: <https://www.ryfan.ca/company/construction-conundrum>

21. 'Towards a Zero-Emission, Efficient, and Resilient Buildings and Construction Sector: Global Status Report 2017', UN Environment. Available at: <https://wedocs.unep.org/20.500.11822-/27140>

22. See publications from this project: E. Keshavarzian, R. Jin, K. Dong, K.C. Kwok, 'Effect of building cross-section shape on air pollutant dispersion around buildings', *Building and Environment* 197 (2021) 107861; E. Keshavarzian, R. Jin, K. Dong, K.C. Kwok, Y. Zhang, M. Zhao, 'Effect of pollutant source location on air pollutant dispersion around a high-rise building', *Applied Mathematical Modelling* 81 (2020) 582-602; E. Keshavarzian, K.C. Kwok, K. Dong, K. Chauhan, Y. Zhang, 'An experimental investigation of stagnant air pollution dispersion around a building in a turbulent flow', *Building and Environment* 224 (2022) 109564.



RESEARCHER PROFILE
DR KEJUN DONG

Associate Professor of Infrastructure Computations,
School of Engineering, Design and Built Environment

Associate Professor Kejun Dong is a leading researcher in the area of simulation and modelling of particle and particle-fluid systems, which are widely encountered in many engineering fields, such as civil, environmental, mechanical, mineral, etc. He has attracted various ARC (Australian Research Council) grants including a DECRA fellowship and several industrial grants in this field. He has authored and co-authored above 130 journal papers (h-index = 36).

FOCUS AREA 04: HOUSING DIVERSITY

DIVERSE, SOCIAL AND AFFORDABLE HOUSING TO MEET COMMUNITY NEEDS AND LIFECYCLES

The array of available housing types of various forms and sizes in a neighbourhood is referred to as 'Housing Diversity'. Communities in urban areas need such diversity in their dwellings due to intersections of demography and culture, with different sized families requiring different sized housing. Further, a significant shift in age cohorts is also a notable trend in contemporary urban settings. Inevitably, the needs of these communities are as diverse as they are.

As a result, diverse housing that meets the changing needs of people is an essential factor for the smooth functionality of an urban community. The need for such housing facilities is even more critical due to competing interests, for example technological development and the preservation of social and cultural values. The general well-being of people requires properly designed houses with sufficient diversity to address a community's needs, at all stages of the lifecycle. There is however an absence of detailed analysis of the urban social and cultural systems that would provide an insight into their dwelling requirements. It is also noted that as the cost of living increases the community's affordability of diverse housing is declining.

Within this focus area, a group of researchers investigated the places, practices and modalities that promote inclusive, cohesive, thriving communities. More than 22% of the Australian population now speaks a language other than English at home,²³ however even in 2015 in Western Sydney this figure was over 38%.²⁴ Settlement trends amongst migrants and refugees remain strongly biased towards urban centres. With its prodigious population growth, Western Sydney is now home to some of Australia's most culturally and linguistically diverse (CALD) local government areas. This project focused on investigating the factors that promote and inhibit inclusion, social cohesion and positive contribution to the community in rapidly diversifying population centres with the overall target of developing an ARC Linkage proposal.

Another team of researchers sought to investigate Asian Australians' experiences of racism during the COVID-19 pandemic. Almost 20% of Australians have Asian ancestry, and a sizeable number have reported facing racism, especially during the COVID-19 pandemic.²⁵ Racism is a significant barrier to healthy urban life, and to find a solution to the problem, a team of researchers compared Asian Australians' experiences of racism during the COVID-19 pandemic with that of other Australians. There are plans to extend the original research project for the development of possible anti-racism strategies. This pilot research informed an ARC application (DP230103079) addressing online racism that was granted in November 2022.

SELECTED SUCCESSES FOCUS AREA 4

Title: Places for Belonging - An exploration of the places, practices and modalities that promote inclusive, cohesive, thriving communities

Research team: Rachael Jacobs, Sukhmani Khorana, Jane Stratton and Anna Cristina Pertierra

Project description: Studying the factors that promote and inhibit inclusion, social cohesion and positive contribution to the community in rapidly diversifying population centres leading to an ARC Linkage application.

Title: Asian Australians' experiences of racism during the COVID19 pandemic

Research team: Alanna Kamp; Nida Denson; Kevin Dunn; Rachel Sharples; Susan Sisko, Rosalie Atie, Matteo Vergani, Jessica Walton

Project description: Broadening the scope of the original research on racism to investigate experiences of racism during the COVID-19 pandemic among the wider Australian population. The grant was used to propose an extension of the original research project and the development of a variety of research translation outputs.

23. 'Australia-Language used at home', .id. Available at: <https://profile.id.com.au/australia/language>

24. 'Western Sydney Profile', .id. Available at: <https://blog.id.com.au/2015/population/demographic-trends/western-sydney-diverse-and-growing-rapidly/>

25. A. Kamp, N. Denson, R. Sharples, R., & R. Atie, R. 'Asian Australians' Experiences of Online Racism during the COVID-19 Pandemic', *Social Sciences* 11(5), 227. Available at: <https://doi.org/10.3390/socsci11050227>



RESEARCHER PROFILE
DR ALANNA KAMP

Lecturer in Geography and Urban Studies, Geography, Tourism & Planning

School of Social Sciences

Dr Alanna Kamp is Senior Lecturer in Geography and Urban Studies and Academic Program Advisor (Geography & Planning) in the School of Social Sciences. She is a member of the Young and Resilient Research Centre (WSU), the Challenging Racism Project (WSU), Diversity and Human Rights Research Centre (WSU) and think-tank consortium the Centre of Resilient and Inclusive Societies. In 2020 and 2022, Dr Kamp was school-based research fellow at the Young and Resilient Research Centre. She was awarded a WSU Early Career Researcher Fellowship in 2021 to continue her work on 'mixed-race' young Australians' experiences of racism, identity and belonging in multicultural Australia. In 2022, she was awarded a WSU Industry Fellowship to facilitate a secondment at the Special Broadcasting Service (SBS). In 2022, she was also awarded the School of Social Sciences Early Career Researcher Award and School of Social Sciences Research Team award.

Dr Kamp's research contributions are in the areas of multiculturalism and cultural diversity in Australia, experiences of migration and migrant settlement, racism and anti-racism, national identity, citizenship, and intersectional experiences of belonging/exclusion. She is currently part of a research team awarded an ARC Discovery grant to investigate online anti-racism initiatives in Australia, and is leading the project *What Australia Means to Me*, funded by SBS.

FOCUS AREA 05: SOCIAL & CULTURAL WELLBEING

INTEGRATING HEALTHY PLACEMAKING WITH SOCIAL AND CULTURAL INFRASTRUCTURE DESIGN

Healthy placemaking represents a unique collaborative process of optimising shared values within the public realm, strengthening the connections between societies and the spaces they share. Placemaking inspires communities to collaboratively reinvent/re-design common/public spaces as the heart of their respective communities, which could also be considered the overarching objective and the specific approach to improving a region, city, or neighbourhood. The concept of placemaking may facilitate creative systems of use while considering the relevant physical, cultural, and social identities that define a community. Thus, this concept goes beyond merely promoting better urban design and supports any ongoing evolution(s) of a given community's public places.

An effective placemaking process may capitalise on a local community's strengths/assets, inspirations, and potential via community-based participation to create high-quality public places that contribute to the community's happiness, well-being, and good health.

Urban Living Futures and Society funded three projects that investigate the integration of integrate healthy placemaking with social and cultural infrastructure designs.

One of the research projects investigated promoting gender equality and developing an inclusion framework, specifically within Muslim communities across Australia and New Zealand, through understanding the cross-cultural collaborations on the complex relationships between Muslim women and sports.

Another advocated the inclusion of dementia-enabling environments and healthy placemaking principles in planning policies, healthcare services, and retail facilities by undertaking dementia awareness campaigns with various community groups, business owners, and representatives from the planning industry. This novel initiative was a collaboration with the Southwestern Sydney Local Health District and Canterbury-Bankstown Council and advocated for the inclusion of dementia-enabling environments and healthy placemaking principles in the planning policies of the Council, healthcare services, and retail facilities.

A third project sought to find suitable transition mechanisms for women who are released from prisons (to homelessness or unstable housing) into local communities. This project was conducted from an intersectional feminist perspective to discover the available post-release housing and homelessness pathways of women who have exited prisons in NSW.

The funded projects in this focus area support UN SDGs Good Health and Well-being (SDG 3), Gender Equality (SDG 5), and Reduced Inequalities (SDG 10).

SELECTED SUCCESS FOCUS AREA 5

Title: Getting out: Women's housing and homelessness pathways after prison

Research team: Gabrielle Drake, Brian Stout, Corrinne O'Sullivan, Robyn Oxley, Maggie Hall, Rimple Mehta, Robyn North, and Women's Justice Network colleagues Gloria Larman, Francs Drake and Ally Colquitt.

Project description: *Getting Out* aimed to explore, through an intersectional feminist perspective, the post-release housing and homelessness pathways of women who exited prisons in NSW. The project included an extensive literature and policy review; consultation with community partners and Corrective Services NSW; and co-facilitated focus groups with investigators with lived experience to inform a co-designed project. Funding supported team members who have successfully been awarded \$74,000 from Corrective Services NSW to conduct the co-designed project.



RESEARCHER PROFILE
DR GABRIELLE DRAKE

Professor, Social Work and Communities and Associate Dean Engagement

School of Social Sciences

Professor Gabrielle Drake is Associate Dean Engagement and Professor of Social Work in the School of Social Sciences at Western Sydney University. Professor Drake has more than 25 years' practice experience in mental health, sexual health, disability, and homelessness, where she has held senior policy and Executive roles with government and various community organisations. She is a recognised expert in the areas of social policy, child well-being, mental health, disability, and homelessness and housing pathways.

Professor Drake's research and scholarship are focused on engaged and collaborative research that leads to impact for individuals and communities, including legislative, policy and service system reform.

FOCUS AREA 06: GREEN-BLUE INFRASTRUCTURE

GREEN STAR COMMUNITY: GREEN AND BLUE INFRASTRUCTURE, INCLUDING CLIMATE SENSITIVE DESIGN

Climate change has undoubtedly become one of the most pressing global crises, and it is one that requires immediate action. Almost every government, enterprise and community is developing and implementing action plans to mitigate the adverse effects of climate change.

One Australian approach to deal with climate change has been the introduction of 'Green Star', an internationally recognised rating tool which sets the standard for sustainable, healthy, resilient and positive buildings and places.²⁶ The Green Star rating system encourages the 'green-blue' features in the built environment in order to improve the natural ecology and to minimise the urban heat island effect in the vicinity—in this sense 'green' features describe trees, parks, gardens, while 'blue' features include drainage and flood storage areas.

Despite the urban cooling offered by such blue and green features, land scarcity, planning laws and overdevelopment have to date limited the possibility of having integrated approaches to the built environment. Innovative and creative transformations are now required to update existing housing and infrastructure, and to create more sustainable and environmentally friendly and climate sensitive housing design.

Under this focus area Urban Living Futures and Society funded research that focused on designing car parks as innovation hubs for urban cooling. This research was designed against the backdrop of the rapid heating up of Western Sydney as a result of the continued expansion of urbanisation coupled with global warming, and the substantial contribution of asphalt carparks—flat, black and unshaded car parks—to this heating up. As of 2019, these unshaded asphalt car parks, covered six square kilometres (6km²) of land across the Western Sydney region. These carparks are known sources for Urban Heat Island Effects which cause risks to public and environmental health, especially when the surface temperature of the asphalt can reach up to 70°C in the summer.²⁷

To mitigate the impact, the research team worked on developing evidence-based solutions to cool car parks and increase the sustainability of urban life. For that, the researchers monitored different car parks of different types—brick car parks, multi-deck car parks, and concrete car parks—at Liverpool Hospital to collect the necessary data to develop a sustainable solution. The researchers successfully attained funding of \$20,000 from Healthy Urban Environment Collaboratory in December 2020 to scale-up their study.

SELECTED SUCCESS FOCUS AREA 6

Title: Car parks as innovation hubs for urban cooling

Research team: Sebastian Pfautsch, Awais Piracha, Ryan Neuwelant and Nicky Morrison

Project description: Combining the strengths in urban planning, policy analysis, environmental monitoring and remote sensing to develop an innovative research project that addressed how heat in carparks could be avoided.

26. 'Introducing Green Star'. Green Building Council Australia. October 2020. Available at: <https://gbca-web.s3.amazonaws.com/media/documents/introducing-green-star.pdf>

27. Evin Priest, 29 January 2021, News.com. Available at: <https://www.news.com.au/lifestyle/parenting/school-life/university-study-finds-areas-of-western-sydney-school-playgrounds-reach-70c-in-summer/news-story/6d0fb3b42b4ae402459ffc3a917d1002>



RESEARCHER PROFILE
DR SEBASTIAN PFAUTSCH

Associate Professor in Urban Management and Planning, Geography, Tourism & Planning

School of Social Sciences

Dr Sebastian Pfautsch is an Associate Professor in Urban Studies at Western Sydney University. Dr Pfautsch develops trans-disciplinary research around the complex issue of urban heat. While the core of his work is concerned with the cooling functions delivered by green infrastructure (GI), his applied projects deal with heat mitigation far beyond GI and include surface and building materials, engineered shade and water infrastructure, smart city technology and more. His high-quality research output is documented in the form of more than 90 peer-reviewed research papers, technical reports and journal articles. Sebastian's work features regularly in the media, which in 2021 led to more than 350 headlines in 21 countries that was published in five languages and reached more than one billion people.

FOCUS AREA 07: SUSTAINABLE & SOCIALLY RESPONSIBLE ENTERPRISES

INDUSTRY ATTRACTION AND STRATEGIC PARTNERSHIPS; INTEGRATED INDUSTRY RESEARCH; GRADUATE EMPLOYMENT PATHWAYS; LOCAL SKILLED JOB CREATION

With its booming population Western Sydney is often considered the fastest-growing labour market in Australia, yet there is a chronic shortage of local jobs. Decentralisation and relocation in manufacturing has driven an economic transformation and structural change in employment scenarios, and the Western Sydney region is expected to face a jobs deficit of 210,000 by 2036.²⁸

Integrated industry-research collaboration is thus the preferred model to find sustainable solutions to this significant job shortage in the region, and for Australia in general. Integrated industry-research collaboration can guide and provide insight to determine different pathways for graduate employment, and it can help form possible strategic partnerships with the private sector to create local jobs. Such collaborative research projects also provide cutting-edge knowledge to the relevant industries to help transform them into sustainable and socially responsible enterprises.

In this focus area Urban Living Future and Society funded two industry-research collaborative projects. One worked on developing a novel 3D printing technology for fabricating micro carbon fibre composites that can replace the micro steel fibres that are currently being tested as reinforcements in Magnesium Oxide Cement (MOC) composite products. The use of 3D printed micro fibres was required by one of the industry partners, and is aimed at replacing micro steel fibres with micro-carbon fibres.

The compactability, high modulus, and tensile strength of micro-carbon fibres make it a perfect replacement for micro steel fibres. Carbon fibre's inability to be used in impact resistance panels is due to its extremely poor toughness, however, it has a high compressive strength. The creative and difficult research challenge is how to use and enhance micro carbon fibre in order to replace micro steel fibre. Micro carbon fibre composites, such as 3D micron carbon fibre composites, could be created to address this weakness and show improved impact resistance. It is hoped that the addition of the carbon micro fibres will further improve the properties of the MOC, making it stronger and cheaper while using less steel.

Another project was funded to investigate the plausible uses of local waste material for stockpiles by proving a certificate based on its mechanical properties, workability and durability, and the subsequent development of a process to certify its quality. Given that the Australian construction industry generates 37% of the 74 million tonnes (MT) of annual waste,²⁹ developing proper waste recycling and reuse guidelines will provide a reliable pathway for the sustainable management of our resources. As Australia's road infrastructure network continues to expand, focus was given to the waste generated via Roads and Pavement (R&P) material resulting from road construction, maintenance and excavation activities as this constitutes a majority of the waste generated by the construction industry.

SELECTED SUCCESS FOCUS AREA 7

Title: Development of a New 3D Printing Technology for Fabricating Micro Carbon Fibre Composites

Research team: Richard Yang, Mariam Darestani, Sarah Zhang, Baolin Wang and Khin Soe

Project description: Reviewing the literature to understand the current research status on micro carbon fibre composites, developing a novel 3D printing process to fabricate micro carbon fibre composites, printing micro carbon fibre composites for prototyping and testing.

28. P. O'Neill, 'Addressing Western Sydney's jobs slide', Centre for Western Sydney, 2022. Western Sydney University. Available at: https://www.westernsydney.edu.au/data/assets/pdf_file/0009/1064961/JTW_report_7April.pdf

29. 'National Waste Report 2020', <https://www.dcceew.gov.au/environment/protection/waste/national-waste-reports/2020> (at p. 27). Available at: <https://www.dcceew.gov.au/environment/protection/waste/national-waste-reports/2020>.

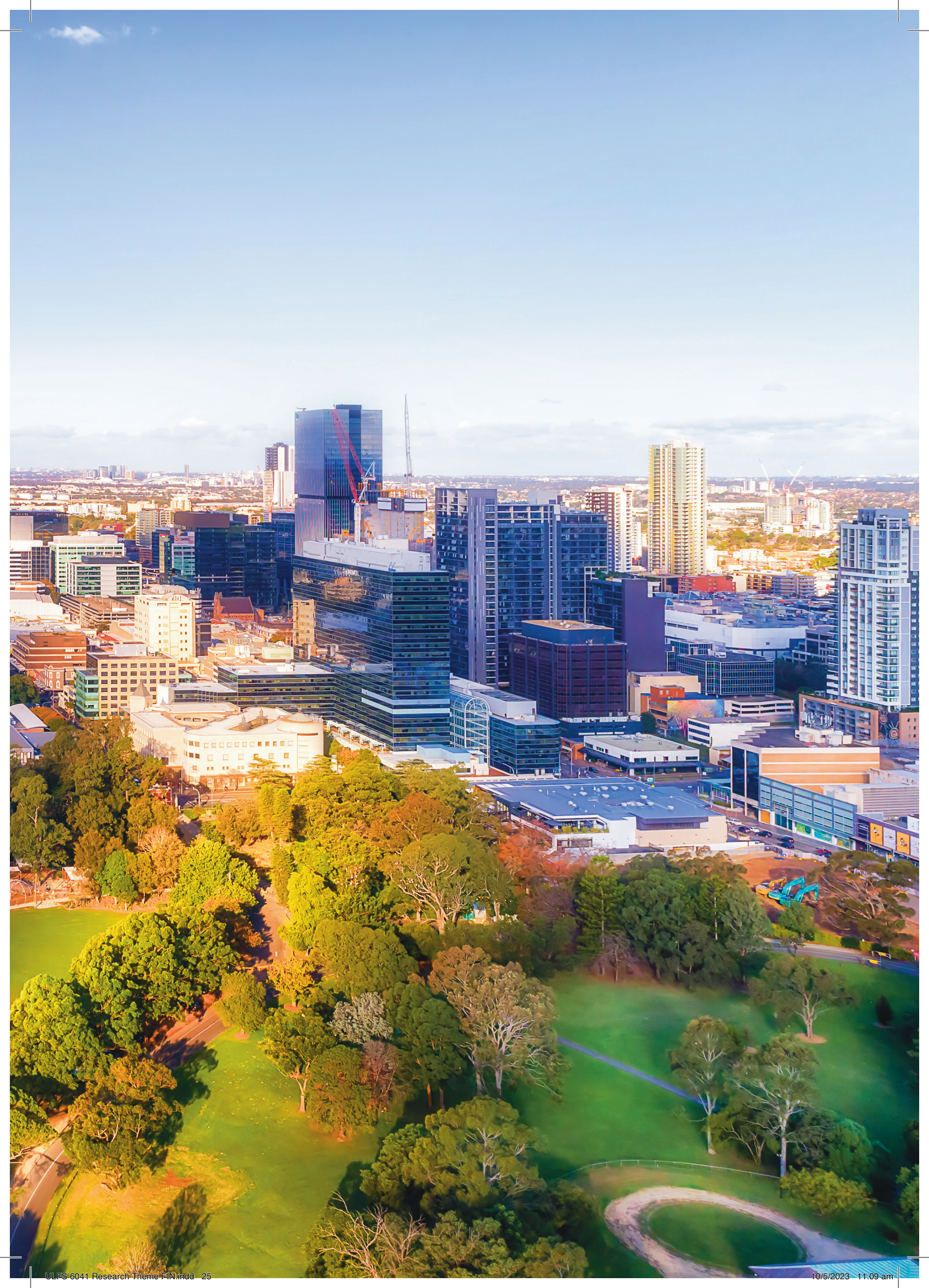
**RESEARCHER PROFILE****DR RICHARD YANG****Professor in Mechanical Engineering and Smart Structures**

School of Engineering, Design and Built Environment

Professor Richard Yang is Discipline Leader, Mechanical, Mechatronic and Robotics, School Research Theme Leader (Industrialisation and Materials), and School Research Group Leader (Advanced Manufacturing) in the School of Engineering, Design and Built Environment. He is an internationally recognised research leader on several fields of research, including: Advanced Manufacturing; Additive Manufacturing (3D printing) of metals, polymers and composites; Advanced Engineering Materials and Structures; Circular Manufacturing and Circular Economy; Defence Technology; Industry 4.0; Machine Condition Monitoring (MCM); Structural Health Monitoring (SHM); Metal Forming and Metal Surface Treatment.

Richard has been awarded over \$12m in competitive research grants, including 12 ARC grants (1 ARC Training Centre, 2 DPs, 3 Linkages, and 6 LIEFs), a CSIRO/NSF Convergence Accelerator on recycled plastic waste, and more than 20 government and/or industry grants. He has authored more than 300 high-quality technical publications in top scientific journals, books, and conferences, and is a major contributor in his relevant fields of research in diverse areas of Engineering, including Mechanical, Mechatronic, Manufacturing, Materials, Aerospace, Civil and Defence.





RESEARCH SHOWCASES AND THEME STORMS

PRIORITISING HEALTHY PLACEMAKING AFTER COVID-19: WORKSHOP OUTCOMES & PRACTITIONER INSIGHTS

19 October 2020

Practitioners and researchers from across local government, planning and health promotion gathered online in October 2020 to discuss survey findings and recommendations from the Healthy Placemaking Survey led by Nicky Morrison, conducted during the summer of 2019-2020. The Workshop was attended by 42 participants including representatives of South West Sydney Local Health District and six local government areas: Penrith, Campbelltown, Wollondilly, Shellharbour, Coffs Harbour and Ballina. Under the guidance of eight facilitators, participants discussed the five important topics:

- » Green infrastructure and open space
- » Social planning and community services
- » Active transport
- » Healthy Food Options
- » Diverse Housing.

Summaries of two topics are below.³⁰

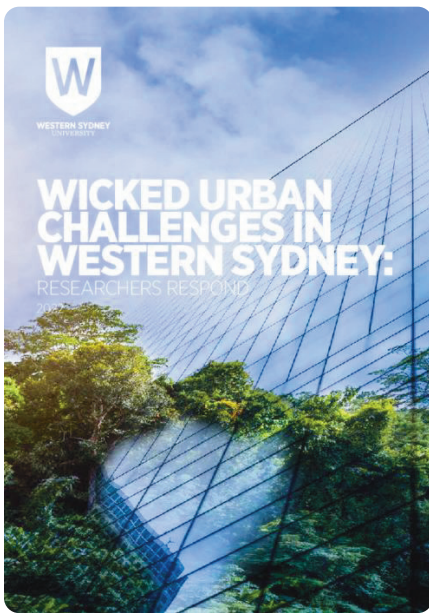
GREEN INFRASTRUCTURE AND OPEN SPACES

Participants discussed a lack of common understanding about what the term 'healthy places' actually means. They also discussed a lack of data at appropriate scales and over time. While there is plenty of data available, it is not always possible for local government representatives or healthy place advocates to be able to track and report on outcomes over time. There was recognition that more time is now being spent getting the community involved, asking them how they see their public spaces, and what outcomes they want.

SOCIAL PLANNING AND COMMUNITY SERVICES

One of the key priorities reported by this group was the need to more adequately value the social dimensions of our cities when compared to measures of economic value. This underscores the importance of the interdisciplinary approach adopted by Urban Living Futures and Society that supports using insights from social science to add to those of engineering.

30. The survey and workshop outcomes are summarised here: <https://researchdirect.westernsydney.edu.au/islandora/object/uws:59559/>
<https://researchdirect.westernsydney.edu.au/islandora/object/uws:59551/datastream/PDF/view>



WICKED URBAN CHALLENGES IN WESTERN SYDNEY

25 October 2021

This online forum in Western's 2021 Research Week tackled four of Western Sydney's 'wicked' urban challenges: job/housing imbalances and inadequate infrastructure investment; declining housing affordability; cultural infrastructure disparities; and extreme urban heat. The aim was to develop solutions to ensure our region is prepared for the future.

Over 160 people attended this highly interactive forum, from those in the built environment profession to people living and working in Western Sydney and beyond. The event brought together our researchers, government, industry, and our local community to challenge conventional policy thinking and offer new ways to solve these four wicked urban challenges in Western Sydney.

Nicky Morrison led the October 2022 report of the findings of this workshop, published as *Wicked Urban Challenges in Western Sydney: Researchers Respond*.³¹

31. N. Morrison, et al. *Wicked Urban Challenges in Western Sydney: Researchers Respond*. Available at: <https://doi.org/10.26183/kcxm-be37>



ZERO CARBON EMISSION AND DISASTER RESPONSE: DEVELOPMENT FOR THE FUTURE OF AUSTRALIA WORKSHOP

4 November 2022

In order to celebrate WSU's 2022 Research Week, Urban Living Futures and Society Research Theme Champions Nichole Georgeou and Olivia Mirza organised the workshop Zero Carbon Emission and Disaster Response: Development for the Future of Australia. This workshop aimed to develop a

strategic plan and policy for industry, along with interdisciplinary research collaboration toward zero carbon emission and disaster response for Greater Western Sydney that will help drive cross-industry engagement within NSW to attract good business investment in zero carbon emissions, and in disaster preparedness and response.

FUTURE INITIATIVES

Urban Living Futures and Society is planning three partners liaison workshops for 2023, divided into three stages.

- » Stage 1 includes inviting potential industry partners to explore possible collaboration with Western research teams for practical and industry-oriented research. This initiative promotes the fresh input of early-career and mid-career researchers who can contribute to interdisciplinary approaches that combine technology with social science.
- » Stage 2 focuses on brainstorming workshops with the invited industry partners to identify contemporary industry problems and the requirements of catering for a sustainable urban living future. The research orientation of such problems and requirements will be deconstructed based on the outcomes of these sessions.
- » Stage 3 workshop brings both academia and industry representatives together to establish the structure of future research projects. Ideas that join Western research teams with industry will be highly encouraged.

APPENDIX 1:

2020 RESEARCH PROJECTS FUNDED

Project Title: Sensor Enabled Smart Living & Work Spaces

Team members: Jim Basilakis; Heidi Bjerling; Bahman Javaid; Anupama Ginige.

Funding Outcomes: The team created a taxonomy to help categorise the various automated options. Development work commenced after locating Internet of Things components that were compatible with the automation framework for smart environments. For testing, demonstration, and as a foundation for future development, a proof-of-concept smart rooms automation framework was created.

Project Title: Technology-based-data-driven government accelerators to improve women's safety in urban areas of Sydney

Team members: Jenna Condie; Roger Dawkins; Calvin Frith & Stephanie Strilakos, Transport for NSW.

Funding Outcomes: Key findings of the research include that in a rush to treat every problem as a 'system' that can be made 'better' with technology, solutions are frequently based on a reductive and limited vision of society.

Project Title: Car parks as innovation hubs for urban cooling

Team members: Sebastian Pfautsch; Awais Piracha; Ryan van den Nouweland; Nicky Morrison.

Funding Outcomes: Research was conducted to limit the warming of car parks to provide evidence-based recommendations to elevate the sustainability of urban life.

Project Title: Asian Australians' experiences of racism during the COVID19 pandemic

Team members: Alanna Kamp; Nida Denson; Kevin Dunn; Rachel Sharples; Susan Sisko; Matteo Vergani; Jessica Walton.

Funding Outcomes: The researchers conducted an assessment of the degree to which other Australians are affected by racism during the COVID-19 pandemic as a secondary research objective to support the overall research documentation.

Project Title: Building multicultural communities: an intersectional study of Muslim Women footballers in Australia and New Zealand

Team members: Jorge Knijnik; Zainab Mourad; Holly Thorpe (Uni of Waikato).

Funding Outcomes: The researchers identified ways and means to promote gender equality and develop an inclusion framework, specifically within Muslim communities across Australia and New Zealand.

Project Title: Getting out: Women's housing and homelessness pathways after prison

Team members: Gabrielle Drake; Brian Stout; Corrinne O'Sullivan; Robyn Oxley; Maggie Hall; Rimple Mehta; Robyn North; and Women's Justice Network colleagues Gloria Larman, Francs Drake and Ally Colquitt.

Funding Outcome: The researchers identified plausible post-release housing and homelessness pathways to eliminate the barriers hindering social inclusiveness of women who have exited prisons in NSW.

Project Title: Optimisation of building shapes for the breath of residents and cities

Team members: Kejun Dong; Kenny Kwok (USyd).

Funding Outcome: Research team developed a CFD model that can be extended for a 4x4 building cluster to simulate air pollution dispersion.

Project Title: Governance models for effective multi-nodal urban economic development

Team members: Ryan Van Den Nouweland; Nicky Morrison; Phil O'Neill.

Funding Outcome: The research developed content for and organised a round table workshop with western Sydney planning authorities, at the local and state levels. The workshop mapped out a shared research agenda and developed external funding opportunities for WSU.

Project Title: Assessing Reputation Damage to Public and Private Institutions caused by Cyber-Attacks

Team members: Srinath Perera; Xiaohua Jin (Sean); Alana Maurushat.

Project Title: Ventilating the future: Fresh Air in the Era of Climate Change and COVID19

Team members: Stephen Healy; Emma Power; Louise Crabtree; Katherine Gibson; Miriam Williams (Macq).

Project Title: Preliminary study of an Industry 4.0 fall protection system for heavy trucks

Team members: Richard Yang; Leo Zhang.

APPENDIX 2:

2021 RESEARCH PROJECTS FUNDED

Project Title: Development of a New 3D Printing Technology for Fabricating Micro Carbon Fibre Composites (co-funded with Environment and Sustainability)

Team members: Richard Yang; Mariam Darestani; Sarah Zhang; Baolin Wang; Khin Soe.

Funding Outcome: The researchers reviewed relevant literature to understand the current research status on micro carbon fibre composites, the development of a novel 3D printing process to fabricate micro carbon fibre composites, printing micro carbon fibre composites for prototyping and testing, and extracting research findings to provide recommendations to industry partners.

Project Title: Certification for recycle and reuse of local waste material for stockpile (co-funded with Environment and Sustainability)

Team members: Chin Leo; Sarah Zhang; Pan Hu; Tao Zhong; Vivian Tam; Geoff McNamara.

Funding Outcome: After conducting a comprehensive literature review on recycling and reuse of road and pavement waste in pavement and construction, the team evaluated and monitored the quality of the final product with respect to common indicators including mechanical properties, workability and durability as a part of eventually developing a quality certifying process.

Project Title: Improving climate change resilience of health infrastructure (co-funded with Environment and Sustainability)

Team members: Sebastian Pfautsch; Nicky Morrison; Awais Piracha; Ryan Neuwelant; Wendy Hird; Laine Simpson; Ingrid Segrovia.

Funding Outcome: This research: explored evidence-based design guidelines that help mitigate the impact of heat on hospital infrastructure; identified gaps in policies in addressing key risks and opportunities for the implementation of sustainable and climate-smart design of hospitals and health-related infrastructure; and investigated the development of a bespoke climate risk analysis training course for the health infrastructure sector.

Project Title: Building partnerships to transform South Western Sydney into a dementia-friendly region (co-funded with Health and Wellbeing)

Team members: Diana Karamacoska; Gen Steiner; Nicky Morrison; Ann Dadich; Cameron McAuliffe; Michelle DiGiacomo; Sandra Loyola Sandoval; Jennie Pry; Tina Britton.

Funding Outcomes: Advocacy for the inclusion of dementia-enabling environments and healthy placemaking principles in planning policies, healthcare services, and retail facilities through dementia awareness campaigns with various community groups, business owners, and representatives from the planning industry. The plan included Policy Content Analysis, Policy Brief, Strategic Planning Workshop, and Dissemination and Expansion.

Project Title: My Place: An app for young people in out-of-home-care (foster care) and their carers and case workers

Team members: Milissa Deitz; Rachel Morley; Amanda Third; Rebekah Grace.

Funding Outcomes: This participatory research investigated:

1. The conditions required to support and encourage positive identity, belonging, agency, self-determination, well-being and resilience in out-of-home (OOHC) young people during periods of disruption, especially in communities and continuities of care.
2. The role digital technology can play in supporting these conditions at the individual level as well as within inter-family networks and the OOHC sectors more broadly.

Project Title: Places for Belonging - An exploration of the places, practices and modalities that promote inclusive, cohesive, thriving communities

Team members: Rachael Jacobs; Sukhmani Khorana; Jane Stratton; Anna Cristina Pertierra.

Funding Outcomes: The research provided suggestions to foster and inhibit inclusion, social cohesion, and positive community contributions in rapidly diversifying population centres that are becoming new homes for recently arrived migrants and refugees.

Project Title: Fully sustainable 3D printed house in education

Team members: David Cole; Ali Hellany; Josh Wodak.

APPENDIX 3:

2022 RESEARCH PROJECTS FUNDED

Project Title: Experimental Study on the Swelling Characteristics and Stabilisation of Bringelly Shale

Team members: Professor Chin Leo, Professor Samantha Liyanapathirana, Dr Qinghua Zeng and Dr Pan Hu

Funding Outcome: Funding supported team members who had been successfully funded in May 2022 for their 2021/22 ARC STEM Project worth \$283,353 ([GA188917-V2](#)) entitled “A novel method to stabilise expansive soils by alkali-activation”. Our funding was specific to support the investigation of the geotechnical properties of expansive soil, and ran preliminary studies to check how this expansion could be properly treated.

Project Title: Ageing and the transition of care for persons with disabilities and their carers from minority migrant communities in Western Sydney

Team members: Dr Daniel Doh, Prof Karen Soldatic, A/Prof Lise Mogensen, Dr Rohini Balram, A/Prof Nichole Georgeou

Funding Outcomes: The team has submitted an expression of interest to host a thematic session at the 2023 Transforming Care Conference and has initiated conversations on developing an ageing disability carer transition toolkit. They are now working on the development of four articles: a systematic review; an article on carers; one on disability; and a comparative study. They are targeting philanthropic funders to support the development of toolkits for families and have planned to apply for the National Disability Research Partnership scheme that commences in 2023.



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