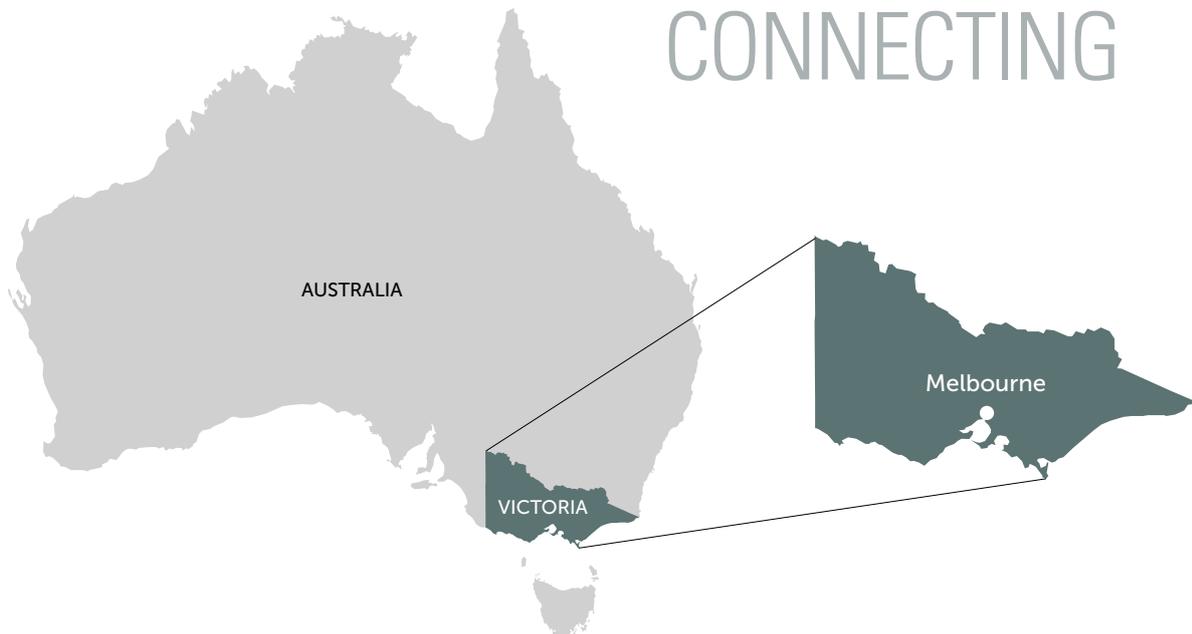


MELBOURNE RESEARCH, EDUCATION AND TRAINING

INFRASTRUCTURE
& URBAN DESIGN



MELBOURNE: LEADING INNOVATING CONNECTING





Melbourne and regional Victoria are a perfect blend of economic strength and dynamism, with a lifestyle that is envied around the world. Talented people, a world-class education system, supportive government and superior infrastructure make the state of Victoria a global leader in research, education and vocational training.

Victoria's research centres, universities and vocational training providers partner with industry, governments, non-government organisations (NGOs) and other educational institutions around the world.

They offer extensive opportunities for partnerships and program collaborations, including joint research initiatives, research and development services, licensing of materials, tailored curriculum development, joint program delivery, staff/student exchange, consultancy services and customised employee development programs.

For more information about Victoria's research, higher education and vocational training capabilities, contact your region's Victorian Government Business Office at: **invest.vic.gov.au/offices**.



INFRASTRUCTURE AND URBAN DESIGN IN MELBOURNE

Melbourne was declared the world's most liveable city for the third successive year in the Economist Intelligence Survey 2013.

This recognition is the result of a conscious and sustained deployment of Melbourne's infrastructure and urban design expertise over recent decades to transform the Victorian capital into an internationally notable urban centre.

Making Melbourne a more liveable city has been a key objective of the city's economic development and growth strategy. Melbourne's urban design strategies are grounded in the recognition that liveable cities attract creative and innovative people and, in turn, creative and innovative people attract high-value industries.

Melbourne has experienced an architectural and design renaissance in recent years and now boasts some of the most innovative buildings and infrastructure in the world.

This urban renewal has been accompanied by state-of-the-art infrastructure and transport networks which support the state's diverse economy, innovative health services, leading education and research institutions, world-class sporting facilities, and dynamic arts and cultural scene.

Melbourne's infrastructure and sustainable urban design expertise is now assisting governments globally as they seek to meet the critical challenges of urbanisation.

VICTORIA'S INFRASTRUCTURE AND URBAN DESIGN INDUSTRY

Many of the world's nations are facing the challenges of rapid, large-scale urbanisation. These challenges include the provision of appropriate housing, schools, hospitals and health and aged care facilities; and the need for education services, more efficient infrastructure including roads, ports, and rail, water and waste water treatment and distribution; airports and aviation services; and water and land remediation technologies.

In many cases, the planning, design and construction of entire new cities and districts is being undertaken by governments and local authorities.

Currently, in China alone, Australian urbanisation-related organisations are successfully engaged in more than 20 urbanisation projects, which have a total spend of more than A\$30 billion.

Victoria is Australia's leader in infrastructure and urban design. Victoria's own infrastructure is clear evidence of the state's expertise in the planning, construction, financing and management of infrastructure, a process in which public-private partnerships (PPP) play a major role. Victoria's comprehensive PPP expertise covers governance and legal frameworks, risk management and procurement systems and financial modelling and controls.

Supported by an effective PPP framework, Victoria's infrastructure industry has a strong record in delivering improved urban amenity and enhancing liveability both in Victoria and in the international marketplace.

Victoria's Sustainable Urban Design and Infrastructure-related organisations and businesses provide the following globally recognised capabilities and expertise:

- Master planning
- Innovative urban frameworks
- Sustainable architectural and engineering design services
- Innovative architecture
- Water sensitive urban design and management
- Water technologies
- Intelligent transport systems
- Advanced green building technologies and systems
- Economic/financial modelling and planning services
- Project management
- Civil engineering
- Quantity surveying and cost control
- Health infrastructure including hospital design, systems design and operations
- Freight and logistics infrastructure
- Ports and airports.

RESEARCH AND DEVELOPMENT

Victoria's pre-eminence in infrastructure and urban design is grounded in its internationally recognised expertise in areas such as advanced manufacturing, architectural design and the social sciences.

Victoria, and particularly Melbourne, is home to many dedicated research and development centres across a broad range of specialisations that collectively make the state a powerhouse in meeting the evolving challenges of creating liveable cities.

KEY RESEARCH CENTRES

Deakin University's **Centre for Intelligent Systems Research** develops state-of-the-art algorithms and methodologies for practical solutions to real-world problems and undertakes research on next-generation robotic control systems. Its well-equipped research labs include industrial robots, supercomputers and the largest number of haptic devices in the Southern Hemisphere.

Deakin University's **Centre for Advanced Design in Engineering Training** (forthcoming) will provide some of the best future-focused engineering and design facilities in the Australian university sector.

The Monash Research Academy is an Indian-Australian multidisciplinary research partnership with the Indian Institute of Technology Bombay. It undertakes research in areas including Infrastructure Engineering and Water Management.

The RMIT Global Cities Research Institute focuses on understanding the complexity of globalising urban settings from provincial settings to mega-cities. Its research emphasis is on questions of resilience, security, sustainability and adaptation in the face of the processes of globalisation and climate change.

RMIT University's **Design Research Institute** brings together over 100 university researchers and their industry, government and community partners from architecture, fashion, aeronautical and chemical engineering, business, industrial design, art and new media to form teams around significant projects to find solutions to the challenges of urbanisation and the cities of the future.

The Swinburne Institute for Social Research is one of the largest social sciences and humanities research centres in Australia. Its research interests include urban planning, economics, statistics, sociology and political sciences. Sustainable Cities is one of its four flagship research areas.

The University of Melbourne Centre for Spatial Data Infrastructures and Land Administration provides a focus for research in Spatial Data Infrastructures and undertakes original international research in land policy and administration especially in the Asia-Pacific region.

Australian Research Centre for the Governance and Management of New Urban Transport is a collaborative research centre dedicated to promoting and supporting sustainable urban transport in Australia and the Asia-Pacific region. A main focus is the impact of transport on climate change, increased oil prices and eventual reduction in oil supply.

VOCATION AND HIGHER EDUCATION

Victoria's capabilities in infrastructure are underpinned by its highly educated, highly skilled workforce. That workforce is, in turn, supported by the quality of Victoria's higher education system.

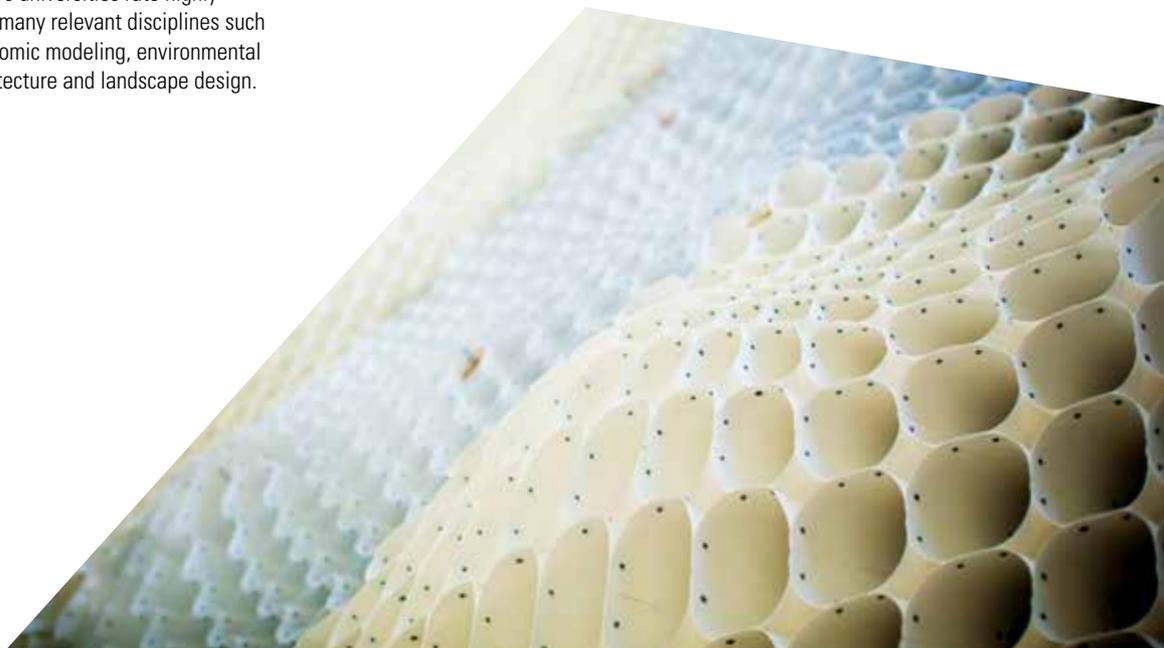
Melbourne and regional Victoria's universities rate highly in international rankings across many relevant disciplines such as policy development and economic modeling, environmental planning, law, sustainable architecture and landscape design.

Similarly, Victoria's vocational education and training (VET) system delivers accredited, industry-ready training to prepare workforces to meet Australia's rigorous professional standards across a range of relevant occupations, notably those in the building and construction industries.

Many of Victoria's VET providers also work with industry, governments and aid agencies around the world to build institutional capacity and provide workforce training through collaborative partnerships.

Victoria's VET providers deliver training in countries throughout Asia Pacific, China, India, the Middle East and, increasingly, Latin America.

MELBOURNE'S
INFRASTRUCTURE AND
SUSTAINABLE URBAN
DESIGN EXPERTISE IS
NOW ASSISTING
GOVERNMENTS
GLOBALLY AS THEY
SEEK TO MEET THE
CRITICAL CHALLENGES
OF URBANISATION



CASE STUDY



JIAOSHAN ISLANDS ECO RESORT

China's Taihu Lake is the site of an exciting sustainable urban design collaboration between RMIT University and global engineers Arup.

In 2008, the Victorian Government signed a memorandum of understanding with its counterpart in Changzhou Municipality to clean up Taihu Lake, China's third largest lake.

An hour from Shanghai, Taihu Lake supplies water to about 30 million people, but it also suffers from outbreaks of cyanobacteria, known as blue-green algae.

That memorandum has resulted in the development of a radical urban model for an eco-resort in the Jiaoshan Islands at Taihu Lake by Associate Professor Rosalea Monacella and Craig Douglas from RMIT's School of Architecture and Design, in conjunction with global engineers Arup.

The Wujin-Taihu Bay Tourism Resort Commission, Changzhou Municipality was seeking an alternative sustainable urban model that would be world leading in all aspects of the design. They wanted an exemplary outcome that would become a benchmark for development in the region and set standards in world practice.

They were impressed by what RMIT had to offer in landscape architecture and urban framework development, both of which are central to this project.

The project is being run by the Office of Urban Transformations Research (OUTR), a research network of RMIT professionals.

"We developed a masterplan around self-sustainability, water harvesting, recycling, low-impact construction and mass off-site customisation of building elements," Associate Professor Monacella says.

"The plan retains much of the fishing and orchard industry on the existing main island and will use it as a filtering device to use and clean the lake water.

"The model is for the resort to have the ability to generate its own alternative and renewable energy source and to run a self-sustained supply network.

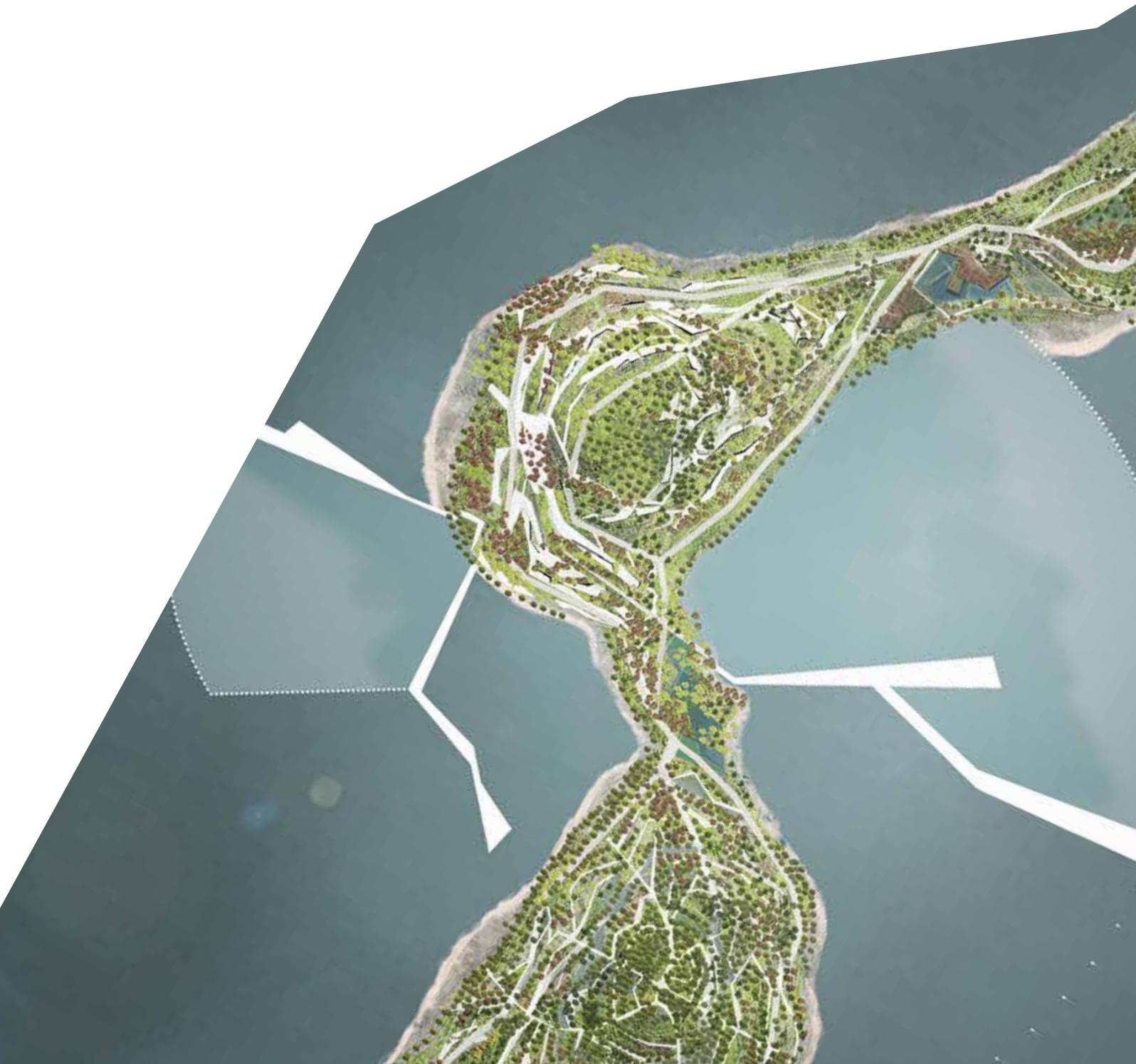
"It will also manage, use and recycle its own sewage and waste, and supply its own water through systematic collection, regeneration, storage and distribution."

Associate Professor Monacella says the project has been a valuable partnership for all concerned.

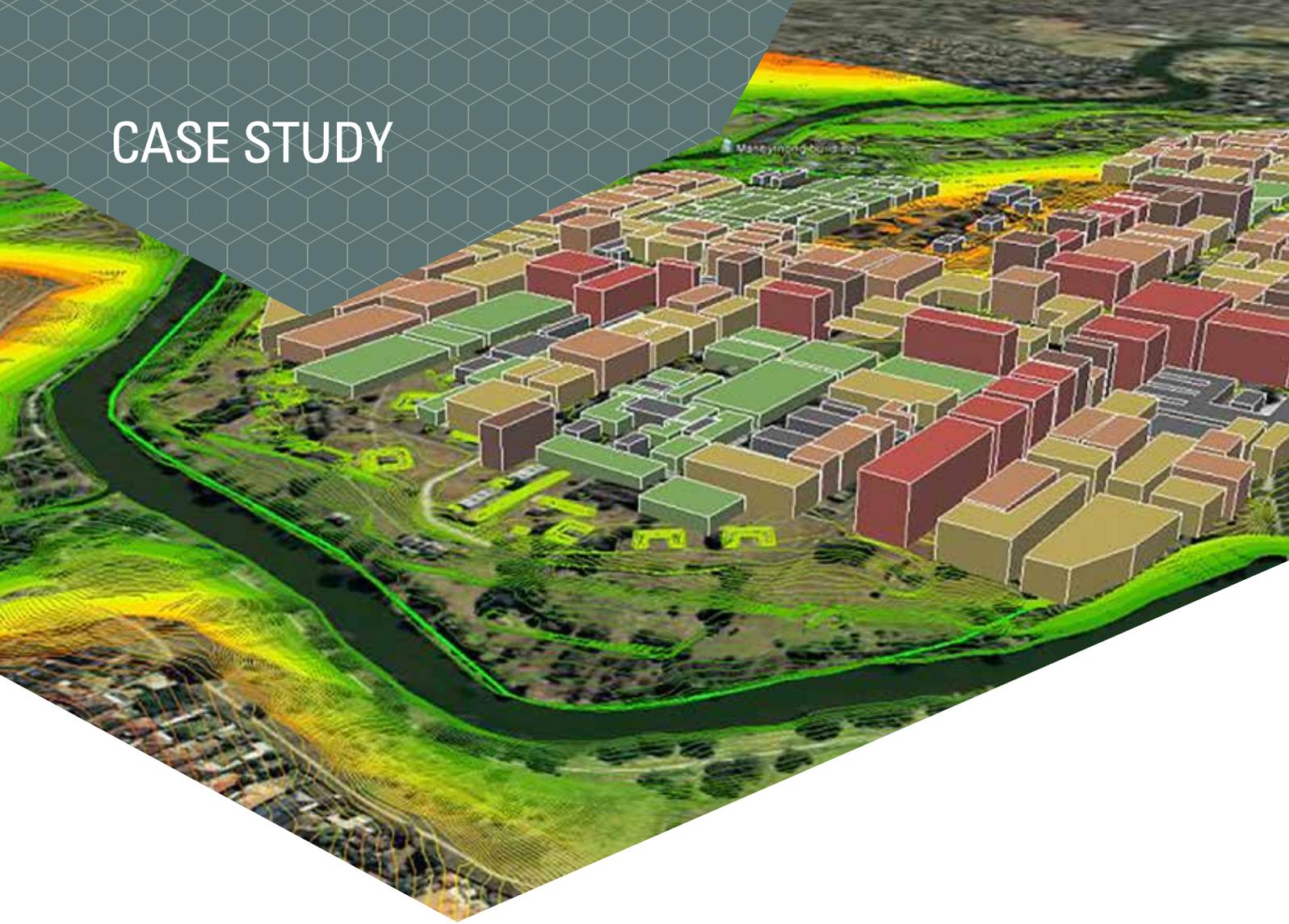
"Yes, we are delivering expertise to China, but we are also learning an enormous amount given the scale and complexities of urbanisation in China, where infrastructural, environmental, social and economic issues are amplified."

“WE DEVELOPED A MASTERPLAN AROUND SELF-SUSTAINABILITY, WATER HARVESTING, RECYCLING, LOW-IMPACT CONSTRUCTION AND MASS OFF-SITE CUSTOMISATION OF BUILDING ELEMENTS.”

Associate Professor Rosalea Monacella, School of Architecture and Design, RMIT University



CASE STUDY

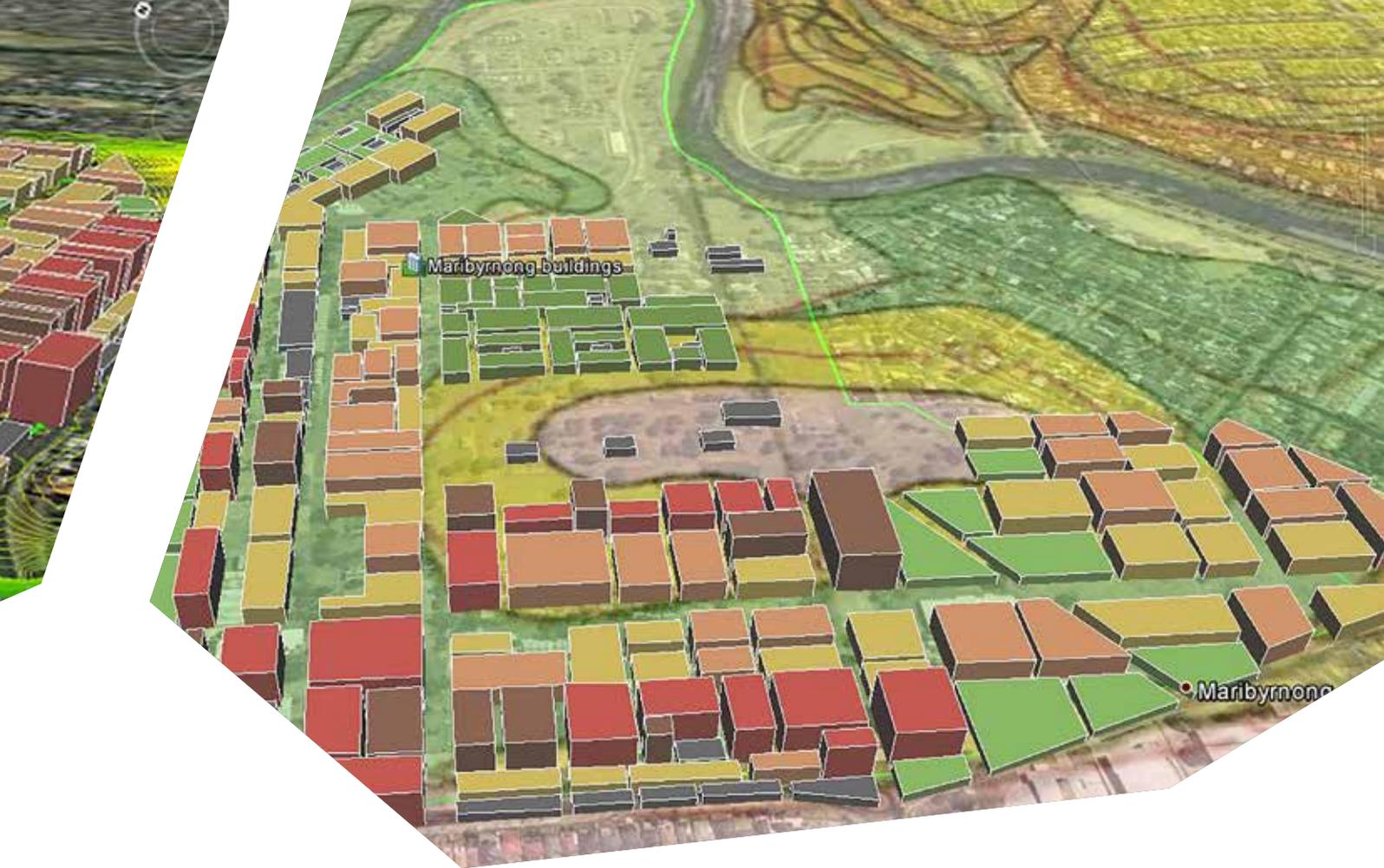


MUTOPIA CAN ASSESS THE SUSTAINABILITY PERFORMANCE OF AN URBAN DESIGN IN FIVE KEY AREAS.

A DESIGN TOOL FOR SUSTAINABLE CITIES

MUtopia, a design tool developed at the University of Melbourne's School of Engineering, allows planners to assess the sustainability performance of an urban design.

In the next 100 years, cities will grow rapidly in size and complexity. Now, more than ever, there is a need to assess the sustainability of engineering constructs before they are built. Ensuring a building is structurally sound or that a water pipeline system will carry a certain load is not enough; new infrastructure and urban developments must be assessed for the sustainability of their design in terms of environmental, social and economic impact.



Until recently, integrated assessment of these impacts within a single system has occurred on an ad-hoc basis.

MUtopia is an urban design modelling and visualisation platform for the assessment of sustainability of urban performance. It displays in 3D the actual appearance of an urban development and can assess the sustainability performance of an urban design in five key areas: water consumption and efficiency, energy use and greenhouse gas emissions, transportation design, waste management and economic outcomes.

The project is run by the School of Engineering's Department of Infrastructure Engineering at the University of Melbourne and supported by the Melbourne Sustainable Society Institute. It operates under the strategic guidance of a world-class team comprised of leading researchers, engineers, economists and urban planners from the University of Melbourne, government agencies and private sector including developers, architects and engineering companies.

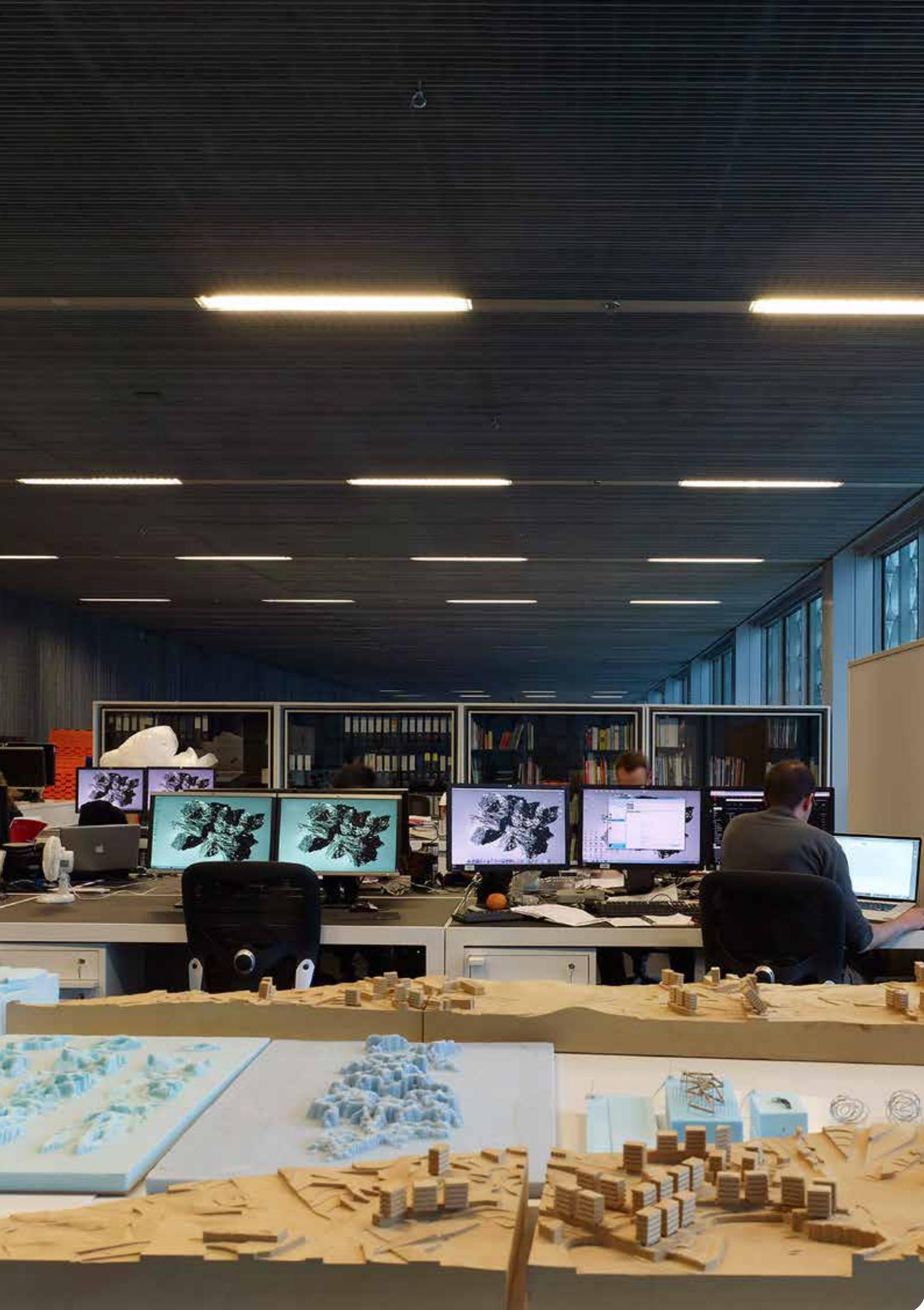
MUtopia allows designers to assess the viability of introducing sustainability measures, as well as ascertaining best practice in areas such as water efficiency, energy efficiency, dwelling and transportation design, construction and maintenance and waste management. MUtopia uses the latest technologies and contemporary engineering theory to enable the sustainability of future constructions to be tested, as well as having the capacity to monitor the sustainability of a site once built.

The MUtopia team has established partnerships with government agencies, local councils, urban planners and engineers to provide practical and well-researched information to the wider community on best practice sustainability in precinct and city developments.

The MUtopia platform has been tested and validated in a number of projects in Melbourne, such as the redevelopment of the Maribyrnong defence site, E-Gate rail yard redevelopment and one of Australia's largest urban renewal projects at Fishermans Bend.

CAPABILITY STATEMENTS







Key areas of expertise

- Urban Design
- Sociocultural Ecology
- Construction Ecology
- Tectonic Ecology
- Advanced Design and Manufacturing
- Sustainable Infrastructure

Research/program delivery capabilities

Deakin University's Schools and research centres offer dynamic learning environments covering local and global contexts with high calibre internationally recognised teams of staff.

The School of Architecture and Built Environment operates an interdisciplinary research program with all staff being active researchers, successful in securing funded research projects and industry-based research consultancies. The School's teaching is both cutting edge and directly linked to professional industry needs with a robust inquiry into urban design, built environment change management and landscape architecture.

The School engages with the emerging built environment's societal challenges of diverse, networked and ecologically fragile environments by developing the creative and professional expertise required to create innovative and sustainable environments.

DEAKIN UNIVERSITY

Deakin University is one of Australia's largest and fastest growing universities, providing learning, teaching and research opportunities across multiple campuses and innovative use of online technologies through Cloud Deakin. World university rankings evidence Deakin's well established reputation for excellent teaching, innovative course delivery, high level student satisfaction and world-class research aligned to industry and community needs.

The Faculty of Science, Engineering and Built Environment, its Schools and associated research areas offer professional expertise and dedicated facilities for innovative and multidisciplinary teaching and research studies linked to urban design and associated infrastructure issues.

Deakin University offers courses at both undergraduate and postgraduate levels, including PhDs.

The School of Engineering offers students experience in project-orientated design-based learning and involvement in programs that are informed and led by the School's own research activities. It works closely with the School of Architecture and Built Environment and associated research centres such as Deakin's Institute for Frontier Materials and the Centre for Intelligent Systems. It has extensive partnerships with industry and is involved in significant collaborative research around sustainable infrastructure, covering smart structures, sustainable energy systems and integrated water management. This group works closely with industry using the latest in design, simulation tools, materials, manufacturing processes and monitoring technology.

Deakin University's forthcoming Centre for Advanced Design in Engineering Training will provide some of the best future-focused engineering and design facilities in the Australian university sector and offer the most advanced engineering and design training capabilities in regional Australia.

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Key areas of expertise

- Building and Construction
- Building Design
- Surveying
- Construction Management and Economics
- Facilities Management
- Carpentry
- Plumbing
- Bricklaying
- Plastering
- Roofing
- Glazing
- Tiling

Research/program delivery capabilities

Holmesglen's model for industry engagement is built on its proven model for forming and sustaining industry alliances in international contexts. Its approach drives innovation through joint partnerships in workforce development, fosters industry-led and validated curriculum design and delivers authentic and structured workplace learning experiences.

Holmesglen's Faculty of Building Construction and Architectural Design has demonstrated experience in customising these programs for offshore trades workers, for example with GMR, a large Indian infrastructure company, and IJM Construction Sdn Bhd, based in Petaling Jaya, Malaysia.

HOLMESGLEN INSTITUTE

Holmesglen is a leader in vocational and higher education and one of the largest providers of technical and vocational education and training in Victoria. Holmesglen delivers over 600 courses to nearly 50,000 students.

Holmesglen has a strong international profile with an extensive global reach built up from over 20 years' experience in the Asia-Pacific, Gulf States and Middle East regions.

Holmesglen's international activities range from working with industry clients, government and aid agencies to build the capacity of institutions, systems and staff in the private and public sectors to collaborative partnerships with education institutions in the delivery of award programs.

The faculty of Building and Construction provides customised delivery of workplace-based training and assessment services to a diverse range of organisations.

Commencing in 2009, Holmesglen worked with GMR India to provide a range of onshore and offshore training (including occupational health and safety and quality practices) in the building and construction area. The project included:

- Customised training to meet Indian industry requirements including development opportunities for traditionally marginalised local workers
- Training for Master Trainers
- Training needs analysis, curriculum design, training facilities and equipment advice, trainer mentoring and assessment moderation.

Holmesglen also provided customised training with IJM Construction to upgrade the knowledge and skills of IJM Construction building supervisors to a level comparable with the relevant skill sets of building supervisors in developed countries.

Holmesglen is also highly experienced in the provision of consultancy services, development and industry projects. Consultancy services include:

- Training needs analysis
- Teacher training
- Professional development for staff and managers
- Curriculum development
- Instructional design – face-to-face, blended and online delivery, work integrated learning
- Advice on facilities and equipment
- Quality assurance services
- Management of scholarship and fellowship programs
- Study tours
- English language training and support.

The Institute has a strong quality assurance framework in place so that clients can be assured of high quality outcomes.

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LA TROBE
UNIVERSITY • AUSTRALIA

Key areas of expertise

- Sustainable Urban Design
- Civil Engineering Materials
- Concrete Structures
- Environmental Engineering
- Environmental Impact Assessment
- Finite Element Analysis
- Geotechnical Engineering
- Hydrology and Water Resources
- Micropalaeontology
- Musical Acoustics
- Physics and Civil Engineering Education
- Properties and Processing of Materials
- Transportation Engineering
- Water/Wastewater Treatment Processes

Research/program delivery capabilities

The Community Planning and Development Program at La Trobe has two unique international collaborations making a substantial contribution to sustainable urban design.

- Research and teaching expertise in designing urban environments for, and with, children. Teaching, research and consulting work in this area is enhanced by research collaborations with universities in Finland, United Kingdom, Japan and Sri Lanka, with developing expansion into China, South Africa and Canada.
- Research and teaching expertise in designing urban environments and shared curriculum and projects with staff and students at the University of Moratuwa in Sri Lanka.

LA TROBE UNIVERSITY

La Trobe University's Sustainable Urban Design research is based on community engagement activities and has strong government and non-government agency links with the planning and urban design, education and parks industries. La Trobe has produced policy assessments and development research reports for metropolitan, regional and rural councils and schools in Victoria, the Child Friendly Cities Network and for schools.

La Trobe's Department of Civil Engineering and Physical Sciences is a multi-disciplinary department with a diverse range of research interests.

The research carried out by the Department of Civil Engineering and Physical Sciences is a mix of theoretical and applied research, and much of the research is tied to the needs of industry. All academic staff are active in research, and the results of their research are disseminated at national and international levels.

While the breadth of research topics is large, much of it falls within the area of sustainable engineering. The Department has partnerships with a wide range of industry sponsors who offer industry-based learning, scholarships, and work experience as part of the degree curriculum. The Department also offers consulting services to a wide range of industries.

Key contact

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MONASH
University

Key areas of expertise

- Advanced Materials Engineering
- Structural Strengthening
- Robotics
- Visualisation and Augmented Reality
- Corrosion and Coatings
- Systems Optimisation
- Energy Technology
- Condition Monitoring and Maintenance
- Water Treatment and Management
- Aerospace Technology
- Rail and Transport Technology
- Aerodynamics (Monash Wind Tunnel facility)
- Integrated Urban Design
- Flexible and Adaptable Housing Designs
- Environmental and Social Sustainable Housing
- Water Sensitive Urban Design
- Urban Architecture
- Design of Public Open Space
- Industrial Design

Research/program delivery capabilities

Monash University has extensive capabilities in civil and structural engineering and works with some of the world's biggest engineering organisations. Expertise includes development of new materials such as metals and alloys and polymer technology such as specialty polymers, composites and nano-composites.

Monash has the largest corrosion research and development group in Australia for the monitoring and mitigation of corrosion of large-scale infrastructure (concrete, pipes, and industrial processes) and the design of novel mitigation protective surfaces on light weight alloys. Along with the Faculty of Information Technology, Monash has developed optimisation and visualisation technologies that can be applied to scheduling and optimising systems.

MONASH UNIVERSITY

Monash University has become the largest university in Australia, renowned for its outstanding teaching, transformative research, international reach and extensive alumni network. Monash is a global university possessing the ambition and ability to address momentous global challenges. Monash has campuses in Australia, Malaysia and South Africa and major partnerships with universities in China, India and the United Kingdom.

Monash has teaching and research capability, in the areas relevant to the infrastructure and construction industries aimed at creating lighter, cheaper and alternative materials for construction, critical infrastructure and transport and telecommunications networks. Monash applies a multidisciplinary approach which involves engineers, architects, designers, economists and educators, leading to the creation of innovative materials and processes.

Monash has extensive capabilities in water treatment and management which include bio-filtration, stormwater harvesting, water sensitive urban design and the use of green infrastructure, water technology design and construction, microclimate assessment, water sanitation management, policy development, economic valuation and modelling, ecosystem services and health, environmental planning and law, and sustainable architecture and landscape design.

Architecture and Industrial Design at Monash undertakes an interdisciplinary and collaborative approach to design for housing and buildings, which includes designs to minimise the footprint of buildings and infrastructure by the efficient and moderate use of materials, energy, and development space; design techniques that increase the ability of a building to capture or generate the building's own energy; incorporating energy efficiency over the entire life cycle of a building; and applying research outcomes to the design of affordable and adaptable housing and the use of low-impact materials.

Key contact

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Key areas of expertise

- Building and Construction
- Building Surveying
- Cabinet Making/Furniture Making
- Construction Pathways and Engineering Design
- Interior Decoration (including Retail Services)
- Interior Design and Decoration

Research/program delivery capabilities

NMIT has state-of-the-art facilities for all study areas, and a long-time presence within the industry, with strong links to associations, employers and suppliers. Dedicated industry-experienced teachers guide and mentor students through the courses.

Pathways and articulation to higher qualifications include a bachelor degree course due to start in 2014.

NMIT cooperates with one of China's top 100 vocational colleges to deliver the Diploma of Building and Construction Management. This program has operated for more than eight years. Graduates from this program are finding excellent career opportunities in China and abroad.

New partnerships in training for building design and management are being established with other colleges across China.

NMIT

NMIT's Faculty of Building and Construction provides flexible training and consultancy in most areas of the building industry. NMIT trains in all necessary knowledge required for builders and managers of small to medium building businesses. Programs include skills in project management and the construction of medium-rise building projects. Graduates are prepared to move into project planning and management in the areas of residential, industrial and commercial building.

Key contact

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Key areas of expertise

College of Design and Social Context

- Architecture
- Construction Management and Building
- Interior Design
- Landscape Architecture
- Project Management
- Property and Valuation
- Planning
- Public Art

College of Science, Engineering and Health

- Building and Construction
- Civil Engineering
- Civil Operations
- Environmental Engineering
- Property Services
- Spatial Information Services and Surveying
- Surveying and Geospatial Science

Research/program delivery capabilities

The College of Design and Social Context researches many aspects of Infrastructure and Urban Design, with research focused on: architecture and design, including narrative architecture; sound; spatial information; architecture; urban transformation; art, including art in public space; and property, construction and project management, including occupational health and safety, sustainability and the built environment.

The College of Science, Engineering and Health's research strengths in this area are civil engineering, environmental and natural resources engineering, and chemical engineering.

RMIT's Global Cities Research Institute focuses its research on the questions of resilience, security, sustainability, and adaptation in the face of the processes of globalisation and global climate change for Global Cities. The Climate Change Adaptation Program focuses on how cities and communities might best respond to the complexity of global environmental change.

RMIT UNIVERSITY

RMIT University is a global university of technology and design with campuses in Australia and Vietnam and international partners worldwide.

Internationally recognised for its architecture, art, design, engineering, infrastructure, urban planning and urban studies and research, the University has extensive research expertise related to these areas.

RMIT's Design Research Institute seeks solutions to urban challenges and identifies options through the development and funding of a transdisciplinary approach to collaborative, project-based, design research at the interface of education, research and industry. Five international Professors of Design, including one in Urbanism, have been appointed to further strengthen RMIT's leadership in design.

The Design Hub brings together progressive design academics, industry practitioners and postgraduate researchers within a cross-disciplinary and collaborative urban environment – the first of its kind in Australia.

Other relevant RMIT Centres and Groups include:

- Centre for Design
- Art, Cities and Transformation Group
- Centre for Construction Work Health and Safety Research
- Sustainable Building Innovation Lab
- Centre for Innovative Structures and Materials
- Rheology and Materials Processing Centre
- Water: Effective Technologies and Tools Research Centre

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Key areas of expertise

- Building and Construction
- Electrotechnology
- Plumbing and Gas
- Hand skills and knowledge across a range of trade-based industries
- Occupational Health and Safety Training

Research/program delivery capabilities

South West TAFE delivers highly recognised industry courses and provides students with state-of-the-art equipment in its purpose-built Sherwood Park training facility and the Warrnambool campus.

South West TAFE's teachers have industry experience and links with business networks which provide students with practical training and experience. The Institute is a preferred provider to various trade-based operations.

South West TAFE's international offerings include short courses and certificate level training. South West has fostered close links with various industries to ensure the direction and delivery of its teaching complies with current and future industry requirements.

During the past 20 years South West TAFE has worked in China, Malaysia, Fiji, Samoa and the Philippines to deliver a diverse range of courses.

SOUTH WEST TAFE

South West TAFE has a long history of providing vocational education and training for the building and construction industries domestically and internationally. It specialises in providing students with skills in building, cabinet making, carpentry, plumbing and electrotechnology.

South West TAFE is a multi-campus institute located in south-west Victoria and is the largest provider of vocational education and training in the region, with approximately 14,000 enrolments annually. It has provided industry recognised training solutions including customised skill-based and nationally-accredited and non-accredited training for more than 150 years.

South West TAFE has provided quality service and delivery of offshore programs since 1994. A range of flexible delivery models ensures students can access services wherever they are based worldwide.

South West TAFE has secured a number of international agreements with companies including Woolworths, GlaxoSmithKline and Alcoa to develop and deliver diverse learning opportunities abroad.

Its experienced staff provide effective responses to international delivery requirements and ensure clients' needs are met with culturally appropriate communication strategies.

The Institute has recently partnered with Metro Trains Melbourne for the workplace delivery of workforce training in the Certificate IV in Transport and Logistics (Rail Operations) and the Certificate IV in Engineering.

The in-house model effectively allows the students to mature into skills whilst learning from mentors in facilitated and supported situations aimed at improving business performance, highlighting continued efficiency developments and promoting services standards to clients.

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Key areas of expertise

- Design Innovation
- Greyfields Regeneration
- The Green Economy
- Hybrid Building
- New Urban Technologies
- Retrofitting Suburbia
- State of Environment Reporting
- Sustainable Consumption
- Sustainable Urban Development

Research/program delivery capabilities

The Sustainable Cities research and teaching program at the Swinburne Institute for Social Research comprises researchers who work across disciplines to investigate issues of contemporary relevance to cities. There are three main themes: the built environment, housing and place, and homelessness.

The Swinburne partnership with the Sustainable Built Environment National Research Centre focuses on people, processes and procurement to deliver improved social outcomes for built environment workers and the Australian community through increased uptake of sustainable practices and minimisation of environmental health and safety risks.

SWINBURNE UNIVERSITY OF TECHNOLOGY

Swinburne is an internationally recognised research-intensive university. Swinburne's emphasis is on high quality, engaged teaching and research in science, technology and innovation – teaching and research that makes a difference in the lives of individuals and contributes to national economic and social objectives.

In 2014 Swinburne's new A\$100 million Advanced Manufacturing and Design Centre opens. The centre will provide a purpose-built teaching and learning environment for engineering, design, business and information technology students.

The Swinburne Institute for Social Research's Sustainable Cities multidisciplinary research and teaching program is designed to provide policymakers, industry and the community with the knowledge and skills in social innovation to meet this challenge.

In 2013, Swinburne was ranked in the top 200 in the field of sociology by the QS World University Rankings by Subject.

Industry and organisational links:

- Australian Housing and Urban Research Institute
- Cooperative Research Centre for Spatial Information
- Low Carbon Living Cooperative Research Centre
- Sustainable Built Environment National Research Centre.

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Key areas of expertise

- Digital design technologies
- Efficient buildings
- Infrastructure integrity
- Low-carbon future
- Managing global practice
- Materials for sustainability
- Mitigation of climate change and natural disasters
- Municipal architecture
- Network-centric systems
- Planning for the participation of children, the homeless, indigenous communities and developing countries
- Prefabrication
- Smart cities and transport networks
- Spatially enabled infrastructure
- Urban intensification
- Use of space

Research/program delivery capabilities

The University of Melbourne's Faculty of Architecture Building and Planning maintains an international reputation for excellence in research and research training and its research cuts across disciplinary boundaries. University of Melbourne is actively engaged in collaborations and partnerships locally and globally, to produce research that responds to major social, economic and environmental challenges of national and international importance, as well as fundamental research into the built environment in Australia and the Asian region. Its researchers address key areas of inquiry, such as sustainability, population growth, the history of the built environment, mitigation of natural disasters, professional practice, design and construction research, and lead debate in these areas.

UNIVERSITY OF MELBOURNE

The University of Melbourne is a public-spirited institution that makes distinctive contributions to society in research, learning and teaching, and engagement.

Ranked number one in Australia and 34 in the world for the quality of its research, the University of Melbourne harnesses interdisciplinary research to solve some of the most difficult problems facing our world.

Research across infrastructure and urban design is both discipline-focused and multidisciplinary in nature and the University of Melbourne collaborates with universities, governments, industry and communities worldwide to further developments cooperatively.

Students interested in careers in infrastructure and urban design may undertake relevant Bachelor, Masters level and research degrees across the environments, commerce, the sciences and engineering.

MUtopia – Sustainable Cities

The Department of Infrastructure Engineering at the University of Melbourne has developed a design tool – MUtopia – for sustainable cities made up of an integrated visualisation and simulation platform, which displays in 3D the appearance of an urban development and quantifies the performance of key sustainability metrics at different scales. Urban designers can assess the viability of introducing sustainability measures, as well as ascertaining best practice in areas such as water efficiency, energy efficiency, dwelling and transportation design, construction and maintenance, and waste management.

Cool Roofs Project

The Cool Roofs project, run by researchers from the University of Melbourne, looked at reducing the urban heat island effect through the use of high Albedo roofing colours and green roofs to help keep buildings cool. A series of portable buildings with sensors that measure thermal loads and transfer of heat under different roofing systems were constructed. The difference in reflection from each roof was then measured. Results are directing future design efforts towards environmentally and economically sustainable practices. The project was funded by the City of Melbourne and the Nursery Growers Industry association, with in-kind contributions from EPA Coatings – Durabond, Sky Cool, Thermoshield, and DULUX.

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Key areas of expertise

- Architectural Engineering
- Building Surveying
- Structural Mechanics and Materials
- Fire Safety and Risk Engineering
- Telecommunications, Electronics, Photonics and Sensors

Research/program delivery capabilities

Victoria University's College of Engineering and Science has a dynamic research culture that is internationally recognised. In the **2012 Excellence in Research for Australia (ERA) rankings**, Victoria University achieved outcomes:

- **well above world standard in electrical and electronic engineering** (including research into control systems and signal and image processing)
- **above world standard in applied mathematics**
- **at world standard in civil engineering.**

The College collaborates with industry partners in research and development, and academic staff have conducted research with organisations such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO), SSL, COMALCO, Olex and Holden.

VICTORIA UNIVERSITY

Victoria University was established as a university in 1990, but its predecessor institutions date back to 1916. Today, more than 51,000 students are enrolled at Victoria University, including more than 4,000 international students studying at our Melbourne campuses and 9,000 studying at offshore partner institutions.

Victoria University's College of Engineering and Science undertakes research with a focus on developing innovative technologies with direct application to industry and the community.

Courses related to infrastructure and urban design range from certificates and diplomas to bachelor degrees, graduate certificates, masters and PhDs. Engineers Australia and other professional engineering bodies have accredited all of Victoria University's Bachelor of Engineering courses. Victoria University delivers one of only two accredited architectural engineering programs in Australia.

Structural mechanics and materials

research includes investigating alternative aspects of designing and assessing structures using dynamic analysis techniques, simulated blasting techniques and fire modelling. Investigations also include structural health monitoring of existing structures.

Victoria University's **Centre for Environmental Safety and Risk Engineering** is one of only two educational centres in Australia that offers postgraduate courses in Performance-Based Building and Fire Codes, and Building Fire Safety and Risk Engineering. Its Large Scale Experimental Building-Fire Facility conducts research for the petrochemical industry and organisations such as Ports and Harbours which store large amounts of oil and flammable liquids.

In the **telecommunications, electronics, photonics and sensor** areas, research ranges across wireless systems, including radio system design, air interfaces and radio architectures; the design of new integrated circuits for solving instrumentation problems and providing more efficient and effective signal processing; and optical fibre sensors and materials, optical fibre lasers and optical amplifiers, and imaging of photonic devices.

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