Thank you to our Industry Partners and Supporters:

Gary Johnston

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THE BIG PICTURE

www.civeng.unsw.edu.au

Our mission is to develop well educated graduates with the essential skills, attributes and knowledge that will enable them to practise as exceptional professional civil and environmental engineers; and to conduct research and development of international distinction to meet the needs of the discipline, industry and society.
About Us

The School of Civil & Environmental Engineering is the largest and most successful School of its kind in Australasia and is ranked 17th best in the world (QS World University Rankings 2012).

We are the largest School in the UNSW Faculty of Engineering, itself the pre-eminent centre for engineering studies and research in Australia, and the first University of choice for NSW’s top students.

From our foundation in 1949, the School has pursued excellence and innovation in education and research. Our alumni are to be found as leaders and decision makers in industry, government and the community. With over two thousand current students, we play a leading role in the delivery of undergraduate and postgraduate degree programs - with a focus on sustainability as well as core engineering knowledge, preparing our students to confidently face the challenges of contemporary global society. We believe that civil and environmental engineers are uniquely placed to understand, meet and solve those challenges.

We are at the forefront of fundamental and applied research across the breadth of civil and environmental engineering with three internationally acclaimed research centres – in infrastructure (CIES), water (WRC) and transport (rCITI). Our academic staff are recognised world leaders in their fields, supported by 70 full time researchers. Each year we work with or on behalf of over 100 industry and government organisations on specific industry related projects and have won millions of dollars in federal funds in order to pursue investigations into issues of national importance.

We continue to forge new links with industry and community partners to ensure a continuing real-world focus for both our teaching and our research.

School Statistics 2012

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>Academic Staff</td>
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<tr>
<td>Professional &amp; Technical Staff (School)</td>
<td>24</td>
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<td>Research Centre Academic Staff</td>
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</tr>
<tr>
<td>Postgraduate Research Students</td>
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<tr>
<td>Postgraduate Coursework Students</td>
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<tr>
<td>Undergraduates</td>
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<tr>
<td>Equivalent Full-time Students (EFTSU)</td>
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<tr>
<td>Doctoral Graduates</td>
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<td>Research Publications Refereed</td>
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<tr>
<td>Recurrent Income</td>
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</table>
The School has never been in such a strong position across all aspects of teaching, research, profile and finances and, under Scientia Professor David Waite's leadership, the year 2012 was again a year of significant growth. As we move to the future, it is important that we acknowledge the work and tireless contribution of David to the School during his six year tenure as our Head of School.

The School’s focus remains firmly directed to its core business of excellence in teaching and excellence in research. By any measurement, whether it be teaching accolades, testimonials or rankings, or research grants, papers and higher degree student completions, 2012 will be marked as a year of great success. As you read through this report you may note that in the QS World University Rankings, we rank 17th in the world … an accomplishment of which we are duly proud but also one that recognises the hard work, efforts and expertise of our staff. Our challenges for the coming years are to raise the School profile even further, to further develop our collaborations locally, nationally and internationally and to look for opportunities wherever they exist.

Some statistics of note that you will find in this 2012 annual report are: (i) the School managed a recurrent income of $13 million and $15 million of research income; (ii) our researchers published 3 books, 9 book chapters, 241 refereed journal papers and 115 refereed conference papers; (iii) we had 124 higher degree research (HDR) students and graduated 14. Our successes as a team in attracting competitive monies, in publishing our works and in HDR student supervision are self-evident. Less visible, however, are the many and major contributions and impacts of our research on the profession – from our work on national and international Standards to representation on national and international industry advisory bodies. In many ways it is this work that has the most lasting impact on our profession.

While all our achievements over the year are too many to list in this brief introduction, they derive from significant efforts by a great many dedicated staff and students. This report contains just a few of our activities and outputs for the year, I thank all of the staff for their tremendous and on-going support. Without their efforts and their dedication, the School would not be the success that it is.

PROFESSOR STEPHEN FOSTER
1 May 2013
The School Management Group

The School Management Group represents the peak decision-making body in the School with all key decisions relating to finances, staffing and overall direction debated and ratified by this group. The SMG is chaired by the Head of School and is made up of the Chairs of the School’s major committees, the Directors of UNSW Centres based within the School, the Associate Head (Academic) and the School’s Senior Administrative Officer.

The School Management Group provides a forum for discussion of all aspects of School life and, with the Head of School, charts the future direction of the School.

School Structure

The School is managed by the Head of School, assisted by the School Management Group and by various other management committees as listed. Each committee has a Director who reports to the Head of School.
Highlights 2012

Australian Research Council (ARC) Discovery Project and ARC Linkage Infrastructure, Equipment and Facilities (LIEF) grants were announced in November 2012. The School was successful in obtaining 3 Discovery Project grants to the value of $1M and 1 LIEF (Linkage Infrastructure, Equipment and Facilities) grant for $390K. This is good news for the School especially considering how competitive these grants are, with a success rate of just 21% across the country in the Discovery category.

The ARC Discovery Projects were won by Prof Ian Gilbert; Prof Nasser Khalili and Dr GaoFeng Zhao; and Prof Chongmin Song, Dr Wei Gao and Prof Yong-Lin Pi. The LIEF Grant was won by Prof Travis Waller and Dr Vinayak Dixit, working with Prof Michiel Bliemer (USyd) and Prof Dennis Del Favero (iCinema).

In addition School researchers Prof Mark Bradford, Prof Nasser Khalili, Dr Xiaojing (Jean) Li and A/Prof Mathew McCabe are partners in four other successful grants working with other Schools and/or universities, while Dr Adrian Russell, Prof Nasser Khalili and Dr Hossein Taiebat were UNSW Goldstar Award winners.

Full details are in Our Research p 31.

Discovery Grants
Visit of the NSW Minister for Transport, The Hon. Gladys Berejiklian

The NSW Minister for Transport, The Hon. Gladys Berejiklian visited the School of Civil and Environmental Engineering in March for a presentation about the Research Centre for Integrated Transport Innovation (rCITI). Professor Travis Waller’s overview of rCITI was followed by discussion with the Minister. Attendees at the Minister’s visit included delegates from UNSW such as Professor Graham Davies (Dean, Faculty of Engineering), Professor Les Field (Deputy Vice-Chancellor, Research), Professor T. David Waite (HoS, Civil and Environmental Engineering), and Professor Nasser Khalili (Associate Dean, Research), as well as representatives from Evans & Peck (Mr Ian McIntyre and Mr Paul Forward, Principals) and NICTA (Mr Rob Fitzpatrick, Director, Infrastructure, Transport & Logistics).

Ms Berejiklian was pleased with the university’s efforts and the creation of a Transportation Research Centre and is looking forward to opportunities for cooperation. During her visit, Ms Berejiklian appointed Professor Waller an invited member to the Transport Specialist Advisory Group for Transport for NSW.
CIES – Leading research in innovative and advanced building systems

CIES Director of Research and Founding Director Scientia Professor Mark Bradford is leading research in the areas of innovative and advanced building systems. A research project entitled “An innovative and advanced systems approach for full life-cycle, low-emissions composite and hybrid building infrastructure” is funded by the Australian Research Council through a prestigious Laureate Fellowship awarded to Professor Bradford.

The topic is of high relevance in contemporary engineering practice and provides a very timely solution to a major contemporary engineering challenge facing Australia. This project is developing a ‘green’ sustainable composite steel-concrete building frame system that reduces greenhouse gas emissions throughout the life-cycle of building construction, usage, maintenance and deconstruction. It will reduce the use of ordinary Portland cement, which is a major carbon dioxide producer, by using geopolymer concrete made from fly-ash, and will use economic thin-walled, high-strength steel sections.

High-strength steel and reduced slab sizes not only result in less material usage for the building itself, but they reduce the size of the footings needed to support the structure. Deconstructability also forms part of the research, which will also consider bolted beam to column joints which can be deconstructed, and using steel hollow section columns as a strength-enhancing repository for concrete made from recycled aggregates.

Keynote speaker Professor David Carmichael noted that companies are increasingly acknowledging the importance of sustainability, both from a global viewpoint and more narrowly in terms of company existence and growth. More companies are promoting their sustainable activities to stakeholders, and industry leaders can be distinguished from the laggards. ‘Still, there is a very long way to go’ he said, ‘and a lot to be done in developing sustainable practices fully and embodying sustainability as standard company ethos. Some legislation may be necessary to speed up the conversion, but sustainability, corporate social responsibility, and triple bottom line reporting will continue to rise in prominence within the construction industry within the coming years.'
In October 2012 the School’s Centre for Infrastructure, Engineering and Safety (CIES) held a Symposium on “Sustainability in Civil Infrastructure: Design, Construction and Resilience” with an impressive line up of international and national leaders in the field of Sustainable Infrastructure research and practice.

Speakers included: Em Prof David Nethercot (Imperial College, London), Prof Jin-Guang Teng (Hong Kong Polytechnic University), A/Prof Daksh Baweja (UTS), Scientia Professor Mark Bradford (CIES-UNSW), Prof Stephen Foster, Prof Röb Melchers (Newcastle), Prof Michael Neuman (FBE, UNSW), Prof Brian Uy (UWS), Prof S. Travis Waller (rCITI-UNSW), Prof John Wilson (Swinburne).

Em Prof R Ian Gilbert (pictured) facilitated a vibrant discussion on the sustainability of Australian infrastructure.

Topics explored at the symposium included design safety, sustaining ageing infrastructure, sustainable design and construction, new materials and technologies for concrete, timber, and steel; recyclable and demountable structures, innovative methodologies of large scale transport systems, and discussions on the concept and measurement of sustainability itself.

On offer to industry participants as well as academic colleagues was the opportunity to review trends in infrastructure sustainability - to keep abreast of current and future developments; as well as to network with leading researchers and professionals with opportunities for collaboration on future research projects. More details on page 86.

The hydroclimatology research group within the School of Civil and Environmental Engineering is engaged in cutting edge research across a range of multi-disciplinary fields on hydrology and its interactions with our changing climate. The group has specializations in climatology, stochastic hydrology, remote sensing, ecohydrology, coupled system modelling and field based observational techniques, and many other areas of expertise. The group has championed the assessment and response to the implication of climate change on hydrology in Australia, especially those related to the estimation of design for floods under changed climatic conditions, and the design and management of water supply storages in a warmer climate.

The group consists of four academic members (Sharma, McCabe, Mariethoz and Johnson), a total of three ARC Future Fellows - the most in any single group in the discipline in Australia, several other Research Fellows, and close to 20 PhD students - all funded through a range of grants from the Australian Research Council, Engineers Australia (in relation to the Australian Rainfall and Runoff revision project), and other competitive and invited industry research grants.
Engineering in Climate Change Adaptation

During 2012, WRL was commissioned to assess the coastal adaptation needs for extreme events and climate change of the Cook Islands. The focus of this investigation is Avarua in Rarotonga - the administrative, economic and tourism hub of the Cook Islands. Late in 2012, Project Engineers Matt Blacka and Duncan Rayner travelled to the Cook Islands to undertake a detailed topographic survey of the Avarua area and neighbouring villages, with a specific focus on the coast and the fringing lagoon system - regions that are difficult to capture using conventional or airborne techniques. They were assisted by local engineer Ben Parakotis.

In a seven day surveying campaign, RTK-GPS surveying equipment was used to survey land levels throughout the study area, as well as measuring bathymetric levels throughout the fringing lagoon. An area of approximately 3 km² was covered by the survey, with 25,000 topographical points measured over a linear distance of 85 km.

The data from the surveying campaign is vital in order to undertake physical and numerical wave process modelling for the area, as well as for mapping hazards to houses and infrastructure from wave impact and inundation during extreme cyclone events. Later stages of the project will see future adaptation strategies canvassed in conjunction with relevant stakeholders, with conceptual designs for the most suitable strategies developed.

WRL are undertaking this project for Climate Change Cook Islands, with funding provided by the Australian Government Department of Climate Change and Energy Efficiency, under the Pacific Adaptation Strategy Assistance Program (PASAP).

WRL Senior Coastal Engineer Matt Blacka undertaking survey of lagoon bathymetry.
MEngSc for Leighton

In 2012 the School continued its delivery of a specialized Master of Engineering Science in Project Management specifically designed for Leighton Holdings. Eighty staff from the Leighton group of companies including John Holland, Habtoor, Leighton Asia, Leighton Contractors and Thiess were enrolled in 2012 and by the end of the year nine graduates had successfully completed this groundbreaking MEngSc. The School congratulates Nicola Abrahams, William Holden, Patrick Kwong, Brett Lumsdaine, Steve Merange, Mark Norris, Brett O’Leary, Paul Steendyk and Jordan Tomasel on their significant achievement.

The MEngSc was established in 2009 when Leighton identified a need for targeted postgraduate education to develop the management skills of its professional staff, and in particular the need for a corporately identified postgraduate degree programme in project management.

The MEngSc provides Leighton staff with technical knowledge such as contracts, cost planning, design management, safety, tendering and estimating as well as developing their professional skills such as leadership and team building, negotiation skills and people management.

The program is taught by distance methods, with the School providing hard copy notes and facilitating online teaching and learning discussions. The Leighton Coordinator Janette Stewart also organises an important residential week for each cohort of students, at which senior CVEN academics and Leighton staff from across the companies impart their knowledge, expertise and experience to students.
Prizes and Awards

John Connell Gold Medal awarded to Scientia Professor Mark Bradford

CIES Director of Research and Founding Director, Scientia Professor Mark Bradford, was awarded the John Connell Gold Medal by Engineers Australia’s Structural College for 2012. The John Connell Gold Medal is awarded annually to an eminently structural engineer who has made a significant contribution to the standing and prestige of the structural engineering profession.

Dr Michael Man, a Research Fellow in the School’s Centre for Infrastructure Engineering and Safety (CIES) was awarded the prestigious Mike Crisfield Prize at the 20th Annual Conference on Computational Mechanics (ACME) in Manchester, UK 2012. Michael’s research interests are in computational mechanics, scaled boundary finite element method, material modelling using artificial neural networks, and advanced composite materials and his prizewinning paper ‘A semi-analytical technique for plate bending analysis with Padé expansion’ involves work undertaken with CIES colleagues Chongmin Song, Wei Gao and Francis Tin-Loi.

Congratulations to lecturer Dr GaoFeng Zhao – who won a 2013 ARC Discovery Early Careers Researcher award (DECRA) for his work in the area of ‘Dynamic fracturing in shale rock through coupled continuum-discontinuum modelling.’

Dr Rita Henderson, Senior Research Associate at the School’s Water Research Centre won a prestigious 2012 NSW
Young Tall Poppy Award for her work on water quality and treatment. These highly sought after awards, presented by the Australian Institute of Policy and Science, recognise early career researchers who excel in their field and are actively engaged in community outreach and education. Rita’s research interests lie in the field of drinking and recycled water treatment where her area of expertise is in the characterisation, treatment and monitoring of algae and organic matter (OM), working to ensure that contaminants are safely removed from our drinking water supply.

**Dr Richard Collins**, a Senior Research Fellow and an ARC Future Fellow was awarded a 2012 Fulbright Scholarship in Nuclear Science and Technology sponsored by the Australian Nuclear Science and Technology Organisation (ANSTO). As a result Richard undertook research at the Pacific Northwest National Laboratory in Washington State, at the US Department of Energy. He uses computational modelling to improve the efficiency of acid leaching processes, which are becoming increasingly used as a way of maximising the extraction of uranium from the waste of low-grade uranium mines.

**Associate Professor Bill Peirson** was awarded a UNSW ARC Postgraduate Council Award for Excellence in Postgraduate Research Supervision. The ceremony was held on 22nd November 2012 at the ASB Business Lounge. A/Prof Peirson received the prestigious award in recognition of his exemplary supervisory conduct and invaluable contributions to the supervision of higher degree research candidates. The award was endorsed by not only the ARC Postgraduate Council but also the Dean of Graduate Research, Professor Laura Poole-Warren.

The **Head of School, Scientia Professor T David Waite** was presented with the 2012 UNSW Staff Excellence Award for Excellence in Senior Leadership by the Vice-Chancellor, Professor Fred Hilmer AO in December 2012. Since 2007 David led the School through an extraordinary period of growth and expansion, in undergraduate and research student enrolments, in research publications and income. He inspired a hardworking School team with his own dynamic creativity and commitment.

**DOUBLE WINNERS**: At the end of 2012 the School’s **External Relations Committee** won both the 2012 Faculty of Engineering Professional Staff Excellence Award for outstanding achievements and the 2012 UNSW Staff Excellence Award (group) for Excellence in Community Engagement. In his nomination, the HoS noted that ‘the strategic objectives of the External Relations Committee (ERC) include the development of effective outreach and marketing programs, and the building and maintenance of mutually beneficial relationships with industry partners and supporters, ex-staff and alumni. The ERC have been dedicated, motivated, highly professional, enthusiastic and endlessly creative in carrying out these objectives and, indeed, in expanding and exceeding them.’
The CEVSOC First Year camp is a student initiative supported by the School. It offers our first year students a chance for closer engagement and connection with one another, with Year 3 and Year 4 students, and with the School.

In 2012, the first year of the camp, 70 students took part in a two night camp held at Wombaroo Outdoor Adventure Centre – with various activities, including engineering challenges, trivia quizzes, sport, scavenger hunt and team building exercises.

yes that’s right... we have a storm trooper... making CVEN the coolest school on campus.

who says only accountants can play with money...
SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING ANNUAL REPORT 2012

OUR PEOPLE

Yes, that’s right... we have a storm trooper... making CVEN the coolest school on campus.
Welcome to new staff 2012

**Dr Ali Akbarnezhad** – BE (Amirkbar, Tehran), PhD (NUS) - has joined the engineering construction and management group as a lecturer in project management and sustainability in construction. Before joining UNSW, he was a Research Fellow in the Department of Civil Engineering, National University of Singapore, where he worked on a number of research projects on sustainable design and construction in collaboration with the Housing and Development Board of Singapore. His research interests include Sustainability Assessment, Design for Sustainability, Information Modelling, Prefabrication, Microwave-Assisted Concrete Technology and Microwave NDT Tests.

**Associate Professor Arnaud Castel** – BE, MEngSc, PhD Toulouse - joined the School from the University of Nice-Sophia Antipolis (UNS) in September 2012 bringing with him his internationally recognized expertise in the areas of concrete technology and concrete structures. Arnaud is an expert in the durability of concrete structures in aggressive environments, life cycle assessment and sustainability of structures, and his appointment will greatly enhance the capability of the School and CIES in the development of solutions to the provision of durable and sustainable infrastructure in Australia.

**Dr Fiona Johnson** – BE, PhD UNSW - joined the water engineering group in September, coming to the School from the Australian Bureau of Meteorology, where she was involved in the revision of Intensity-Frequency-Duration (IFD) data for Australia as part of Australian Rainfall and Runoff. Her teaching areas are hydrology, water resources and environmental engineering. Fiona’s research interests are in statistical hydrology and modelling. She is particularly interested in climate change impacts on water resources systems and the resulting implications for engineering design and developing methods to evaluate and correct the simulations from climate models.

**Hugh McMullen** is the new Health & Safety Implementation and Facilities Officer, a new position created by the School to manage the huge increase in student usage of labs and facilities as our enrolments have soared. Hugh came to the School from Noel Arnold & Associates Risk Management consultancy.

**Dr Hamid Valipour** – BE, MEngSc, PhD UNSW – came from UTS to join the structural engineering group as a senior lecturer. His teaching areas include engineering mechanics and mechanics of solids, steel and reinforced concrete design, and bridge design. His research areas involve behaviour modelling of structural components and materials, earthquake engineering, mechanics of materials, as well as non-linear finite element modelling of structures, and 3D finite element modelling of reinforced concrete structures.
Looking ahead for 2013

At the end of 2012 the School welcomed two new appointments for the expanding future.

**Professor Brian Uy** is the new Director of the School’s Centre for Infrastructure Engineering and Safety (CIES), after serving as Professor of Structural Engineering and the Foundation Director of the Institute of Infrastructure Engineering at the University of Western Sydney. Involved in research in steel-concrete composite structures for over 20 years, Brian has co-authored over 500 publications including over 140 journal articles. Much of this research has been underpinned by competitive grant funding from most of the ARC granting schemes and from industry totalling over $22 million Australian dollars.

Currently Professor Uy is Chairman of the Standards Australia Committee BD32 on Composite Structures and a member of BD90 on Bridge Structures which are developing standards on Steel and Composite Structures for buildings and bridges respectively. Brian also serves on the editorial boards of eleven international journals for structural engineering and is Chief Editor (Asia-Pacific) for Steel and Composite Structures. Back at his alma mater where he commenced his undergraduate studies in civil engineering some 25 years ago and where he also served on academic staff from 1999-2004, Brian is looking forward to leading CIES together with its illustrious group of Directors - Professors Bradford, Gilbert, Khalili and Song - to further excellence and growth and hopes his previous academic/industry relationships developed over the last decade at Wollongong and Western Sydney can also help to increase the breadth and diversity of the research and engagement activities within CIES and the School.

**Associate Professor Tommy Weidmann**, a Senior Research Scientist at CSIRO, was appointed to lead the Sustainability Assessment Program in the School. Tommy has long-standing expertise in integrated sustainability assessment and environmental footprint analysis. He develops and applies environmental input-output analysis as part of a holistic concept to life cycle assessment, industrial ecology and sustainable consumption and production research. His main research question is how to achieve human wellbeing without increasing environmental impacts. Tommy has published over 25 peer-reviewed journal articles and is a regular reviewer of articles in more than twenty high-ranking scientific journals.

In 2012 Tommy received the Thomson Reuters Citation Award in Economics. In his previous affiliations with the Stockholm Environment Institute and CSIRO Ecosystem Sciences Tommy coordinated a number of research projects funded by the European Commission and Australian and UK Governments. In particular he led a groundbreaking research project which provided, for the first time, information on the UK’s national carbon footprint.
Acworth, R. Ian
Director, Connected Waters
Institute
Research Interests: Investigation of groundwater dynamics and hydrogeochemical processes in the coastal zone: Development of field instrumentation and analysis methods in groundwater studies; Electrical methods in the investigation of groundwater and salinity: Relationship between Palaeoclimate and dryland salinity.

Akbarnejad, Ali
Lecturer
BE Arminibat, Tehran, PhD NUS

Andersen, Martin
Senior Lecturer
MSc in Engineering, PhD DTU, Denmark
Research Interests: Investigations of physical and geochemical processes at the surface water groundwater interface; groundwater dynamics in the coastal zone; reactive flow and transport modelling; developing methodologies for using heat as a tracer of groundwater flow; karst hydrology.

Attard, Mario
Associate Professor
Associate Head – Academic
Chair, Teaching & Learning Committee
BE PhD MPhil UNSW, MEMA, CEng
Research Interests: Finite Strain Isotropic and Anisotropic Hyperelastic Modelling: Fracture in Concrete and Masonry: Crack Propagation due to Creep: Ductility of High Strength Concrete Columns: Buckling of Sandwich Columns: Lateral Buckling of Thin-Walled Beams.

Baker, Andrew
Professor
BSc PhD Bristol
Research Interests: climatology and paleoclimatology, karst hydrology, organic matter characterisation in engineered and aquatic systems, and fluorescence technologies.

Bernold, Leonhard
Associate Professor
D Phil Eng, NT, Switzerland; PhD Georgia Tech, MBA 14 Ga, USA, MASC

Birk, Carolin
Lecturer
BEng DEng Dresden

Blenkinsopp, Christopher
Lecturer
MEng(Hons) Nottingham, PhD Southampton

Bradford, Mark
ARC Laureate Fellow
UNSW Senior Professor
BSc BE PhD USyd, DSc UNSW, CEng, MSC, FIEAust, MIStructE
Research Interests: Structures subjected to elevated temperatures, curved members, arches, steel structures, composite steel-concrete structures, concrete structures, numerical methods, stability, viscoelastic effects, non-discretisation techniques, design codes, structural retrofit.

Birm, FGS
BSc Leeds, MSc PhD

Castel, Arnaud
Associate Professor
BE, MEngSc, PhD Toulouse

Carmichael, D.G
Professor
BE MEngSc USyd, PhD Cant, CEng, FIEAust, MIStructE
Research Interests: Management, systems applications of optimisation, synthesis: Identification and analysis: Contracts and disputes: Project delivery: Construction operations: Project management and management functional areas including risk, economics, finances, people resources and scope: Construction management: Problem solving and decision making.

Cox, Ron
Associate Professor
Chair, External Relations
BE PhD UNSW, CEng, FIEAust

Davis, Steve
Lecturer
BE PhD UNSW
Research Interests: Stochastic Systems: Evolutionary Programming: Parallel Computing Applications to Civil Engineering

Dixit, Vinayak
Senior Lecturer
MT Institute of Technology, Delhi, PhD University of Central Florida

Douglas, Kurt
Fellow, Chair of Rock Mechanics, Chair External Relations
BE (Hons) USyd, PhD UNSW
My main interests lie in the field of rock mechanics. Predicting strengths of large-scale rock masses (hundreds of meters) continues to be a major challenge. I am attempting to improve our understanding using laboratory tests, field studies and numerical methods. I am also currently involved in an ARC and Industry sponsored project researching erosion of rock spillways and backward erosion of embankment dams.

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Gao, Wei
Senior Lecturer
BE, MEngSc PhD (Xidian, MAA)


Foster, Stephen
Professor
Director, CIES
BE(NSW), MEngSc PhD UNSW, MIE Aust

Research Interests: Structural optimization

Garden, Lauren
Lecturer
BS ArchE, MSc, PhD
University of Texas at Austin

Research Interests: Network modelling for multi-domain integrated systems: congestion pricing models accounting for uncertainty, the role of real-time information and adaptive pricing: Sustainability models integrating transportation and electricity systems: developing network-based optimization models to predict the role of global transport systems in the spread of contagious disease.

Hamed, Ehab
Senior Lecturer
BS, MSc, PhD (Technion)

Research Interests: Viscoelasticity of concrete and composite materials, Creep buckling of concrete domes and shells, Strengthening of concrete and masonry structures with composite materials (FRP), Nonlinear dynamics of concrete structures.

Han, Sangwoon
Lecturer
BEng WCU, MSc HYU, PhD UUC


Johnson, Fiona
Lecturer
BE, PhD UNSW

Research Interests: statistical hydrology and modelling, climate change impacts on water resources systems; bias correction methods that can be applied to climate model simulations; models for design rainfalls and flooding; models for regionalisation of rainfall data; questions on stationarity of large to extreme rainfalls and the impacts of climate change on these events and the resulting implications for engineering design.

Khalili, Nasser
Professor
Associate Dean, Research
BS, Tehr, MSc, Birm, PhD
UNSW


Khan, Stuart
Senior Lecturer
BS (Hon 1) URes, PhD
UNSW, MIE Aust


Khoshghalb, Arman
Lecturer
BEng, MEng, Sharif University of Technology, Tehran, PhD UNSW

Research Interests: large deformation analysis in geomechanics, advanced numerical methods in geomechanics, mechanics of unsaturated soils and coupled analysis of porous media.

Mariethoz, Gregoire
Senior Lecturer
MSc, MAS, PhD University of Neuchatel, Switzerland

Research Interests: geostatistics applied to surface and subsurface problems, uncertainty modelling, stochastic hydrogeology, paleoclimate data analysis, high-order statistics, characterization of complex spatial structures, subsurface flow and transport modelling, inverse problems, hydrology, processing of remote sensing and climatic data, parallel computing.

McCabe, Matthew
Senior Lecturer
BE, PhD Newcastle

Research Interests: Applying remote sensing approaches to improve knowledge of the Earth System, focusing predominantly on water and energy cycles at the land surface, but broadly interested in all applications encompassing terrestrial, atmospheric and oceanic components.

Moore, Stephen
Senior Lecturer
Chair, Teaching and Learning Committee
BE UNSW, MEngSc Adel., CFEng, MIE Aust

Research Interests: Development of environmental material accounting techniques, such as Material Flux Analysis, for regional and corporate environmental management systems; Simulation and decision analysis applied to waste management systems.

Peirson, William
Associate Professor
Co-Director, Water Research Laboratory
Senior Lecturer
BE BSc MEngSc PhD UNSW

Bill is an international expert in Civil and Environmental Engineering fluid mechanics and undertakes specialist research in the fields of coastal engineering, air-sea and air-water interaction and exchange, fluxual hydraulics, estuarine processes and the hydraulics and mechanical behaviour of turbomachines.

Russell, Adrian
Senior Lecturer
Chair, Technical Services
BE, PhD UNSW, PG Cert
Bristol


Song, Chongmin
Professor
Chair, Computing Services
BE ME Tsinghua, DLing Tokyo


Stuetz, Richard
Professor
Co-Director, Water Research Centre
BSc, PhD UNSW


Sharma, Ashish
Professor
ARC Future Fellow
BE Roorkee, MEng IT Delhi, PhD Utah State


Valipour, Hamid
Senior Lecturer
BE, MEngSc, PhD UNSW


Turner, Ian
Associate Professor
BSc (Hons) USyd, MEngSc UNSW, PhD USyd, MIE Aust, MAGU

Research Interests: Modelling of Coastal Engineering and Coastal Management: Innovative coastal measurement and monitoring techniques; Sediment transport at the beachfront; Modelling of coastline variability and change spanning storm, seasonal, annual and decadal timescales; Assessment of coastline adjustment to a changing climate.

Taiebat, Hossein
Senior Lecturer
PhD USyd


Vandebona, Upali
Senior Lecturer
BSc (Eng) Ceylon, MEng AIT, PhD Monash

Research Interests: Transportation network modelling, particularly systems characterized by dynamics, uncertainty and information; large-scale integrated transport optimization and planning. Specific applications or problem domains include Dynamic Traffic Assignment (DTA), routing algorithm development, network equilibrium, stochastic optimization, integrated demand/supply modelling, network design, adaptive equilibrium, system analysis of public-private partnerships, and bi-level optimization of transport networks.

Vrcelj, Zora
Senior Lecturer
BE (Hons 1) W’gong, PhD UNSW

Research Interests: Transportation network modelling, particularly systems characterized by dynamics, uncertainty and information; large-scale integrated transport optimization and planning. Specific applications or problem domains include Dynamic Traffic Assignment (DTA), routing algorithm development, network equilibrium, stochastic optimization, integrated demand/supply modelling, network design, adaptive equilibrium, system analysis of public-private partnerships, and bi-level optimization of transport networks.

Waller, S Travis
Evans & Peck Professor of Transport Innovation
BSc Ohio State, MSc, PhD Northwestern
Dr Nadarajah Gowripalan (Gowrie) – who had been with the School since 1993 - retired in March 2012. Gowrie was an effective and popular teacher, who was awarded the Vice-Chancellors Teaching Excellence Award in 1999. His research interests were in concrete technology and advanced materials technology, but his real passion was cricket. By all reports he was an excellent spin bowler.

In September Dr Sangwon Han, lecturer in engineering construction and management, returned home to Korea for family reasons. Sangwon had taught at the school since 2008 and was very involved in developing stronger international links between construction academics and professionals.

In July 2012 Dr Zora Vrcelj left to take up a new position in Victoria. Her prodigious work for the School in innovative engineering education and her development and introduction - with A/Prof Mario Attard - of the very successful BE Civil with Architecture - made her a wonderful colleague who is very much missed.

We wish Gowrie, Sangwon and Zora all the very best in their new lives.

Silver Celebrations

In 2012 three academic staff members celebrated twenty five years at the School. These are not quite baby photos but clearly they began work at a very early age! Congratulations to David Carmichael, Stephen Foster and Upali Vandebona.

Promotions

Congratulations to Chongmin Song for his well deserved promotion to Professor in 2012. Chongmin’s research is on the development of advanced numerical methods and their application in structural and geotechnical engineering. He is one of the two original developers of the Scaled Boundary Finite-Element Method and has published more than 50 papers in the area of numerical methods, earthquake engineering, structural dynamics and fracture mechanics.

Congratulations to Ehab Hamed for his well deserved promotion to Senior Lecturer in 2012.
### Professional and Technical Staff

#### School Manager
- Karenne Irvine
  - BA UNSW

#### Student Services Manager
- Julijana Baric

#### Administrative Officers
- Flora Fan
  - BA CUHK, BMed HKU, MLib-IM UNSW
- Patricia McLaughlin
- Angela Spano

#### Administrative Assistants
- Les Brown
- Alice Yau

#### Web/IT
- Kate Brown
  - BArch SU, Thalland, MArch UNSW
- Patrick Vuong
  - BIT

#### Professional Officers
- Dr Gautam Chattopadhyay
  - BE PhD Jadavpur, M5 Youngstown
- Paul Gwynne
  - POMP, Sheffield Poly

#### Senior Technical Officers
- Anthony Macken
  - Rudino Salleh
  - William Terry

#### EA to Head of School
- Xiaobo Ni
  - 2012 Web Developer

#### Centre Managers
- Sylvia Brohl
  - BCom Bonn rCITI
- Irene Calaizis
  - BCom UNSW CIES

#### Technical Officers
- Richard Berndt
  - BSc Macq
- Ron Moncay
- Kelvin Chun
  - H Ong BEng MScTech UNSW, Grad Dip NUS

#### ACCARNSI Coordinator
- Tamara Rouse
  - BA UNSW

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  - William Terry

#### Web/IT
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  - BArch SU, Thalland, MArch UNSW
- Patrick Vuong
  - BIT
Research, Adjunct & Visiting Academic Staff

Emeritus Professors
John Andrew Black, BA Manc, MTCP USyd, PhD Bradford, CPEng, FIEAust
Thomas Chapman, BSc Leeds, PhD Southampton, FIEAust
Robin Fell, BE MEngSc Qld, CPEng, FIEAust
Raymond Ian Gilbert, BE PhD UNSW, CPEng, FIEAust
David Pilgrim AM, BE PhD DSc UNSW, CPEng HonFIEAust
Francis Shay Khiet Tin-Loi, BE PhD Monash, CPEng, MIEAust
Somasundaram Valliappan, BE Annam, MS Northeastern, PhD DSc Wales, CPENG FIEAust FASCE FIACM

Senior Research Associate
Shikha Garg, BE IIT Kanpur PhD UNSW

Research Fellows
Huiyong Ban, BE PhD Tsinghua University, China
Taha Hossein Rashidi, BSc MSc, Sharif UT Tehran; PhD, UI Chicago
Atsushi Ikeda, BE Meiji Univ (Japan), ME, PhD Tokyo Tech
David Kellerman, BE PhD UNSW
Sundararajan Natarajan, BE Bharathiar University, India, PhD Cardiff, UK

Vice-Chancellor Postdoctoral Research Fellow
Tongxu Liu, BSc SDU, MSc & PhD GSCAS, China

Research Associates
Christopher Miller, BE BSc UNSW

Post Doctoral Teaching Fellows
Xavier Barthelemy, PhD Paul Sabatier, Toulouse
Samaneh Mohammadi
Ali Khajeh Samani

Visiting Professorial Fellows
Dr Nicholas Ashbolt, BAgSc PhD Tas, MASM
Dr Kourosh Kayvani, BSc Tehran, MEngSc PhD UNSW, MIEAust, CPEng, MIABSE, MIASS
Dr Brian Shackel, BE Sheff., MEngSc PhD UNSW, CPEng FIEAust

Senior Visiting Fellows
Dr Reza Attarnejad, BScMSc U Tehran, PhD UPC Barcelona
Dr Ian Cordery, BE ME PhD UNSW
Dr Mark Davidson, BSc, PhD UCS Swansea
Dr Andrew L Rose, BE BSc PhD UNSW

Visiting Fellows
Dr Bruce Cathers, BE Syd, DipHE Delft, MEngSc UNSW, PhD Manc
Mr Hauke Gravenkamp, Dip Physics, Hamburg
Dr Hironobu Hasegawa, PhD Muronan IT, Japan
Dr Peter Hidas, MCEng Dip TP, PhD Budapest
Dr Atsuko Ikeda, BE Meiji, ME, PhD, Tokyo Institute of Technology
Dr Xiaomin Li, BSc China Ag Uni, PhD, Guangzho Inst of Geochemistry
Dr Dunja Perić, Dipl. Ing U Zagreb, MS, PhD U Colorado
Dr Gregory Peters, BE, PhD Syd
Dr Shan Qiu,
Mr Frank Robert Scharfe
Dr Gareth Edward Swarbrick, BE Adel, PhD UNSW
Centres and Research Staff

**Australian Climate Change Adaptation Research Network for Settlements & Infrastructure (ACCARNSI)**

**Convenor**
Associate Professor Ron Cox

**Coordinator**
Ms Tamara Rouse

**Research Assistants**
Dr Philip Booth
Alicia Begonia
Dr Hazel Rowley

**Centres and Research Engineering and Safety (CIES)**

**Director**
Professor Stephen Foster, BE NSWIT, MEngSc PhD UNSW, MIEAust

**Research Director**
Scienfa Professor Mark Bradford, BSc BE PhD Syd DSc UNSW
FTSE PEng CEng CEng FIEAust FStructE MAICD MASEt MACI

**Deputy Directors**
Emeritus Professor Ian Gilbert, BE PhD UNSW CPEng FIEAust MACI

Professor Nasser Khalili, BSc Teh MSc Birm PhD UNSW

**Centre Manager**
Irene Calaizis, BCom UNSW

**Other Academics**
Professor Yong Lin Pi, BE Tongji ME Wuhan PhD UNSW CPEng MIEAust

Professor Chongmin Song, BE Tsinghua, DEng Tokyo

A/Professor Mario Attard BE PhD MHEd UNSW, MIEAust, CPEng

A/Professor Arnaud Castel BE, MEngSc, PhD Toulouse

Dr Carolin Birke BE DEng Dresden

Dr Kurt Douglas BE Syd, PhD UNSW, MIEAust

Dr Wei Gao BE HDU, ME PhD Xidian, MIAV, MAAS

Dr Ehab Hamed, BSc MSc PhD Technion

Dr Arman Khoshghalb BE ME Sharif Uni of Tech, PhD UNSW

Dr Adrian Russell BE, PhD UNSW, PGCert Bristol

Dr Hossein Taiebat BSc Isfahan M.E.S. PhD Syd

Dr Hamid Vali Pour Goudarzi BSc MSc Tehran, PhD UNSW

Dr Zora Vrcelj BE W/gong, PhD UNSW

**Other Research Staff**

Dr Hujiyong Ban BE PhD Tsinghua University, Beijing

Dr Zhen-Tian Chang, BE ME Hunan PhD UNSW

Dr Liao-liang Ke, BE Wuhan, PhD Beijing Jiatong

Dr David Kelleman BE, PhD UNSW

Dr Xiaojing Li, BEEng Wuhan PhD UNSW

Dr Xinpei Liu BE SCUT, MEngSc MPhiph PhD UNSW

Dr Michael Man, BE PhD UNSW

Dr Sundararajan Natarajan BE Mech Eng, PhD Cardiff

Dr Tian Sing Ng, BE PhD UNSW

Dr Ean Tat Ooi, BE UTM, PhD NTU

Dr Maziar Ramezani, BSc MSc Semnan Iran, PhD Sains Malaysia

Dr Ghaofeng Zhao, BSc MSc CUMT, PhD EPFL

**Technical Team**

John Gilbert
Ron Moncay
Greg Worthing

**Emeritus Professor**
Somassundaram Valliappan BE Annam, MS Northeastern, PhD DSc Wales, CPEng, FASCE, FIACM

**Professorial Visiting Fellow**
A/Prof Brian Shackel, BE Sheff, MEngSc PhD UNSW, CPEng FIEAust

**UNSW Members**
Professor Alan Crosky
School of Materials Science & Engineering

A/ Professor Gangadhara Prusty
School of Mechanical Engineering

**Connected Waters Initiative Research Centre**

**Director**
Prof Ian Acworth (until September 2012)

Professor Andy Baker (from September 2012)

**Associate Director**
Dr Martin Andersen (from September 2012)

**Centre Manager**
Mr Antonio Woo

**Academics**
Associate Professor Bryce Kelly

Dr Cameron Holley

Dr Gregoire Mariethoz

Dr Wendy Timms

**Visiting Fellow**
Dr Denis O’Carroll PEng, BSc, Ottawa, MS Clarkson, PhD Michigan

**Post-Doctoral Researchers**
Dr Hoori Ajami
Dr Steve Bouzalakos
Dr Alessandro Comunian
Dr Mark Cuthbert
Dr Anna Greve*
Dr Ander Guinea Maysounave
Dr Adam Hartland*
Dr Catherine Jex
Dr Sanjeev Jha
Dr Joshua Larsen
Dr Gabriel Rau
Dr Hamid Roshan
Dr Helen Rutledge
Dr Andrew McCallum
* post-doctoral researchers that completed in 2012

**Professional Staff**
Jodi Adams - Administration
Peter Graham - Manager -NCGRT Wellington Research Farm
Sam McCulloch – Field Engineer
Dayna McGeeney – Laboratory Manager
Mark Whelan – Centrifuge Engineer

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**Water Research Centre (WRC) 2012**

**Co-Directors**
Associate Professor Bill Peirson (Director, WRL)
Professor Richard Stuetz

**Business Managers**
Grantley Smith (WRL)
Robert Steel

**Academics**
Professor Ashish Sharma
Professor David Waite
Associate Professor Ron Cox
Associate Professor Ian Turner
Dr Chris Blenkinsopp
Dr Stuart Khan
Dr Gregoire Mariethoz
Dr Matthew McCabe

**Research Staff**
Dr Hoori Ajami
Michael Allis (WRL)
Dr Xavier Barthelemy (WRL)
A/Prof Sivakumar Bellie
Dr Mark Bligh
Dr Heather Coleman
Dr Richard Collins
Dr Chris Duesterberg
Dr Shikha Garg
Adam Hambly
Dr Rita Henderson
Dr Adele Jones
Dr Andrew Kinsela
Dr Nhat Le
Dr Yi Liu
A/Prof Sven Lundie
Dr James McDonald
Dr Rajeshwar Mehrotra
Dr Kate Murphy
Dr Gavin Parcsi
Dr An Ninh Pham
Dr David Roser
Dr Hazel Rowley
Dr Michael Short
Dr Eric Sivret
Dr Kristen Splinter (WRL)
Dr Jacqueline Stroud
Dr Lixin Wang
Dr Xinguang Wang
Dr Yuan Wang

**Principal Project Engineers - WRL**
Brett Miller
Grantley Smith

**Senior Project Engineers - WRL**
Doug Anderson
Matt Blacka
James Carley
Dr William Glamore

**Project Engineers – WRL**
Alexandra Badenhop
Ian Coghan
Erica Davey
Chris Drummond
Barry Farrelly
Dr Francois Flocard
Pramon Rahman
James Ruprecht
Dr Tom Shand
Dr Wendy Timms
Conrad Wasko

**Administration and Technical Staff**
Anna Blacka (WRL)
Bela Carvozzo
Robert Jenkins (WRL)
Coral Johnson (WRL)
Patricia Karwan
Ross Matthew (WRL)
Larry Paice (WRL)
Anna Piorkowska
Hamish Studholme (WRL)
Joan Terlecky (WRL)
Wendy Thomason-Harper (WRL)
Robert Thompson (WRL)

**Library – WRL**
Caroline Hedges
Jane Fortt

**Visiting Academics**
Associate Professor Sankar Arumugam, North Carolina State University, USA
Professor Nicholas Ashbolt, University of Cincinnati, USA
Dr Antonio Dorado Castaño, Polytechnic University of Catalonia, Barcelona
Dr Bruce Cathers, UNSW, Australia (WRL)
Associate Professor Ian Cordery, UNSW, Australia
Dr Stuart Dever, GHD, Australia
Professor Jorg Drewes, Colorado School of Mines, Colorado, USA
Dr Manabu Fuji, University of Tohoku, Japan
Dr Bruce Jefferson, Cranfield University, UK
Professor Ian King (WRL)
Professor Peter Rasmussen, University of Manitoba, Canada
Associate Professor Andrew Rose, Southern Cross University, Australia
Professor Mel Suffet, UCLA, USA
Dr Gareth Swarbrick, Pells Sullivan & Meynink, Sydney Australia

---

**Research Centre for Integrated Transport Innovation (rCITI)**

**Director**
Professor S. Travis Waller, Evans & Peck Professor of Transport Innovation

**Deputy Director**
Dr Vinayak Dixit

**Academics**
Dr Lauren Gardner
Dr Upali Vandebona

**Research Staff**
Dr David Fajardo
Dr Taha Hossein Rashidi,

**Centre Manager**
Sylvia Brohl

---

Research Centre for Integrated Transport Innovation (rCITI)

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**Research Staff**
Dr David Fajardo
Dr Taha Hossein Rashidi,

**Centre Manager**
Sylvia Brohl
Tom Chapman was born in Shanghai but spent most of his childhood on the Channel Island of Jersey, where he was a schoolboy during the German occupation. At the end of World War II he studied civil engineering at Leeds University. Unimpressed by the English climate (‘I had an attic room in Leeds with a sky-light, through which no actual light penetrated for six weeks because it remained covered in snow’) he headed for Australia, working for seven years on a variety of civil engineering projects, mainly for Government departments. He ventured back to England to undertake a PhD in groundwater hydraulics at Southampton University, then returned to Australia to work for 13 years with the CSIRO Division of Land Research in Canberra. He then held the Chair of Engineering at UNSW Faculty of Military Studies in Dunroan for a decade, before joining the School in 1981 as Professor of Water Engineering, replacing Rupert Valentine.

Tom’s research expertise was in hydrology, with particular emphasis on interactions between surface water and groundwater. His primary scholarly contribution was in the national review of predictive methods for Australian hydrology – with the landmark publication in 1975 of Prediction in catchment hydrology / a National Symposium on Hydrology; sponsored by the Australian Academy of Science – edited by Tom and F X Dunin.

Tom was Head of School from 1984 – 1987 where he oversaw the introduction of the new world of IT into the School. He also was a strong proponent of community building for the School staff, and recalled a more collegial era. ‘When I became Head of School, Ian Somerville and I used to travel to Randwick on Friday afternoon to purchase cask wine, orange juice and snacks, which were available in Room 601 to any staff member prepared to make a contribution of $1. This activity became known as ‘The 1630 Club’.

Tom retired in 1987 – but remained active as a researcher, writer and scholarly adviser for many years afterwards. As his successor as Head of School, Professor Max Irvine noted at the time, ‘Tom’s concern for students was well known and his efficient administration of school affairs and wise counsel on many matters are features that staff and students alike are indebted to him for.’

Ken Faulkes (1933 – 2012)

Emiratus Professor Ken Faulkes was one of the first alumni and academics of the School. He taught structural engineering from 1968 to 1981, before leaving the School to join and then lead the Faculty of Engineering at UTS.

Associate Head (Academic) A/Prof Mario Attard recalls, ‘I studied Civil Engineering in the early 70s at UNSW and Ken was my lecturer in structural design. I looked up to Ken and admired his inspired style. He was one of those special teachers that made every class enjoyable and would instil passion for designing creative structures. His forte was prestressed concrete with his book on that subject being a key resource in Australia for structural engineers. He later became Dean of Engineering at UTS. He was a very humble and fine gentleman.’

Brian Shackel (1940 – 2012)

Brian Shackel was a recognised world authority on concrete block paving (CBP), and was the author of numerous research papers and 3 books on this topic. One of these, Design and Construction of Interlocking Concrete Block Pavements, Elsevier Applied Science, London, (1990) was probably the only book by a School staff member to have been published in four languages.

Brian was also the author of the well-known LOCKPAVE software package for the design and specification of concrete block paving. His work on concrete block paving won him an Award for Excellence from the Concrete Institute of Australia.

Brian retired from the School of Civil & Environmental Engineering in 2001 and took an honorary visiting appointment. He was a very busy retiree; giving public seminars, and presenting papers around the globe.
Our aim is for better communication between the leaders of industry practice and those at the cutting edge of engineering research and education. Together we can consider current and future needs – and shared solutions.

About Us:
The UNSW School of Civil and Environmental Engineering is the largest School of its kind in Australasia. We are at the forefront of fundamental and applied research across the breadth of civil and environmental engineering, with three internationally acclaimed research centres - in infrastructure (CIES), water (WRC) and transport (rCITI). Our academic staff are recognised world leaders in their fields, supported by 70 full time researchers. We work with or on behalf of over 100 industry and government organisations each year on specific industry related projects, and have won millions of dollars in federal funds in order to pursue investigations into issues of national importance.
The School’s Research Management Committee (RMC) manages and supports research activities within the School, including research undertaken by both the staff and the School’s postgraduate research students, and liaises with and contributes directly to the Faculty’s Research Management Committee. In 2012, the RMC met every month to oversee and progress all research related aspects of the School’s operation.

RMC Committee Membership 2012

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steve Foster</td>
<td>Chair, CIES Director</td>
</tr>
<tr>
<td>Ian Turner</td>
<td>Deputy Chair, Postgrad Research Student Coordinator, WRL Research Director</td>
</tr>
<tr>
<td>Mark Bradford</td>
<td>CIES Research Director</td>
</tr>
<tr>
<td>Richard Stuetz</td>
<td>WRC Co-Director</td>
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<tr>
<td>Travis Waller</td>
<td>rCITI Director</td>
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<tr>
<td>Ian Acworth/Andy Baker</td>
<td>CWI Director</td>
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<tr>
<td>Adrian Russell</td>
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<td>Ashish Sharma/Matt McCabe</td>
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<td>Sangwon Han</td>
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<tr>
<td>Wei Gao</td>
<td>Taste of Research Coordinator</td>
</tr>
<tr>
<td>Patricia McLaughlin</td>
<td>Admin</td>
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</tbody>
</table>

Postgraduate Research Student Management

An important aspect of the Committee’s work involves the management of the School’s postgraduate research student’s program. In 2012, the School had 136 postgraduate research students enrolled in either ME or PhD programs. Management of this vital research activity within the School involves the assessment of applications to undertake higher degrees within the School, the formulation of specific research plans for each student accepted into the program, the nomination of a suitable supervisor, reviewing the progress of students at regular intervals, making recommendations on progress to the Faculty’s Higher Degree Committee, and finally nominating examiners when the thesis is completed and, where necessary, following up on the examination process.

Each student is assigned a review committee of three academic staff chaired by a member of the RMC. The review committee meets to interview the student and supervisor(s) at 6 or 12 monthly intervals, depending on the student’s progress, and, at these reviews, the student is invited to present a brief seminar outlining progress since the last review. Most academic staff and several research only staff participated in the student review panels in 2012. Much of the work load in this area is carried by the School’s Postgraduate Coordinator Associate Professor Ian Turner and the Postgraduate Research Student Administrator Ms Pattie McLaughlin.

Research Grants

The RMC also provides input to the preparation and coordination of research grant applications. This includes ranking the School’s applications for internal Faculty Research Grants (FRGs) and UNSW Major Research Equipment and Infrastructure Initiative (MREIs) and reviewing applications for competitive external grants such as the Australian Research Council (ARC) Grants and from industry.

### Continuing Growth in Research

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<td>ARC Grants (year announced)</td>
<td>$1.94M</td>
<td>$3.33M</td>
<td>$2.13M</td>
<td>$1.53M</td>
<td>$1.74M</td>
<td>$3.06M</td>
<td>$4.32M</td>
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<td>Total Research Income pa</td>
<td>$6.0M</td>
<td>$6.3M</td>
<td>$6.9M</td>
<td>$7.7M</td>
<td>$8.0M</td>
<td>$10.7M</td>
<td>$13.6M</td>
<td>$15.1M</td>
<td>$17.35M</td>
<td>$15.56M</td>
</tr>
</tbody>
</table>
ARC Discovery Projects:

Professor Ian Gilbert – “Control of cracking caused by early-age contraction of concrete” $355K
Professor Nasser Khalili and Dr GaoFeng Zhao – “Dynamics analysis of unsaturated porous media subject to damage due to cracking” $300K
Professor Chongmin Song, Dr Wei Gao and Professor Yong-Lin Pi – “A high-performance stochastic scaled boundary finite-element framework for safety assessment of structures susceptible to fracture” $330K

LIEF Grant:

Professor Travis Waller and Dr Vinayak Dixit of rCITI, with Professors Michiel Bliemer (USyd) and Dennis Del Favero (iCinema) – “Travel Choice Simulation Laboratory (TRACSLab): a visualisation laboratory to study travel behaviour and drivers’ interactions” $390K

In addition to the above successes, School researchers are partners in four other successful grants:
Professor Mark Bradford is a partner on a LIEF grant for “Performance level structural testing facility” ($500k) in collaboration with the University of Queensland.
Professor Nasser Khalili is a partner on a LIEF grant for “A national facility for in situ testing of soft soils” ($300k) in collaboration with the University of Newcastle.
Dr Xiaojing (Jean) Li, working with CIES, is CI on a grant “Advanced techniques for imaging radar interferometry” ($330k) in collaboration with Linlin Ge and others from UNSW Surveying.
Associate Professor Mathew McCabe is a partner on a LIEF grant for “Mobile weather radar system for advanced environmental monitoring and modelling” ($340k) in collaboration with Monash University.

UNSW Goldstar* Award winners: Dr Adrian Russell, Professor Nasser Khalili and Dr Hossein Taiebat were awarded $40K for their research project on ‘Mechanistic design tools for shallow foundations in unsaturated soils derived through numerical modelling, analysis and experimental investigation’.

*Goldstars are awarded annually to UNSW researchers who narrowly miss out on project grants in the major ARC funding rounds.

Image of Grant winners is on p7 of this report.
Research Facilities & Capabilities

The Randwick Heavy Structural Laboratory at UNSW King St campus, and the Materials Research Laboratory and Geotechnical Engineering Laboratories, collectively known as the Infrastructure Laboratories, support the research of the School’s Centre for Infrastructure Engineering and Safety (CIES), while the Water Research and Water Quality Laboratories support key research in the School’s Water Research Centre. The laboratories also provide extensive support for undergraduate and postgraduate teaching and learning.

**Infrastructure Laboratories:** The structures and materials laboratories support the research of academic staff, and postgraduate and undergraduate students involved in experimental research on various aspects of Structural Engineering. The laboratories are equipped with state-of-the-art servo-controlled hydraulic actuators and universal testing machines. The laboratories maintain a capacity for high load testing, ranging from 10 kN to 5000 kN. Strength testing is often combined with X-Ray measuring of laboratory specimens under load, pioneered by CIES researchers, enabling improved understanding at the materials level and for the development of refined, mechanically based, structural models.

**The Geotechnical Engineering Laboratories** within the School contain a diverse range of conventional soil, rock and asphalt testing equipment, along with specialist equipment used primarily to support the School’s research. Notable inclusions are modified triaxial cells, pressure plates and an oedometer for testing unsaturated soils at normal and elevated temperatures, rotating cylinder and a specialist pin-hole apparatus for testing erosion of soils, ring shear apparatus, a large shear box and high pressure triaxial cells for testing gravel, rock and sands undergoing particle crushing, as well as an asphalt testing laboratory. Recent additions are the calibration chamber for conducting cone penetration tests in unsaturated soils and the design and construction of a Lateral Earth Pressure testing rig to assist with research on unsaturated soil-retaining wall interaction; as well as a high performance thermal imaging camera to research progressive development of instability and failure in soil and rock samples.

**The Water Quality Laboratories (WQL)** include specialist laboratories for chemical and microbial analysis, pilot hall facilities for large scale bioreactor studies, a radiation laboratory for isotope studies and an olfactory laboratory for odour characterisation. They contain a wide range of analytical instruments for the chemical, microbial and physical analysis of environmental samples from water, wastewater, waste and the atmosphere. These include gas chromatograph coupled with a tandem mass spectrometer (GC-MS/MS), high pressure liquid chromatography-tandem mass spectrometer (HPLC-MS/MS), inductively coupled plasma-atomic emissions spectroscopy (ICP-AES) and inductively coupled plasma-mass spectrometry (ICP-MS). Specialised equipment includes an olfactory-GC-MS for odorant characterisation coupled with thermal desorption (TD) for gas sample pre-concentration and odorant characterisation and UV-VIS and fluorescence spectrophotometers for spectral analysis of samples.

WRC staff also have access and expertise in equipment held and managed by the UNSW Mark Wainwright Analytical Centre including the DOC Labor Liquid Chromatography – Trace Organic Carbon Detector (LC-OCD). Speciation and trace analysis of total carbon and nitrogen in water samples, such as drinking water, is available using the LC-OCD. The system uses size-exclusion chromatography to separate classes of dissolved organic materials (such as humic acids) then uses a catalysed UV oxidation to measure low levels of total carbon in the eluent.
The UNSW Odour Laboratory is a research group within the School’s UNSW Water Research Centre. The laboratory is a leading edge facility that specialises in interdisciplinary research and training for the assessment and management of odour and gaseous emissions. The odour research laboratory was established in 1991. The Odour Laboratory provides specialist olfactory and chemical analysis for the characterisation of odorous and gaseous emissions from point and area sources. The laboratory attracts funding from a mixture of competitive CAT1 research grants (ARC, CRC) supported by applied research from government agencies, industry associations (WERF) and utilities.

The Water Research Laboratory Manly Vale (WRL) employs a vast range of numerical (computer) models in its projects and research efforts. These software programs include hydrodynamic models, water quality models, sediment transport models, wave transformation models, rainfall and runoff models, and groundwater models. WRL also continues to develop and maintain state-of-the-art equipment and instrumentation to undertake its investigations. Such equipment includes the following:

- An ARGUS coastal imaging system capable of monitoring several kilometres of coastline with high resolution in time and space over years. Sophisticated image processing software is used to analyse the images, enabling measurements to be made of a wide range of coastal features and processes.
- Groundwater investigations equipment ranges from-specific to general use, with a multitude of tools to aid in: bore design, aquifer delineation and testing, acid sulfate soil investigation, downhole geophysical investigation, electrical imaging, resistivity imaging and groundwater quality testing.
- As well as having a long history in hydraulic research, WRL continues to develop and use state-of-the-art instrumentation to undertake its investigations. Such equipment includes: Particle image velocimetry (PIV) using non-coherent and laser light sources; Laser induced fluorescence (LIF) measurements of aqueous concentration and sediment particle fields; Suspended sediment particle sizers; Acoustic techniques for measuring turbulent fluid stresses (Sontec ADVs and RDI ADCPs); Conductivity measurements of bubble size and speed in multiphase flows; Conductivity measurements of aqueous concentration fields.
- WRL also has a wide range of hydrology equipment that has been employed in numerous field activities and hydrology studies including: Automatic weather station, Data logger, Gamet grab sampler, Water level follower, Rain gauge, Ultrasonic probe, Hydrolab water quality probe, Solar panel, FloPro sensor, GSM/GPRS modem.

With the unique large-scale physical facilities at the Manly Vale site, a mobile lab for accurate on-site analysis, a track record for addressing computationally-demanding numerical modelling in water engineering and significant experience in undertaking field investigations, WRL continues to maintain an international reputation.

Coming soon to the Research Centre for Integrated Transport Innovation (rCITI): a driving simulation laboratory, the Travel Choice Simulation Laboratory (TRACSLab). TRACSLab is a world-first facility to observe collective travel choice in a realistic lab environment. It is unique due to the focus on travel choice, networked interaction and strong teaming. The findings of the lab will support a new generation of transport analysis techniques for emerging issues such as sustainability, reliability, and ITS.


Conference - Full Paper Refereed


GF Zhao, Khalil-Naghadeh, N, Zhao, XB & Tu, X 2012, ‘Development of Graphic User Interface for Discontinuities Deformation Analysis (DDA): 10th International Conference on Advances in Discontinuous Numerical Methods and Applications in Geomechanics and Geoengineering, IAMC 10, Honolulu, HI, 6-8 December, 2011.

GF Zhao, Zhao, J 2012, ‘Discontinum based micromechanics modeling methods’, 10th International Conference on Advances in Discontinuous Numerical Methods and Applications in Geomechanics and Geoengineering, IAMC 10, Honolulu, HI, 6-8 December, 2011.


Garnock, B, & Leonhard Emil Bermond 2012, ‘Core prestressed, 4th International Core Beams Made with Waterless Concrete’, ASCE Earth and Space, Pasadena, CA, USA, April 15-18.


Sixth International Conference on Scour but-bounded parameters by kinematic approach. ICADD 10, Honolulu, HI, 6-8 December, 2012.

Tamm CT, Ong, KGC, Akbarnehazad, A, and Zhang M H 2012, Research on recycled concrete aggregate at National University of Singapore, CONCET 2012 11th International Conference on Concrete and Concrete Technology, Putrajaya, Malaysia, 12-13 June 2012.


### CIES 2012 Funding Summary

<table>
<thead>
<tr>
<th>Researcher(s)</th>
<th>Research Topic</th>
<th>Granting Organisation</th>
<th>Value at 2012</th>
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<tbody>
<tr>
<td>MA Bradford</td>
<td>An Innovative and Advanced Systems Approach for Full Life-Cycle, Low-Emissions Composite and Hybrid Building Infrastructure</td>
<td>ARC Laureate Fellowship including Faculty of Engineering &amp; UNSW support</td>
<td>562,462</td>
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<tr>
<td>MA Bradford</td>
<td>Thermal-induced unilateral plate buckling of concrete pavements: design and evaluation</td>
<td>ARC Discovery</td>
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<tr>
<td>C Song, W Gao, W Becker</td>
<td>Non-deterministic fracture analysis of structures by extending the scaled boundary finite-element method</td>
<td>ARC Discovery</td>
<td>161,508</td>
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<tr>
<td>N Khalili; R Niven, M Oeser</td>
<td>CO2 sequestration in deformable, chemically interactive, double porosity media</td>
<td>ARC Discovery</td>
<td>129,206</td>
</tr>
<tr>
<td>N Khalili; AR Russell</td>
<td>Erosion of variably saturated soils - a fundamental investigation</td>
<td>ARC Discovery</td>
<td>96,905</td>
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<tr>
<td>R I Gilbert</td>
<td>Anchorage of reinforcement in concrete structures subjected to loading and environmental extremes</td>
<td>ARC Discovery</td>
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<tr>
<td>R I Gilbert</td>
<td>Time-dependent stiffness of cracked reinforced concrete</td>
<td>ARC Discovery</td>
<td>66,580</td>
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<td>Chongmin Song, Francis Tin-Loi, Wilfried Becker</td>
<td>Scaled boundary finite-element approach for safety assessment of plates and shells under monotonic and shakedown loadings</td>
<td>ARC Discovery</td>
<td>124,617</td>
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<td>Ehab Hamed; Stephen Foster</td>
<td>Nonlinear long-term behaviour and analysis of high strength concrete panels</td>
<td>ARC Discovery</td>
<td>114,232</td>
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<td>S Foster; Hamid Valipour</td>
<td>Progressive collapse resistance of reinforced concrete framed structures with membrane action</td>
<td>ARC Discovery</td>
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<td>Y L Pi</td>
<td>Interval nonlinear analysis of spatially curved structures with material and geometric uncertainties</td>
<td>ARC Discovery</td>
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<tr>
<td>R I Gilbert; MA Bradford, R Zeuner, GR Brock</td>
<td>Time-dependent in-service behaviour of composite concrete slabs with profiled steel decking Collaborating/Partner Organisation(s) Fielders Australia Pty Ltd, and Prestressed Concrete Design Consultants Pty Ltd</td>
<td>ARC Linkage</td>
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<td>Markus Oeser, Alan Pearson, Nasser Khalili, Brian Shackel</td>
<td>Permeable Pavements with Concrete Surface Layers- Experimental and Theoretical Basis for Analysis and Design</td>
<td>ARC Linkage</td>
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<tr>
<td>Uni of Melbourne, Xiaojing (Jean) Li</td>
<td>A new approach to structural design that incorporates the effect of non structural components</td>
<td>ARC Linkage</td>
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<td>L. Ge</td>
<td>Integrated radar and optical satellite remote sensing for safeguarding carbon capture and storage</td>
<td>Federal Department of Resources, Energy and Tourism (the Australia-China Joint Coordination Group on Clean Coal Technology Research &amp; Development Grants)</td>
<td>40,040</td>
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<tr>
<td>Stephen Foster, Ehab Hamed, Zora Vrcelj</td>
<td>Advanced Composite Structures</td>
<td>Cooperative Research Centre for Advanced Composite Structures Ltd (CRC-ACS)</td>
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<td>Stephen Foster, Ehab Hamed, Zora Vrcelj</td>
<td>Advanced Composite Structures</td>
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<td>Carolin Birk</td>
<td>FRG Grant</td>
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<td>Zora Vrcelj</td>
<td>FRG Grant</td>
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<td>Wei Gao</td>
<td>Goldstar Project</td>
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<td>Gaofeng Zhao</td>
<td>ECR</td>
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### Connected Waters Initiative Funding Summary 2011-2012

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<thead>
<tr>
<th>Researchers / Investigators</th>
<th>Research Topic</th>
<th>Granting Organisation</th>
<th>Value at 2012</th>
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<tbody>
<tr>
<td>Ian Acworth</td>
<td>Super Science: Groundwater Research and Training</td>
<td>DIISRTE</td>
<td>4,000,000</td>
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<tr>
<td>Andy Baker, Ian Acworth, Bryce Kelly, Wendy Timms, Matt McCabe,</td>
<td>National Centre for Groundwater Research and Training</td>
<td>ARC &amp; NWC</td>
<td>1,594,933</td>
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<tr>
<td>Andy Baker</td>
<td>Source - receptor analysis of lignin and liquid macromolecules</td>
<td>ARC DP110102124</td>
<td>105,483</td>
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<td>Wendy Timms</td>
<td>CRC for Cotton Catchment Community</td>
<td>CRC</td>
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### 2012 rCITI Funding / Grant Summary

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<tr>
<th>Senior Investigator(s) / Advisor(s) / Researcher(s)</th>
<th>Subject Area / Research Topic</th>
<th>Granting Organization(s) / Industry Sponsor(s)</th>
<th>Value at 2012</th>
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<tbody>
<tr>
<td>Prof. S. Travis Waller</td>
<td>Federal Highway</td>
<td>US DOT, Booz Allen Hamilton</td>
<td>270,000</td>
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<tr>
<td>Dr. Lauren Gardner</td>
<td>Quantifying the Spatiotemporal Energy Consumption Patterns of Electric Vehicles in Regional Transport Networks</td>
<td>Faculty Research Grant Program / Early Career Researcher Grants Program</td>
<td>20,000</td>
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<tr>
<td>Prof. S. Travis Waller</td>
<td>Adaptive Stochastic Network Behaviour Modeling Approaches for Representing and Responding to Disrupted Conditions</td>
<td>UNSW Goldstar</td>
<td>40,000</td>
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<tr>
<td>Dr. Vinayak Dixit</td>
<td>Experimental Economic Methods to Evaluate Impact of Risk Aversion and Subjective Beliefs on Route Choice</td>
<td>Faculty Research Grant Program / Early Career Researcher Grants Program</td>
<td>15,000</td>
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<tr>
<td>Dr. Lauren Gardner</td>
<td>Quantifying the Role of International Transport Network Connectivity in Modelling Australian Epidemiological Risk via Passenger Travel and Freight Importation</td>
<td>Faculty Research Grant Program / Early Career Researcher Grants Program</td>
<td>20,000</td>
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<td><strong>TOTAL</strong></td>
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<td><strong>365,000</strong></td>
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### ACCARNSI

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<tr>
<th>Researchers/Investigators</th>
<th>Research Topic</th>
<th>Granting Organisation</th>
<th>Value at 2012</th>
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</thead>
<tbody>
<tr>
<td>R Cox, R Stuetz, W Peirson (CVEN at UNSW); B Randolph, M Neuman (FBE at UNSW); R Tomlinson (Griffith Uni); G Hugo (U Adelaide); M Taylor (Uni SA)</td>
<td>Nationwide network to support the coordination of the Australian research community in the field of Climate Change Adaptation – supporting multi-disciplinary research, building research capacity, and promoting and supporting information exchange relating to coastal settlements, urban planning, the built environment and infrastructure.</td>
<td>Commonwealth Department of Climate Change and Energy Efficiency (DCCEE) through the National Climate Change Adaptation Research Facility (NCCARF) ($406,364): also Griffith Uni, ($5K) U South Australia, ($2.5K) U Adelaide – ($2.5K) plus industry support from NSW OEH ($20K) and NSW Dept of Services ($5K)</td>
<td>441,364</td>
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<tr>
<td>As above</td>
<td>As above</td>
<td>UNSW support: including DVC – Research FBE and WRC</td>
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<td><strong>TOTAL</strong></td>
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### Water Research Centre 2012 Funding Summary

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<tr>
<th>Researchers / investigators</th>
<th>Research Topic</th>
<th>Granting Organisation</th>
<th>Value at 2012</th>
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<tbody>
<tr>
<td>D. Waite, S. Khan, B. Vigneswaran</td>
<td>Physico-Chemical controls on Growth, Toxicity and Succession of microcystis and Anabaena Species in Sydney Water Supply Reservoirs</td>
<td>Australian Research Council (ARC) Linkage Project LP0883561, WQRA, Sydney Catchment Authority</td>
<td>61,000</td>
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<tr>
<td>A. Sharma, AJ. Pitman, NK. Tuteja</td>
<td>Integrated assessment of climate change, climate input errors and land-use change on soil-moisture and carbon-balance in a catchment simulation framework</td>
<td>ARC Linkage Partner LP0883296, NSW Department of Environment and Climate Change (DECC), APAI, Southern Rivers Catchment Management Authority (SRCMA)</td>
<td>66,530</td>
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<tr>
<td>R. Henderson, R. Stuetz, W. Peirson, G. Newcombe, B. Jefferson, V. Bulmus</td>
<td>Optimising dissolved air flotation (DAF) for algae removal by bubble modification in drinking water and advanced wastewater systems</td>
<td>ARC Linkage Project Grant 2009 Round 2 LP0900189, APAI, APDI, Melbourne Water Corporation, United Water, SEQWATER, South Australia Water Company</td>
<td>93,277</td>
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<tr>
<td>R. Cox, W. Randolph, W. Peirson</td>
<td>National Climate Change Adaptation Research Facility Climate Change Adaptation Research Network - Settlement and Infrastructure</td>
<td>Department of Climate Change</td>
<td>36,000</td>
</tr>
<tr>
<td>M. McCabe, J. P. Walker, R. C. Pipunic, M. Abuzar, D. M. Whitfield</td>
<td>A new paradigm for improved water resource management using innovative water modelling techniques</td>
<td>ARC Linkage project LP0989441 Shared Grant / Subcontract, University of Melbourne, Department of Primary Industries, Victoria</td>
<td>16,970</td>
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<tr>
<td>W. Peirson, N. Ashbolt, G. Peters</td>
<td>Interdisciplinary greenhouse gas assessment - nitrous oxide emissions from marine wastewater disposal</td>
<td>ARC Discovery Project DP1095722</td>
<td>118,439</td>
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<tr>
<td>R. Stuetz, K. R. Murphy, R. Bro</td>
<td>Olfactory Characterisation of Odours for Optimising Impact Assessment</td>
<td>ARC Discovery Project DP1096691, APDI</td>
<td>86,089</td>
</tr>
<tr>
<td>D. Waite, R. Luthy, S. Al-Abed, G. Batley</td>
<td>Synthesis of Activated Carbon Supported Zero Valent Iron Nanoparticles and Application to Contaminant Degradation in Benthic Sediments</td>
<td>ARC Linkage Project LP100100852, APAI, NSW Department of Environment and Climate Change (DECC), NSW Maritime - Sydney Ports Corporation, Orica Australia, Maritime Authority of NSW, Sydney Metropolitan Catchment Authority</td>
<td>300,363</td>
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<tr>
<td>S. Khan, L. D. Nghiem, J.E. Drewes</td>
<td>Assessment and optimisation of N-nitrosamine rejection by Reverse Osmosis for planned potable water recycling applications</td>
<td>ARC Linkage Project LP0990705, Uni Wollongong, Veolia Water Australia, Queensland Managed Water Authority</td>
<td>54,657</td>
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<tr>
<td>S. Moore</td>
<td>Sustainability of water and wastewater treatment chemicals</td>
<td>ARC Linkage Project, APAI, South Australia Water, Sydney Water Corporation, Melbourne Water, Yarra Valley Water, Water Corporation, Gold Coast City Council</td>
<td>32,358</td>
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<tr>
<td>D. Waite, R. N. Collins, B. A. Neillan, G. Sinclair, R. J. Ring</td>
<td>BioGeoChemical Controls on efficacy and sustainability of uranium heap leaching</td>
<td>ARC Linkage Project LP100200792, APAL, Energy Resources of Australia</td>
<td>177,672</td>
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<tr>
<td>R. Collins</td>
<td>Exploiting natural processes to effectively remediate acidified coastal environments</td>
<td>ARC Linkage Project LP110100480, Tweed Shire, NSW Canegrowers, NSW Sugar Milling Co-Op Scholarship</td>
<td>208,029</td>
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<td>A. Sharma</td>
<td>Representing low-frequency variability in hydro-climatic simulations for water resources planning and management in a changing climate</td>
<td>ARC FT100100197</td>
<td>195,100</td>
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<td>S. Khan, G. Peters, N. J. Ashbolt</td>
<td>Deeper and broader life cycle risk assessment - extending the frontier for hybrid methodologies</td>
<td>ARC Linkage Project LP110200594, Environmental Protection Authority (EPA) Victoria, APAI</td>
<td>46,910</td>
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<tr>
<td>R. Collins</td>
<td>Fate of Cr(VI) associated with Fe (II)-catalysed Fe(III) oxide transformations</td>
<td>Australian Synchrotron Access Program</td>
<td>760</td>
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<tr>
<td>Researchers / investigators</td>
<td>Research Topic</td>
<td>Granting Organisation</td>
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<tr>
<td>A. Sharma</td>
<td>Managing change in soil moisture and agricultural productivity under a global warming scenario using a catchment scale climate change assessment framework</td>
<td>Dept of Innovation, Industry, Science and Research. Australia-India Strategic Research Fund</td>
<td>38,000</td>
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<tr>
<td>A. Sharma</td>
<td>Project 4: Continuous rainfall sequences at point locations</td>
<td>Engineers Australia</td>
<td>66,667</td>
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<tr>
<td>R. Stuetz</td>
<td>Minimising emissions from wastewater biosolids for beneficial reuse</td>
<td>Degremont Pty Ltd</td>
<td>50,000</td>
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<tr>
<td>R. Collins</td>
<td>Iron, sulfur and phosphorus speciation to optimise phosphorus speciation to optimise phosphorus and iron recovery from wastewater treatment</td>
<td>Australian Synchrotron/International Synchrotron Access Program</td>
<td>5,901</td>
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<tr>
<td>R. Henderson</td>
<td>Advanced characterisation of organic matters in desalination pretreatment and its removal strategies - Scholarship for Barun Karina</td>
<td>National Centre of Excellence in Desalination</td>
<td>10,000</td>
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<tr>
<td>D. Waite</td>
<td>Reactive oxygen species generation by zerovalent silver nanoparticles; implications to toxicity and contaminant degradation</td>
<td>Australian Research Council / Discovery Project - DPI 20103222</td>
<td>135,002</td>
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<td>New perspectives on iron oxide transformations inoxic and anoxic aqueous environments: Implications for iron bioavailability and contaminant mobility</td>
<td>Australian Research Council / Discovery Project - DPI 20103234</td>
<td>126,541</td>
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<tr>
<td>A. Sharma</td>
<td>A new strategy for design flood estimation in a non-stationary climate</td>
<td>Australian Research Council / Discovery Project - DPI 20100338</td>
<td>86,540</td>
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<tr>
<td>M. McCabe</td>
<td>Closing the water cycle using land surface modelling, remote sensing and an Australian hydrological observatory</td>
<td>Australian Research Council / Discovery Project - DPI 20104718</td>
<td>135,002</td>
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<td>R. Collins</td>
<td>Iron - A solution for uranium resource recovery and pollutions response</td>
<td>Australian Research Council / Future Fellowships FT 110100067</td>
<td>227,292</td>
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<tr>
<td>B. Sivakumar</td>
<td>Development of generic catchment classification framework in hydrology</td>
<td>Australian Research Council / Future Fellowships FT110100328</td>
<td>293,086</td>
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<tr>
<td>S. Garg</td>
<td>Interaction between silver ions, silver nanoparticles and reactive oxygen species: implication to toxicity</td>
<td>Australian Research Council / (DECRA) - DE 201202967</td>
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<td>R. Collins</td>
<td>Effect of pH on the Fe(II)-catalysed transformation of Fe(III) oxides</td>
<td>Australian Synchrotron/International Synchrotron Access Program</td>
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<td>Effect of pH on the fate of U(III) associated with Fe(II)-catalysed Fe(III) oxides transformations (AS)</td>
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<tr>
<td>A. Sharma</td>
<td>Simulating persistence in future rainfall: correcting GCM bias in regional climate models - Scholarship for Eytan Rocheta</td>
<td>NSW Office of Water / 2012 Peter Cullen Postgraduate Scholarship</td>
<td>20,000</td>
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<tr>
<td>R. Henderson</td>
<td>Optimising dissolved air flotation (DAF) for algae removal by bubble modification in drinking water and advanced wastewater systems - Scholarship for Russell Yap</td>
<td>Water Quality Research Australia (WQRA)</td>
<td>15,625</td>
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<tr>
<td>D. Waite</td>
<td>Physico-chemical controls on growth, toxicity and succession of Microcystis and Anabaena species in water supply reservoirs - Scholarship for Anna Yeung</td>
<td>Australian Synchrotron Postgraduate Award for Daniel Boland</td>
<td>7,076</td>
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<tr>
<td>D. Waite</td>
<td>Australian Synchrotron Postgraduate Award for Daniel Boland</td>
<td>Water Quality Research Australia (WQRA)</td>
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<td>R. Stuetz</td>
<td>Fate of Volatile Organo-Sulfur Compounds (VOSCs) in Odour Assessment - Scholarship for Mr Hung Viet Le</td>
<td>CRC for Poultry</td>
<td>35,000</td>
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<tr>
<td>S. Khan</td>
<td>Impact of Hazardous Events on Membrane Bioreactor performance - Scholarship for Ms. Trang Trinh</td>
<td>Water Quality Research Australia (WQRA)</td>
<td>11,695</td>
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<td>A. Sharma, R. Mehrotra</td>
<td>Experimental Streamflow Predictions at Decadal and Inter-Decadal Time Scale</td>
<td>Bureau of Meteorology</td>
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<td>A. Kinsela, R. Collins</td>
<td>Sources of Environmental Contaminants: Upper and Southern Christies Creek Catchment</td>
<td>Tweed Shire Council</td>
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<td>H. Rowley</td>
<td>Dairy Australia Project</td>
<td>PE International</td>
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<td>S. Khan, J. McDonald</td>
<td>Development of Nitrosamines method</td>
<td>Agilent</td>
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<td>S. Khan, J. McDonald</td>
<td>Analysis of samples</td>
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<td>Analytical Method Development</td>
<td>Sydney Water</td>
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<td>S. Khan</td>
<td>Physicochemical degradation of Taste and Odour Compounds- parts 2 and 3</td>
<td>Sydney Catchment Authority</td>
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<td>S. Khan</td>
<td>Physicochemical degradation of Taste and Odour Compounds- parts 4, 5 and 6</td>
<td>Sydney Catchment Authority</td>
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<td>X. Wang, E. Sivret</td>
<td>Odour Analysis</td>
<td>Aero 247</td>
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<td>X. Wang, E. Sivret</td>
<td>Activated Carbon Capacity Testing</td>
<td>Actew AGL</td>
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<td>D. Roser</td>
<td>QMRA - initiation</td>
<td>Hunter Water</td>
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<td>S. Khan, J. McDonald</td>
<td>Water Samples analysis</td>
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<td>X. Wang, E. Sivret</td>
<td>Identification of odourants from a leachate dam</td>
<td>Blue Mountains Council</td>
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### Funding for fundamental research led by WRL investigators (excl. CWI & ACCARNSI)

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<tr>
<th>Topic</th>
<th>Senior investigators</th>
<th>Funding Source</th>
<th>Value at 2012</th>
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<td>Transitions in wave breaking from deep to shallow water</td>
<td>Michael Banner (UNSW Mathematics), Bill Pearson, Frederic Dias (ENS Cachan, France)</td>
<td>Australian Research Council – Discovery DP120101701</td>
<td>135,002</td>
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<tr>
<td>Bed shear stress on beach sediment and coastal structures under wave run-up</td>
<td>Chris Blenkinsopp, Ian Turner, Tom Baldock (Queensland), Hocine Oumeraci</td>
<td>Australian Research Council – Discovery DP110101176</td>
<td>67,046</td>
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<td>Erosion of embankment dams and dam spillways</td>
<td>Robin Fell, Chongmin Song, Bill Peirson, Kurt Douglas</td>
<td>Australian Research Council – Linkage LP110100389</td>
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<td>Australian Coastal Observation Network: Monitoring and Forecasting Coastal Erosion in a Changing Climate</td>
<td>Ian Turner, Ian Goodwin (Macquarie), Mark Davidson (Plymouth), Andrew Short</td>
<td>Australian Research Council – Linkage LP100200348</td>
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<td><strong>$705,958</strong></td>
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### Industry funded research undertaken by the WRL Projects Team

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<th>Subject area</th>
<th>Senior investigators and advisers</th>
<th>Industry Sponsors</th>
<th>Value at 2012</th>
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<tbody>
<tr>
<td>Coastal Engineering and Management</td>
<td>Matt Blacka, Ian Turner, Ian Coghlan, Ron Cox, Alessio Mariani, Francois Flocard, James Carley, Bill Peirson, Tom Shand, Chris Blenkinsopp</td>
<td>BioPower Systems Pty Ltd, Byron Shire Council, Cook Islands Government, Engineers Australia, Local Government Association of Tasmania, Manly Council, Manly Hydraulics Laboratory, Moyne Shire Council, NSW Department of Lands, NSW Office of Environment and Heritage, NSW Department of Primary Industries, Sydney Coastal Councils Group, Umwelt (Australia) Pty Ltd, University of Tasmania, US Army RDECOM ACQ CTR, Warringah Council.</td>
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<td>Coastal Structures and Wave Protection</td>
<td>Matt Blacka, Ian Turner, Ian Coghlan, Ron Cox, Alessio Mariani, Francois Flocard, Bill Peirson, Duncan Rayner, James Carley, Tom Shand, Jamie Ruprecht, Chris Blenkinsopp, Bruce Cathers</td>
<td>Aurecon, Aurecon Hatch, Local Government Association of Tasmania, NSW National Parks and Wildlife Service, NSW Office of Environment and Heritage, NT Department of Natural Resources, Ove Arup Dan Rakan-Rakan, SMEC, SRK Consulting (South Africa) Pty Ltd, Sydney Coastal Councils Group, Treharnes Manly Boatshed, Tweed Shire Council, VIC Department of Sustainability and Environment.</td>
<td>301,268</td>
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<td>Desalination Outfalls</td>
<td>Brett Miller, Grantley Smith</td>
<td>Veolia Water Operations Pty Ltd</td>
<td>10,675</td>
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<td>Sewage Disposal in Coastal Waters and Environmental Impacts</td>
<td>Brett Miller, Duncan Rayner, Conrad Wasko, Bruce Cathers</td>
<td>Sydney Water Corporation</td>
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<td>Environmental Restoration Projects</td>
<td>Will Glamore, Jamie Ruprecht, Duncan Rayner, Grantley Smith, Conrad Wasko, Brett Miller</td>
<td>Department of Sustainability, Environment, Water, Population and Communities, Fitzroy Basin Association Inc, Greater Taree City Council, JP Environmental, Northern Rivers Catchment Management Authority, Newcastle City Council, NSW Department of Industry and Investment, NSW Department of Primary Industries, NSW Office of Environment and Heritage, NSW Office of Water, Ross Human Directions Limited, RPS Aquaterra Pty Ltd, SA Department of Environment, Water &amp; Natural Resources, SMEC, Umwelt (Australia) Pty Ltd, WetlandCare Australia, Wyong Shire Council</td>
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<td>Civil Engineering Hydraulics</td>
<td>Brett Miller, Jamie Ruprecht, Francois Flocard, Bill Peirson</td>
<td>Abate Fire Services, Aurecon, NSW Department of Primary Industries, Outotec (Australia) Pty Ltd</td>
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<td>Water Resources including river morphology</td>
<td>Grantley Smith, Will Glamore, Conrad Wasko, Ron Cox, Duncan Rayner</td>
<td>Coffey Mining, Department of Sustainability, Environment, Water, Population and Communities, Hunter Water Corporation, Jennifer Hale Consulting, Sydney Catchment Authority</td>
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<td>Flooding and Floodplain Management</td>
<td>Grantley Smith, Conrad Wasko, Ron Cox, Duncan Rayner, Ian Coghlan</td>
<td>Engineers Australia, IAG Re Australia Pty Ltd, Myriax Pty Ltd, NSW Department of Planning and Infrastructure, VIC Department of Sustainability and Environment</td>
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<td><strong>TOTAL</strong></td>
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<td><strong>$2,340,927</strong></td>
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PhD Students

Agarwal, Ankit
Steel fibre reinforced concrete structures using CFRP
Supervisor: Foster, S

Aljassmi, Hamad Abdulla Mohd
Dynamic project management
Supervisor: Han, S

Allan, Rebecca Jane
Backward erosion piping of dams
Supervisor: Douglas, K

Allis, Michael James
Wave breaking onset, speed and strength for 3D deep water wave
Supervisor: Peirson, W

Alvarez Gaitan, Juan Pablo
Sustainability of water and wastewater treatment chemicals
Supervisor: Moore, S/Peters, G

Amin, Ali
Steel fibre reinforced concrete
Supervisor: Foster, S

Asadi Zarch, Mohammad Amin
Hydroclimatology
Supervisor: Bellie, S/Sharma, A

Ataei, Abdolreza
Steel and composite structures
Supervisor: Bradford, M

Azcurra, Cecilia
Isotopes in hydrology
Supervisor: McCabe, M

Bai, Yun
Coupled thermo-chemo-flow-deformation analysis on a tunnel lining
Supervisor: Douglas, K

Bertuzzi, Robert
Estimating rock mass strength and stiffness with particular interest in the load
Supervisor: Khalili, N

Boland, Daniel
 Fate of metal contaminants during iron oxide crystallisation
Supervisor: Waite, TD

Cai, Yingzhe Mick
Isotope hydrology, water resources
Supervisor: McCabe, M/Evans, J

Castilla Rho, Juan Carlos
The effects of climate change on coastal aquifers
Supervisor: Andersen, M/Mariethoz, G

Chen, Xiaojun
Computational Mechanics
Supervisor: Song, C/Birk, C

Chiong, Irene
A scaled boundary finite-element limit and shake-down approach
Supervisor: Song, C

Chowdhury, Morsaleen Shehzad
Structural Engineering
Supervisor: Song, C

Dao, Duy Minh
Structural safety assessment, non-deterministic analysis vehicle bridge interaction dynamics, numerical analysis
Supervisor: Gao, W

Ebrahimi Nejad Rafsanjani, MeySam
Projects and carbon
Supervisor: Carmichael, DG

Elhadyan, Farid
Constitutive modelling of lightly cemented unsaturated soils
Supervisor: Khalili, N

Eshahidi Esmaelabadi, Ali
Remote sensing hydrology
Supervisor: Evans, J/McCabe, M

Ershadi Esmaeilabadi, Ali
Remote sensing hydrology
Supervisor: Evans, J/McCabe, M

Esfahani Kan, Mojtaba
Seismic deformation analysis of earth and rockfill dams
Supervisor: Taiebat, H

Foerster, Jean
Natural resource projects
Supervisor: Carmichael, DG

Gharib, Mohammad Mahdi
Numerical modelling for service life prediction and performance evaluation of deteriorated reinforced concrete structures due to climate change impacts
Supervisor: Foster, S

Gholamhoseini, AliReza
The time dependent behaviour of composite concrete slabs with profiled steel deck
Supervisor: Gilbert, RI

Graham, Peter William
Groundwater, hydrogeology
Supervisor: McCabe, M

Gui, Yilin
Cracking in unsaturated soils
Supervisor: Khalili, N

Guo, Yi Fei
Construction simulation for productivity improvement
Supervisor: Han, S

Halloran, Landon James Szasz
Groundwater
Supervisor: Acworth, I

Hasheminezhad, Seyedkomil
Blast loading on bridges
Supervisor: Bradford, M

He, Di
Silver nanoparticle-mediated generation of reactive oxygen species
Supervisor: Waite, TD

He, Xudong
Modelling of systems with discontinuities using the scaled boundary finite element method
Supervisor: Birk, C

Hasan, Mohammad Mahadi
Hydrology
Supervisor: Sharma, A

Hambly, Adam Christopher
Fluorescence as a portable tool for cross-connection detection within dual reticulation systems
Supervisor: Khan, S/Stuetz, R

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Fluorescence as a portable tool for cross-connection detection within dual reticulation systems
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Supervisor: Khan, S/Stuetz, R
<table>
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<tr>
<th>Name</th>
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<th>Supervisor(s)</th>
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<tbody>
<tr>
<td>Ho, Lam</td>
<td>Synthesis of activated carbon supported zero valent iron nanoparticles and application for contaminant degradation in benthic sediments</td>
<td>Waite, TD</td>
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<td>Kaboli, Seyed Ali Reza</td>
<td>Lifecycle costs of steel petrochemical structures</td>
<td>Carmichael, DG</td>
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<td>Hossenian, Seyed Mahdi</td>
<td>The principal-agent problem and project delivery methods</td>
<td>Carmichael, DG</td>
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<td>Howe, D</td>
<td>Coastal engineering</td>
<td>Blenkinsopp, C/Turner, I</td>
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<td>Huang, Yue</td>
<td>Long-term behaviour of high-strength concrete panels</td>
<td>Hamed, E</td>
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<td>Modelling route choice behaviour under uncertainty</td>
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<td>James, Edward Malcolm</td>
<td>Payment systems for soft soils</td>
<td>Oeser/M/Russell, A</td>
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<td>Jeremiah, Erwin Joachim</td>
<td>A Bayesian framework for reducing structural and parameter uncertainty in hydrological modelling</td>
<td>Sharma, A</td>
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<td>Jury, Karen Lillian</td>
<td>Investigation of the role of antibacterial drugs in municipal wastewater as a selective influence on the spread of bacterial resistance</td>
<td>Stuetz, R</td>
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<td>Kabayashi, Yumi</td>
<td>Life cycle assessment and risk assessment</td>
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<td>Kearney, Edward Tah Dah</td>
<td>Monitoring and Modelling of Storm Induced Beach Erosion</td>
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<td>Khajeh Samani Ali</td>
<td>Ductility in reinforced concrete columns</td>
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<td>Khan, Mohammad Zaved Kaiser</td>
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<td>Khan, Md Shakera Karim</td>
<td>Development of a generic catchment classification framework in hydrology</td>
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<td>Buckling and post-buckling behaviour of composite laminated structures with material non-linearities</td>
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<td>Li, Chao</td>
<td>Fracture analysis of piezoelectric composites by using scaled boundary finite element method</td>
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<td>Advanced characterisation of dissolved organic nitrogen in drinking water sources</td>
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<td>Liu, Nan Guangyu</td>
<td>Uncertain modeling and uncertain methods; Vehicle-bridge interaction dynamics; Wind and/or seismic induced random vibration; structural stability and reliability analysis</td>
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<td>Luo, Kai</td>
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<td>Mac, Thi Ngoc</td>
<td>Time dependent behaviour of slope</td>
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<td>Performance assessment of process based planning and control in construction</td>
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<td>Optimisation of coagulant addition to submerged membrane bioreactors using computational and experimental methods</td>
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<td>Mahmud, Kashif</td>
<td>Groundwater modelling, heterogeneity, transport processes, contaminated sites</td>
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<td>Mazumder, Manzur Hasan</td>
<td>Structural engineering, Anchorage of reinforcement in concrete structures subjected to loading and environmental extremes</td>
<td>Douglas, K/Russell, A</td>
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<td>McCallum, Andrew Murray</td>
<td>River-aquifer interactions in stressed semi-arid environments</td>
<td>Acworth, I/Andersen, M</td>
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<td>Mohamad Abas, Faisur Zahri</td>
<td>Strength of fibre reinforced concrete slabs with profiled steel decking</td>
<td>Gilbert, R/I</td>
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<td>Mohammadi, Samaneh</td>
<td>Large deformation analysis of slopes</td>
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Mole, Melissa Anne  
Monitoring and modelling scale coastal variability: implications for the establishment of a national coastal observing network  
Supervisor: Turner, I

Moon, Sungkon  
Process centered dynamic quality control in construction  
Supervisor: Bernold, L/Davis, S

Moutabsherkit, Shahrokh  
Dynamics Analysis of Unsaturated Porous Media Subject to Damage due to Cracking  
Supervisor: Khalili, N

Musa, Idris Ahmed  
Buckling of thick plates  
Supervisor: Attard, M

Naseem, Bushra  
Surface water hydrology  
Supervisor: Sharma, A

Parvez, Md. Ahsan  
Fibre reinforced concrete structures  
Supervisor: Foster, S

Pells, Steven Edward  
Erosion of rock in spillways  
Supervisor: Douglas, K/Peirson, W

Peng, Yuan  
Cost contingency  
Supervisor: Davis, S

Perera, Weebadda Arachchilage Salinda  
Study causes of defect occurrence and issues  
Supervisor: Davis, S

Salimzadeh, Saeed  
Numerical modelling of two phase fluid flow through deformable fractured porous media  
Supervisor: Khalili, N

Peterson, Mark Aaron  
Ground water resources in fractured rock aquifers using geochemical and isotopic methods  
Supervisor: Andersen, M/Cendon, D

Rahman, Shaikh Mohamad Hasibur  
Optimisation of ferry network  
Supervisor: Vandebona, U

Rahnamayie Zekavat, Payam  
Effect of information richness on project performance  
Supervisor: Bernold, L

Rancic, Aleksandra Sanja  
Groundwater levels in fractured rocks - climate and land use impacts  
Supervisor: Acworth, I

Rocheta, Eytan  
Simulating persistence in future rainfall: correcting GCM bias in regional climate models  
Supervisor: Sharma, A

Shi, Xue  
Uncertain analysis of engineering structures, structural reliability analysis, structural dynamics  
Supervisor: Gao, W/Pi, Y-L

Shutoya, Yulia  
Water Quality  
Supervisor: Baker, A/Henderson, R

Siew, Yung Jhien Renard  
Sustainability analysis  
Supervisor: Carmichael, DG

Singh, Sachin  
Fluorescence as an online tool for monitoring Membrane integrity  
Supervisor: Khan, S

Srikantharajah, Sanchayan  
Reactive powder concrete subjected to high temperature and temperature cycles  
Supervisor: Foster, S

Su, Lijuan  
Lateral and post buckling with shear effects  
Supervisor: Attard, M

Sun, Zhicheng  
Fracture analysis by using the scaled boundary finite element method  
Supervisor: Song, C

Teo, Tiffany Li Lee  
Analysis of true chemical contaminants in water  
Supervisor: Coleman, H

Tran, Hanh Van  
Alternative formulations in project management  
Supervisor: Carmichael, DG

Tran, Thao Minh  
Fouling of anaerobic membrane bioreactors  
Supervisor: Stuetz, R/LeClech, P

Tran, Trong Binh  
Project and organisational staffing – cultural issues  
Supervisor: Davis, S

Tsarev, Sergey  
Biogeochemistry  
Supervisor: Collins, R

Vazquez Campos, Xavier  
Urabuyn heap leaching biogeochemistry  
Supervisor: Neilan, B/Waite, TD

Vo, Thanh Liem  
Soil-structure interaction  
Supervisor: Russell, A
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<td>Wang, Bei</td>
<td>Treatability of odorants in abatement system</td>
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<td>Membrane fouling control</td>
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<td>Reactions of Cu(1) and Cu(11) with H2O2 in natural waters: kinetics, mechanism and the</td>
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<td>Yeung, Anna Chi Ying</td>
<td>Factors influencing the growth and toxicity of cyanobacteria in drinking water supplies</td>
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<td>Yin, Peijie</td>
<td>Micromechanics of unsaturated flow in fractured porous medium</td>
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<td>Yousefnia Pasha, Amin</td>
<td>Numerical modeling of cone penetration in unsaturated soils</td>
<td>Khalili, N / Khoshghalb A</td>
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<td>Zhao, Xinlei</td>
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<td>Zhu, Jianbei</td>
<td>Elasto-plastic thermal lateral buckling analysis of submerged oil and gas pipelines</td>
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<td>Zainuddin, Nur Syahiza</td>
<td>Sources and mobility of arsenic in alluvial river sediments</td>
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<td>Zhang, Zhenghua</td>
<td>Optimisation of hybrid coagulation/submerged membrane bioreactor treatment of wastewaters</td>
<td>Waite, TD</td>
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<td>Zhou, Yuening</td>
<td>Research on impact of information redundancy in project documentation on project quality</td>
<td>Davis, S</td>
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Khoshghalb, Arman
Numerical algorithms of penetration problems in variably saturated media
Supervisor: Khalili, N

Liu, Xinpei
Time-dependent behaviour of composite curved beams
Supervisor: Bradford, M

Liu, Yi
Hydrology, remote sensing, climate variability
Supervisor: Evans, J /McCabe, M

Mille, Christopher James
The transformation and Implication of reactive oxygen species in natural aquatic systems
Supervisor: TD Waite

Ng, Tian Sing
Fibre reinforced high performance geopolymer concrete
Supervisor: Foster S

Pournaghiazar, Mohammad
Cone penetration in unsaturated porous media
Supervisor: Khalili, N

Pui, Alexander Charles
Stochastic hydrology
Supervisor: Sharma, A

Rau, Gabriel Christopher
Using heat as a tracer to study surface water groundwater and interactions
Supervisor: Andersen, M

Thomas, Jacqueline Marie
Pathogen ecology within drinking water biofilms
Supervisors: Ashbolt NJ /Stuetz, R

ME Graduate 2012
Hao, Pan
Risk management in infrastructure project
Supervisor: Han, S

The Peter Cullen Scholarship is supported by the NSW Office of Water and NSW water agencies including the Sydney Catchment Authority, State Water, Sydney Water and Hunter Water, and is worth $60,000 over three years. It honours the memory of Professor Peter Cullen, a visionary in Australian water resource management and mentor to young water scientists. The scholarship also brings with it the opportunity to participate in the mentoring program run by the Wentworth Group of Concerned Scientists, of which Professor Cullen was a founding member.

Eytan’s research focuses on one of the key challenges facing climate scientists and hydrologists, simulating climate change’s impacts on the water cycle, particularly sustained anomalies of climate extremes which cause floods and droughts. His research aims to develop a methodology to improve the simulation of persistence in rainfall through correcting global climate model bias in regional climate models.

Eytan is studying in the School of Civil and Environmental Engineering under the supervision of Professor Ashish Sharma and Dr Jason Evans from the UNSW Climate Change Research Centre.

CVEN PhD candidate Eytan Rocheta has been awarded the 2012 Peter Cullen Postgraduate Scholarship at Parliament House by the Minister for Primary Industries, Katrina Hodgkinson and Peter’s widow, Vicky Cullen.
The Civil and Environmental Engineering Research Student Association (CERSA) is the organization that represents postgraduate research students within the School. CERSA provides support for students in many ways including answering questions about the research experience, providing networking opportunities, and organising social events. The CERSA committee, composed of research students elected by their colleagues to liaise with the school and administer the organisation, works with the School management to ensure that the PhD experience is as successful as possible for every student.

During the past year CERSA experienced a great turnout at all events. As always, we welcomed new students with our bi-annual BBQ at the beginning of each semester. We had a number of successful networking events, including Movie & Pizza Nights (some with more than 50 attendees), and a non-School sponsored trip to the Blue Mountains. CERSA has always enjoyed the generous support of the School and this year was no exception - the CERSA committee worked with the School to provide a new state-of-the-art coffee machine which will be appreciated by students for many years to come.

Next year, CERSA will continue engaging students in the research community by facilitating social and academically oriented events. Official ARC-affiliation, a research writing skills development workshop, reinstatement of the popular “Post PhD Careers Night”, and of course, BBQs and Movie & Pizza Nights are a sample of the planned activities to look forward to!

2012 CERSA Committee

President - Melissa Duell
Vice President - Yulia Shutova
Treasurer - Anna Yeung
Secretary - Yliane Yvanes-Giuliani
Committee Members:
Cecilia Azcurra
Irene Chiong
Lam Ho
Xavier Vazquez Campos
Chengwei Yang
Russell Yap

Prize winners for the 2012 Annual Research Student Poster Forum:

Environmental Engineering Prize – XIAOMING MA
Geotechnical Engineering Prize – JIANJUN MA (pictured)
Infrastructure Engineering Prize – ALI KABOLI
Structural Engineering Prize – ANKIT AGARWAL
Structural Engineering Prize – JIANBEI ZHU
Water Engineering Prize – DANIEL HOWE
Overall Engineering Prize – DANIEL HOWE
Research Student Peer Engineering Prize – RUSSELL YAP
1st January 2012 saw the implementation of Harmonised Work Health and Safety (WHS) legislation in NSW and ACT. The *Work Health and Safety Regulation 2011* expands on the requirements of the *Work Health and Safety Act 2011* by providing details on how certain sections of the Act are to be implemented.

The School of Civil and Environmental Engineering has a Workplace Safety Committee in accordance with the Work Health and Safety Act 2011.

As required by the WHS Regulation 2011, the Committee representation covers all work groups within the school, including the Head of School, Academics, Laboratory Managers, IT, Administration, Postgraduates and Undergraduates. Membership also includes Centre Representatives, a First Aid Officer, and the Chief Warden (Emergency Control Organisation).

The School consults with all staff and students on WHS issues as they arise, through the School’s Level 3 Health and Safety Consultation Committee. Minutes of the meetings are posted on School noticeboards and on the School’s website.

The School continues to implement and use the UNSW HS Management System which contains six key elements; commitment, planning, consultation, implementation, measurement and review, for the continual improvement of safety both in the School and in the field.

All School Laboratory users complete the compulsory ‘RIPA’ (Registration, Induction and Project risk Assessment) documentation which provides the mechanisms by which safe systems of work can be implemented and monitored. The School’s system is closely integrated with the UNSW HS Management System.

During 2012, the Committee had full voluntary membership, and met regularly every two months with excellent attendance. Several positions on the Committee are now shared to improve attendance and guarantee prompt feedback to each work group. The Committee scheduled regular workplace inspections, authorised various training courses for staff and students, and resolved a wide range of WHS issues.

In 2012 several laboratory and office refurbishments were completed. A new gas bottle storage facility at the rear of the building was completed, and the lifts can now be locked-out for safe transportation of gas bottles. The Committee liaised closely with Facilities Management on these projects.

The provision of a safe work environment for all School staff and students remains the School’s highest priority.

**Committee Members and Representation for 2012:**

- David Waite (HoS), Paul Gwynne – Chair (Infrastructure Lab and First Aid), Hugh McMullen – Secretary (HS and Facilities), Les Brown (Admin. and IT), Irene Calaizis (CIES), Hamish Studholme/Larry Paice (WRL), Gautam Chattopadhyay/Kelvin Ong (WQL and First Aid), Steven Davis (Academic and Chief Warden), Ron Moncay/John Gilbert (Heavy Structures Lab), Patricia Karwan (WRC), Lam Ho (Postgraduate Rep.), Maritsa Kakopieros (Undergraduate Rep.) and Rohan Singh Panwar (Faculty OHS Coordinator).
The Teaching and Learning Committee (TLC) of the School is responsible for all academic matters relating to all undergraduate and postgraduate coursework programs. These involve encouraging teaching quality, providing teaching aids to staff, monitoring courses through student focus group surveys, interaction with student representatives of CEVSOC and research student tutors through PRSC, setting policy regarding academic aspects of undergraduate and postgraduate examinations and enrolments, and providing a focal point for student assistance in undergraduate and postgraduate coursework matters. The major drive behind the Committee’s agenda is to improve the learning experience of students. The members of the committee in 2012 were:

### Teaching and Learning Committee 2012

- **Stephen Moore**: Chair & Environmental Eng Program Coordinator
- **Mario Attard**: Assoc Head (Academic) Civil Engineering Program Coordinator
- **Julijana Baric**: Student Services Manager
- **Leonhard Bernold**: Year 2 Coordinator
- **Carolin Brk**: Structures Representative
- **David Carmichael**: EC&M Representative
- **Vinaay Dixit**: Year 4 Coordinator
- **Kurt Douglas**: Geotechnical Representative
- **Karene Irvine**: School Manager
- **Matt McCabe**: Year 3 Coordinator
- **Bill Peirson**: Water Representative
- **Hossein Taiebat**: Year 1 Coordinator Postgraduate Coursework Coordinator
- **Upali Vandebona**: Industrial Training Coordinator
- **Zora Vrcelj**: Civil with Arch Program Director

### Undergraduate Student Enrolments in 2012

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### Trends in the School Profile

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### STAFF (Full-time, tenured)

| Academic | 32 | 33 | 29.5 | 25 | 25 | 28 | 30.5 | 28 | 32 | 36 |
| Technical (School) | 15 | 14 | 15 | 13 | 13 | 13 | 12 | 9 | 12 | 12 |
| Administration (School) | 8 | 8 | 8 | 7 | 8 | 9 | 10 | 9 | 12 | 12 |

### STUDENT/STAFF RATIO

- **EFTSU/ACADEMIC**: 18.2 / 17.2 / 19.7 / 23.7 / 26.8 / 28.8 / 32.3 / 39.01 / 41.0 / 39.2

*Effective Full-Time Student Unit
‘Engineers are known to be logical, task oriented and solution focused. But they also need to be good people managers and leaders,’ Hamish Tyrwhitt, CEO of Leighton Holdings informed students of the School of Civil and Environmental Engineering when he visited UNSW in July. ‘Just as importantly, a good engineer needs to have a clear set of values and a vision for themselves, their companies, and their society.’

Hamish was addressing a packed class of third year students studying Civil Engineering Practice – a project based course designed to assist students further develop their research, teamwork, managerial and self-directed learning skills. Drawing from his own extensive experience, the CEO of Australia’s largest construction company offered students insights and advice on life after university.

Hamish impressed upon the students that ‘the key to success in the world is teamwork. To be a good engineer you need to be able to work effectively in a team. You need to learn now how to do that. Get involved in university in team activities, be it sport or student organisations or other collective community efforts.’

Hamish reminded students that ‘the best and most successful engineers are not self-serving. You have to be comfortable with supporting, with contributing as part of the team, as well as being able to lead and manage. The important thing is that on any job or project, you are part of the solution, not part of the problem.’

Students asked many questions, during the talk and after the class, ranging from general careers advice to specific questions on Leighton procedures and performance. Leighton Holdings, which employs 55,000 people around the world, annually recruits 400 young Australian graduate engineers to its operating companies which include John Holland, Thiess and Leighton Contractors.

Invest in yourselves

‘Invest in yourselves’ Hamish urged students. ‘Choose where you want to go. A lot of people think that their employer is responsible for their career. But actually, you are! Choose the direction that you want to go in – there is no point in turning up to a job you don’t care about.’

‘And just remember that your learning is not over. It will never be over. The best thing you are learning at university is how to learn. Be prepared, when you come out to work, for even more learning - and enjoy the ride.’

Curriculum Review 2012

In 2012 the school embarked upon an internal review of the undergraduate curriculum for the BE civil engineering. The revision process involved the seeking of advice from both past and present students, representatives from the Student Society CEVSOC, as well as from industry, through our Industry Advisory Committee. Student input was sought through email and focus group discussions. Academic staff were also asked for comment and there were discussions with the major discipline groups within the School.

Most stakeholders were happy with the overall structure of the curriculum and the performance of the curriculum since its major rebirth in 2006. Although there have been several important minor changes since 2006, the curriculum balance between the various discipline groups and the proportion of electives to core courses was considered appropriate and shouldn’t be changed.

One of the main proposed changes was the introduction of a new CVEN course in Systems and Optimization. Systems were a key element of the Civil program prior to the 2005 revision and were identified as an important deficiency in the current program. Electives in fourth year for environmental engineering students will be broadened to include sustainable energy course options, and a number of courses will get assignments associated with the new CRC for Low Carbon Living centred at UNSW.

In fourth year, all students, including honours students, will now be required to complete a Capstone Design Practice in either semester 1 or semester 2. The capstone design practice course would contain multi-disciplinary design projects undertaken in groups. It would also have material on the issues related to the design of sustainable infrastructure.
Imagine a world where we live within our environmental resources. Imagine a world where we don’t pollute the air, the sea and spread our waste in a thin layer that is never recoverable nor recyclable. Imagine a world where a third of the world’s population does not lack clean water and sanitation. If we are to live in such a sustainable and socially just world it will be civil and environmental engineers who will play a disproportionate part.

- Alumnus Dr Robert Care, AM
One morning in September 2012, our photographer Mike Gal roamed classrooms, labs and lecture halls to capture the essence of the School in its daily teaching and learning work...these are some of the images he caught of our dedicated students and staff.

To the optimist, the glass is half full.
To the pessimist, the glass is half empty.
To the engineer, the glass is twice as big as it needs to be.
The School’s undergraduate programs offer students the broadest and most comprehensive civil and environmental engineering education with the opportunity to specialise in their final year by majoring in a range of sub-disciplines. The curricula have proved a model for engineering educators and have been widely benchmarked by other academic institutions.

Undergraduate BE student enrolments have more than doubled over the past six years (617 in 2005 to 1430 in 2011). While the student to staff ratio is 1:41, the School has preserved a tutor to student ratio of less than 1:20 to preserve quality teaching outcomes.

### Undergraduate Studies

**BE Program Outlines**

**Disclaimer:** Information provided about subjects, units, courses and any arrangements for courses including staffing, are an expression of intent only and are not to be taken as a firm offer or undertaking.

#### BE Civil Engineering

**Year 1 | Semester 1**

<table>
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**Year 1 | Semester 2**

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**Year 2 | Semester 1**

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**Year 2 | Semester 2**

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**Year 2 | Semester 2**

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**Year 3 | Semester 1**

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**Year 3 | Semester 2**

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**Year 4 | Semester 2**

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**Key:**

- **UOC - Units of Credit**
- **HPW - Hours per Week**
### BE Civil with Architecture as in 2012

#### Year 1 | Semester 1

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#### BE Environmental Engineering

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#### Year 3 | Semester 1

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### General Education

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### Professional Electives

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Postgraduate coursework teaching and learning has been one of the core activities and major strengths of the School of Civil and Environmental Engineering for over fifty years. With 426 coursework students enrolled in 2011 the School continued to be the leading provider of postgraduate engineering education in Australia. All our courses provide essential specialist knowledge, backed by cutting edge research, to enable industry professionals to improve their performance and advance their careers.

Our Master of Engineering Science (MEngSc) educates students to the top level required nationally in seven specialisations:
- Civil Engineering
- Environmental Engineering
- Geotechnical Engineering and Engineering Geology
- Project Management
- Structural Engineering
- Water Resources (includes coastal engineering)
- Water, Wastewater and Waste Engineering

Courses in construction management and transport engineering are also offered on campus and by distance.

The School offered 42 postgraduate courses in 2011 either as internal weekly courses, in short course mode or in a distance education format, making the program large even by international standards. Continued Commonwealth Support (HECS) makes our MEngSc program financially very competitive for local students.
Postgraduate courses offered at the School include:

- CVEN9405 Urban Transport Planning Practice
- CVEN9414 Transport Systems Part 1
- CVEN9415 Transport Systems Part 2
- CVEN9422 Traffic Management & Control
- CVEN9511 Geotechnical Models and Site Investigation
- CVEN9512 Geomechanics
- CVEN9513 Advanced Foundation Engineering
- CVEN9514 Numerical Methods in Geotechnical Engineering
- CVEN9521 Slope Instability and Stabilisation
- CVEN9522 Rock Engineering
- CVEN9523 Pavement Engineering and Analysis
- CVEN9524 Geotechnical Engineering of Dams
- CVEN9525 Fundamentals of Geomechanics
- CVEN9610 Surface Water Hydrology
- CVEN9621 Urban Hydrology & Stormwater Management
- CVEN9612 Catchment and Water Resources Modelling
- CVEN9620 Channels, Rivers and Estuaries
- CVEN9630 Groundwater Hydrology and Resources Analysis
- CVEN9631 Hydrogeochemistry
- CVEN9640 Waves, Beaches and Coastal Infrastructure
- CVEN9701 Engineering Economics and Financial Management
- CVEN9702 Project Planning & Control
- CVEN9703 Quality & Quality Systems
- CVEN9706 Human Resources Management
- CVEN9707 Contracts Management
- CVEN9710 Management of Risk
- CVEN9712 Dispute Avoidance & Resolution
- CVEN9714 Resource Management
- CVEN9717 Marketing in Technology and Engineering
- CVEN9718 Strategic Management for Engineering
- CVEN9720 Problem Solving & Decision Making
- CVEN9723 Design of Construction Operations
- CVEN9726 Legal Studies and Professional Practice
- CVEN9730 International Project Management
- CVEN9731 Project Management Framework
- CVEN9802 Structural Stability
- CVEN9806 Prestressed Concrete Design
- CVEN9809 Reinforced Concrete Design
- CVEN9820 Computational Structural Mechanics
- CVEN9882 Steel Structures
- CVEN9884 Advanced Materials Technology
- CVEN9885 Water and Wastewater Analysis & Quality Requirements
- CVEN9856 Water Treatment
- CVEN9872 Hazardous Waste Management
- CVEN9884 Environmental Engineering Science 1
- CVEN9885 Environmental Engineering Science 2
- CVEN9888 Environmental Management (Materials Risk Assessment)
- CVEN9892 Sustainability Assessment & Risk Analysis (in water and energy systems planning)
- Masters Project

Not all courses are on offer each year. For further details please see the School Timetable at http://www.civeng.unsw.edu.au/information-for/current-students
The Computing, IT and Education Technology Committee (CIETC) provides support to the School’s academic and professional staff, and undergraduate, postgraduate and PhD students. This committee is also responsible for the website of the school.

A summary of the School’s computing facilities in 2012 includes:
- 2 Win7 laboratories (Lab 201 and Lab 611) with 85 SOE computers for undergraduate and postgraduate coursework students.
- Networked administrative and technical staff SOE PCs.
- Networked SOE and non-SOE PCs for PhD students.
- Networked laser printers, scanners and other peripherals.
- 2 smart-board systems (CE701 and CE501) for lecture recording and video conferencing.

The general opening hours for the undergraduate and coursework postgraduate laboratories are 8am to 10pm (weekdays), and 10am to 6pm (Saturdays) during Semester. Four student assistants were employed to staff the laboratories after hours (6pm to 10pm) during weekdays and during Saturdays, and also for audiovisual support.

The major operations and changes in our IT infrastructure are as follows:
- All SOE computers in Lab 201 and Lab 611 have been upgraded to Windows 7.
- The computers in Lab 201 have been replaced as the warranty expired in June 2012. The computers in Lab 611 will be replaced when their warranty expires in January 2013.
- Complete the upgrade of internet connection in Civil and Environmental Engineering Building (H20) to 1Gb with the installation of addition 2x48 port switches.
- Upgrade internet connection in Vallentine Annex (H22) to 1Gb.
- Upgrade network ports from dual to quad in offices in Civil and Environmental Engineering Building (H20) and Vallentine Annex (H22).
- Working with Comms and the Faculty IT unit to migrate VLANs (315, 317) to a combined Faculty of Engineering VLAN (172) to release fragmented ranges of IP addresses for further deployment.
- Decommission of the old web server (Webnew). Relocation of all web applications and databases to Drupal CMS server and to a new VM Linux server called CVEPLWS hosted by IT Service Centre.
- Complete new loan booking system on CVEPLWS for audio visual, computer labs, and equipment.
- Creation of an online demonstrator registration to assist with casual academic staff recruitment.
- Review of School web site: Internal review completed. Changes have been made where possible. Additional request for changes at Faculty level have been reported back to the Faculty.
- Migration of CIES website to Drupal CMS and creation of RCITI website on Drupal CMS.
- Migration of email distribution lists from Majordomo to combination of AD based email distribution lists and Mailman distribution lists.
- Complete a new sign-in sheet and work log application for professional staff.
- Provide assistance to the creation of research gateway staff profiles.
- Provide support and space on Drupal CMS for research student profiles.
- Provide local and administrative support to IT Service Centre operations and services (such as File Sharing Service, Manage Print Service, IT Procurement and Service Desk Requests).
- Commencement of online industrial training management system.
- Commencement of technical laboratory equipment booking system.

Xiaobo Ni has been employed from 18 June 2012 as a new fixed-term Web Developer. He undertakes web application projects.
With the integration of technology in classroom curriculum, most of the School’s courses featured either Blackboard 9 (BB9) or Moodle to enhance the student’s learning experience. In 2012, we had over 100 online learning Modules with large numbers of academic, visiting, casual teaching staff, and students participating in various online learning and teaching activities. Those activities include online course content delivered in digital documents and videos, online quizzes and assessment submissions, online group discussions and forums, and online marking and mark distribution.

The management of eLearning process is carried out within the School, with some support from IT Service Desk and the UNSW Learning and Teaching Unit. The Modules are automatically created by default along with NSS course catalogue creation by the School’s administrative officer, Flora Fan. The School’s Web/IT coordinator, Kate Brown, administers and applies appropriate templates to each Module, facilitates staff/teaching assistants enrolment and coordinates training.

There was an announcement at the end of 2012 that Moodle would be replacing Blackboard 9 in S1 of 2014.

Staff continued to produce their lecture videos and uploaded them via UNSW TV to enhance their distance teaching, using our Interactive whiteboard (known as Smartboard), lecture recording and video conferencing facilities. The School’s Computer System Officer, Patrick Vuong assists academic staff with any technical issues that may occur during recording.

The Teaching & Learning Committee supported staff’s educational technology activities by purchasing 12 HP Tablets 2760p for selected academic staff. The Tablets enabled staff to deliver their face-to-face classroom lecture more effectively especially where engineering designs can be drawn directly to the screen and shown during the class.
CEVSOC began 2012 on an exciting note with the successful First Year Camp focused on building a strong grassroots relationship with CEVSOC members through creating a supportive social environment. Throughout the year we continued our commitment to our members by running a series of events with industry support, promoting careers and working closely with the School and other societies on campus.

The office bearers of CEVSOC for 2012 were:

President Daniel Morris
Vice-President Lindsay Collier
Secretary Isabelle Testoni
Treasurer Brendan Walton
Arc Delegate Saskia de Haan
WH&S Coordinator Maritsa Kacopieros
Sports Representative Lucas Earl

Social Report
Throughout 2012 CEVSOC continuously focused on improving the university experience for its members through our events and activities. We held regular social nights within the Civil Engineering building and set record attendances through welcoming students, staff and industry representatives. We also produced CEVSOC jerseys in our school colours, which proved very popular and were worn proudly throughout the year.

First Year Camp
2012 saw the debut of the highly anticipated First Year Camp. The CEVSOC Executive and elected student leaders from senior years took a group of first year students to Camp Wombaroo bordering the Jellore State Forest between Sydney and Canberra.

The all-inclusive weekend camp included outdoor team-building engineering challenges, afternoon BBQ’s by the river and social mixers into the evening. With significant support from the School and extremely positive student feedback, the First Year Camp was deemed a great success and is to be a prominent CEVSOC event into the future.

Cardno Cup
The third annual Staff versus Students soccer match was held on 24th April 2012 and for the third year in a row was taken out by the narrowest of margins by the student team. A great turnout of supporters cheered while enjoying the BBQ and drinks provided by our industry partner Cardno. This proved to be the perfect post-match celebration and we look forward to continuing this and other industry-sponsored events in future years.

Harbour Cruise
Our major social event for Semester 1 was the Annual CEVSOC Harbour Cruise run with the theme, “Used To Be Cool.” The picturesque Sydney Harbour Cruise was a dance party inside a 1990’s time capsule; thoroughly enjoyed by all. With an onboard live DJ set and an abundance of food and refreshments the night provided many students with an opportunity to experience the Harbour for the first time in a uniquely memorable way.

Fourth Year Dinner
CEVSOC was proud to be associated with celebrating the achievements of its members in organizing a formal evening for the graduating class of 2012. The 200 guests included industry sponsors who conducted an awards presentation and various staff members such as Dr. Kurt Douglas who ended the evening with his best wishes and a vote of thanks. We wish the graduating class the best into the future and look forward to hearing of your success.

2013 and Beyond
After a very successful year with record attendances at events, the new committee brings an abundance of experience and enthusiasm to expand CEVSOC in the same way the outgoing committee did. With exciting new ideas as well as proven favorites, CEVSOC will maximize the experience of our members into 2013 and beyond.

Josh Farr
CEVSOC President 2013
Year 4 DINNER
Undergraduate Student Awards and Prizes 2012

University Medallists 2012
A University Medal is awarded to a student in an undergraduate program who has shown highly distinguished merit in completing her or his program of study. The University Medal Committee takes into account the whole academic record of the student. The award of a Medal indicates outstanding academic performance - as in the case of a degree awarded with Honours - the recipient is expected to achieve significantly above the minimum requirements for Honours Class 1.

The University Medal in Civil Engineering - Shuang Guo
The University Medal in Environmental Engineering - Bijoy Joseph

Our sincere congratulations to Shuang and Bijoy.

Dean’s Awards for studies undertaken in 2012
The Faculty of Engineering Deans Award is an annual award made to students in all undergraduate degree courses offered in the Faculty. The award recognises significant academic achievements of students currently studying at the leading Engineering Faculty in Australia, and are awarded to students ranked in the top 2 percent in their year.

Civil and Environmental Engineering students – Deans Awards for studies undertaken in 2012
Stage 1: Jonathan Chan, Jason Ko, Geeheon Ngo, Karina Siems, Anh Tran, Shenggang Wang, Hubert Xiao.
Stage 2: Timothy Cheung, Jarrah Duckhs, Anthony Ferraro, Nell Hardy, Sarah Hayes, Kyudong Kim, Tony Ly, Jeremy Rajendram, Kelly Tang, Lennox To.
Stage 3: Danny Abdalla, Mathew Chong, Alison Goddard, Alice Harrison, Kelvin Nguyen, Rohan Stocker
Year 4 Industry Sponsored Prizewinners

At the annual Year 4 dinner, held at the Sheraton in November, students and staff celebrated four years of hard work and achievement. Several industry partners assisted with subsidising students’ tickets to the dinner and the awarding of prizes to some of our many outstanding students. We are grateful to these prize sponsors, and to all our industry partners, for their generous support of the work of the School.

The Civil Engineering with Architecture Prize (donated by ARUP)
Garth Miller

The Civil and Environmental Engineering Construction Management Discipline Prize (donated by Brookfield Multiplex)
Bianca Bustamente

The Civil and Environmental Engineering Environmental Discipline Prize (donated by SKM)
Michael Reeves

The Civil and Environmental Engineering Geotechnical Discipline Prize (donated by PSM)
Sam Tagliabue

The Civil and Environmental Engineering Structures Discipline Prize (donated by Aurecon)
Shuang Guo

The Civil and Environmental Engineering Transport Discipline Prize (donated by AECOM)
Edward Robson

The Civil and Environmental Engineering Water Discipline Prize (donated by GHD)
Lisa Granqvist

The Civil Engineering Industrial Training Prize (donated by URS)
Jivanka Perera

The Civil Engineering Practice Prize (donated by Cardno)
Lizhe Sun

The Environmental Engineering Practice Prize (donated by Cardno)
Carol Ka Ho Ng

Other prize winners

The Jeffery and Katauskas Prize
Anh Tran

The Welding Technology Institute of Australia Prize
Anthony Ferraro

The Alexander Wargon Prize
Shuang Guo

Engineers Australia Civil and Structural Engineering Prize
Andrew Davis

The Jacob N Frenkel Prize
Jonathan Chan
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Co-funders of Academic Positions:

Mr Gary Johnston for the Gary Johnston Chair of Water Management

School Industry Partners:

ARUP, Aurecon, LAING O’DURKIE, Brookfield MULTIPLEX

Public Works NSW, Woodhead, Taylor Thompson, SMEC, SKM

Macmahon, Parsons Brinckerhoff, WorleyParson

School Industry Supporters:

AECOM, GHD, Sydney WATER, Cardno Suspension

NSW Transport for NSW, URS
The strategic objectives of the External Relations Committee (ERC) of the School of Civil & Environmental Engineering include the development of effective outreach and marketing programs, and the building and maintenance of good relationships with industry partners and supporters, ex-staff and alumni. The Committee is made up of academic and administrative staff and liaises with the School’s Industry Advisory Committee (IAC) which includes senior staff from major engineering companies and state bodies. The ERC also liaises with Faculty of Engineering marketing, scholarships and external relations staff.

ERC members represent and promote the School at many presentations and functions on and off campus. These include UNSW and Engineering Information days, High School visits, the Honeywell Engineering Summer School, Indigenous Australian Engineering Summer School, National Youth Science Forum, UNSW Nura Gili Winter School, Indigenous students pictured on visit with Kurt Douglas and Faculty of Engineering staff to Sydney Harbour Bridge), UNSW Open Day and facilitating all day school visits with engineering studies lectures and experiments in labs, a program which has been developed for use with the HSC Engineering Studies ‘Civil module’ Syllabus.

The ERC also administers the Industry Partner Program and within that portfolio organises an annual Industry Partners Careers Market, Elite Student/Industry breakfast, Graduate Women Ambassadors program, and the Maths Primary Prize. The ERC also sponsored careers advisors attendance at the gala night of Sydney EA Engineering Excellence Awards held at the Westin on September 21, and liaised with industry sponsors in order to support the annual Fourth Year Dinner. An Industrial training – information for employers – brochure was also designed and produced in conjunction with the IAC. The ERC also successfully manages the provision of an external MEngSc in project management specially developed for staff within the Leighton Holdings group of companies - in Australia and overseas, and facilitated the visit in 2012 of Leighton CEO Hamish Tyrwhitt to speak to Year 3 students about life beyond university.
The Year 10 work experience bus tour, which was held in June is another clear IAC and ERC creative success. This year 40 students from 26 schools took part. The week’s activities included a visit to Royal North Shore Hospital to look at a Thiess construction project, a trip to the Seaclliff bridge and RTA road tunnel MS, the Water Research Laboratory, Centennial Park, Port Botany and the Kurnell coastal works and desalination plant as well as time at UNSW in the CVEN Design Studio working on bridge model constructions, and in the School’s computer labs working on their daily reports.

A total of 41 primary schools participated in the CVEN Maths primary prizes while 47 new schools were engaged with the new Faculty sponsored prizes. All had been excellently administered by the School’s Maths Prize Coordinator Ms Tricia Tesoriero. Members of the School’s Industry Advisory Committee, School staff and some illustrious alumni presented the awards at end of year ceremonies, further raising the profile of the profession to hundreds of young people, their families and community. As ERC Co-Chair Ron Cox noted, we were the only university at the awards – the message of UNSW as a concerned and connected university was effectively reinforced at each presentation.

The ERC continues to develop the School’s relationship with graduates through the Annual Report and the annual CVEN Alumni newsletter - distributed through the University’s alumni magazine UNSWorld. Other School success stories reached all Faculty of Engineering alumni through UNSW Engineers alumni magazine, as the ERC works with both Faculty and UNSW media offices.

In 2012 the work of the committee was recognised by two awards. In November team members were honoured with The Faculty of Engineering’s Professional Staff (Team) Excellence Award, for the innovative projects of the Maths Primary Prize and the Year 10 Work Experience Week. In December, the entire team was awarded the UNSW Staff Excellence Award (group) for Excellence in Community Engagement. In nominating the ERC, Professor David Waite, HoS, wrote: ‘The ERC have been dedicated, motivated, highly professional, enthusiastic and endlessly creative in carrying out their strategic objectives - of raising the profile and building the connections of the School - and, indeed, have expanded and exceeded them. Their work has significantly benefitted the School, the Faculty and UNSW.

For further information on external relations, alumni, the IAC and School Industry Partnership Program contact Dr Mary O’Connell at m.oconnell@unsw.edu.au
The Industry Advisory Committee is an important means by which links between the School and industry are maintained. Members of the IAC are drawn from private sector, government and consultant organisations. Its main function is that of "sounding board" for the School in regard to undergraduate and graduate programs, and research directions.

The IAC membership represents a broad cross section of relevant industry sectors at a senior and influential level. Quite apart from specific initiatives, the opportunity for general interaction between the School and industry organisations is important both to the School and to the industries to which it relates, whether by means of formal quarterly meetings or by way of informal exchange of information, perspectives and views.

The IAC has also been the source of many initiatives aimed at maximising the standard of students making application for undergraduate and graduate programs. As a consequence, the School now reaches out to these groups in several practical ways including: Presentation of prizes in primary schools, Year 10 visits to engineering projects and activities as an alternative form of “industry work experience” for high school students; and sponsorship of attendance by school careers advisers at industry awards dinners for engineering excellence as a means of increasing the understanding that careers advisers have of engineering.

Each of these means of outreach has received very favourable feedback from participants and the scale of each was increased in 2012.

Ian McIntyre
Chairman
Andrew leads an integrated buildings design team in the Sydney Arup office delivering bespoke high level multi-disciplinary design to achieve better and more sustainable buildings.

Andrew is a structural engineer with a passion for design philosophies combining innovation with efficiency in holistic building or structural solutions, and his experience designing and delivering projects in Australia, the UK, and around the world over 17 years includes collaboration with some of the world’s leading architects on commercial, education, sport & leisure, industrial, retail, residential, and marine projects for both private sector and government clients.

His specific structural expertise includes tall buildings, hybrid structures, long-term serviceability of structures, seismic analysis and design, and long-span lightweight roof structures.

Dr Kourosh Kayvani
Innovation Leader - Asia Pacific
Aurecon

Dr Kourosh Kayvani is Aurecon’s global Head of Innovation. Over a 20+ year career, he played key roles in the design of many innovative and award-winning structures including Wembley National Stadium (Arch and Roof), London; the ANSTO OPAL Reactor Building, Lucas Heights, NSW; and State Hockey Centre, Sydney Olympic Park, Sydney.

Kourosh has been listed in Engineers Australia Top 100 most influential engineers in 2009 in recognition of his Engineering Expertise. He is also a Laureate of the IABSE Prize awarded by the International Association for Bridge and Structural Engineering for his contribution to long span structures worldwide. Kourosh is a Fellow of Engineers Australia, a Director of Australian Steel Institute (ASI) and a Director of Association of Structural Engineers, NSW (ASCE).

A civil engineer and School alumnus, with 36 years’ experience in the construction and mining industries in Australia, South East Asia and India, Bruce has held a number of senior positions within Thiess. These have included President Director of PT Thiess Contractors Indonesia—a role he held for eight years after his appointment in 1999. He was appointed Executive General Manager Asia in August 2007 and in January 2010 he took on the role of Thiess’ Chief Executive Mining. Bruce has a long history with Thiess’ parent company, Leighton Holdings, having worked with both Leighton Asia and Leighton Contractors.

Bruce is also on the Boards of the Minerals Council of Australia and Australian Constructors Association and Queensland Chair of the Australia Indonesia Business Council.

Andrew Johnson
Principal, ARUP

Andrew Johnson, Principal, ARUP, is the Operating Centre Manager for GHD’s Tasmanian business and Victorian Manager for GHD’s Tasmanian business and Victorian Manager for Transportation and Municipal Engineering.

Garry worked with the NSW Department of Public Works and with consulting geotechnical engineers from 1970 until 1986. He then joined the School of Civil Engineering at UNSW where he lectured in civil and environmental engineering practice and geotechnical engineering. He joined PSM in 1997 as a Principal Consultant. Garry’s fields of specialist expertise include slope engineering, foundation engineering, rock mechanics, geotechnical risk analysis, and forensic engineering. He has authored or co-authored over 60 journal and conference papers. He has worked on major projects throughout Australia and in Thailand and PNG. He has been an active member of several national and international code and practice committees and been involved at the highest levels of the Australian Geomechanics Society and the International Society for Rock Mechanics.

A/Prof Garry Mostyn
Principal, PSM

A/Prof Garry Mostyn, Principal, PSM, is the Operating Centre Manager for GHD’s Sydney Operating Centre. He has worked with GHD for more than 14 years and has strong experience ranging from concept development to detailed design and construction management, predominantly in the transportation sector. Previously, he was the Operating Centre Manager for GHD’s Tasmanian business and Victorian Manager for Transportation and Municipal Engineering.

Les Wielinga
Director-General
Transport NSW

Les has been Director-General of Transport NSW since July 2009. Transport NSW is the state’s main agency for public transport and roads in NSW, with responsibility for policy, planning and coordination, infrastructure delivery and asset management. He was previously Chief Executive of the Sydney Metro Authority and the NSW Roads and Traffic Authority.

IAC School Members

Professor T David Waite
Scientia Professor
Head of School

A/Prof Ron Cox
Co-Chair, External Relations Committee
Convener, ACCARNSI

Dr Kurt Douglas
Co-Chair, External Relations Committee

Dr Mary O’Connell
Manager - External Relations

A/Prof Garry Mostyn
Principal, PSM
Industry Partners’ Sponsored - CVEN Maths Primary Prize - Winners 2012

Alexandria Park Community School
Cian Cameron-Gleeson
Ricky Li
Ben Snaea
Lucy Zheng

Avondale School of Higher Education
Cody Bailey
Hope Latu
Dominique McMahon
Nyah White

Balgowlah North Public School
India Rowe

Beecroft Public School
Alex Noh

Bellevue Hill Public School
Yianni Nicolau
Ben Matsumoto

Belrose Public School
Ben Berry
Lachlan Clarke
Mitchell Cree
Skye Farquhar

Berowra Public School
Philip Meli
Aaron Munro
Natalie Storrie
Alodie Wheeler

Bilgola Plateau Public School
Tom Braund
Billy Ballico
Thomas Davies
Myles Pymble

Camdenville Public School
Ryan Li
callin Pauner

Cammeray Public School
Charlotte Beaumont
Leon Everett
Oscar Fevre
Robert Hunter

Campbelltown Public School
Agape Ah-Young
Sarah Al-Nakeeb
Maxim Bousargine
Iemaima Etuale
Visal Ken
Sorin Szabo
Shivanti Vinod

Carlton South Public School
Phillip Gorgijevski
Kane Qian

Chifley Public School
Andrew McCarthy
Cowra Public School
Ellis Hawker
Marcus O’Connor

Crescent Head Public School
Fergus Hanss
Blake Pietsch

Double Bay Public School
James Donato

Eastlakes Public School
Aris Ahmadi
Ubai Dahoud
Lillian Fletcher
Sanjida Islam

Harbord Public School
James Anthony
Allyson Campbell
Jesse Lillley
Hugo Pearson
Phoebe Tulk

Jasper Road Public School
Bob Chen
Kevin Lee
Hrishikesh Masurkar
Louise Wang

Kambora Public School
Kevin Carver
Breyton Chant
Jamieson Schramko
Jordan Stoddart

Kensington Public School
Joon Kim
Jack Lin
Kevin Tong
Phoebe Zeng

Loquat Valley Anglican Preparatory School
Juliette Di Bello
Matthew Hooker
Harrison Keys
Max Lo Certo

Manly West Public School
Casey Bolton
Jessica Luo
Oisin McMorow-Dermody
Aidan Torpey

Mosman Public School
Anna Goodman
Mount Colah Public School
Corey Miller
Anderson Pendick
Errol Riezenkamp
Samantha Riezenkamp

Narrabeen North Public School
Robbie Caldwell
Daniel McKay

North Haven Public School
Jordan Mitchley
Luke Mudge

Northbridge Public School
Haeata Balfour-Ash
Alyssa Nogli

Northern Beaches Christian School
Ben Hutchison
Rhys Mackintosh
Joshua Yoe

Pennant Hills Public School
Ji-Yun Kim
Eleanor Lidbetter

Picnic Point Public School
Victoria Gao

Randwick Public School
Brandon Wimsley

Roselea Public School
Jane Wang

St Joseph’s Primary School
Joseph Atkins
Thomas Beauchamp

Tacking Point Public School
Byron Kipreotis
Diego Bovey Mendez

Toongabbie West Public School
Trishan Don Bernard

West Pennant Hills Public School
Harrison Chudleigh
Nathan Ng
Thomas Rolinson
Seth Sweeney

Woolloomooloo Anglican College
Noah Sarkis

Woollahra Public School
Kelvin Du
Ben Gurtala
Chen Zhang
Dear Professor Davies and Mr Allen,

Thank you very much for my UNSW Faculty of Engineering Primary School Prize in Mathematics. Although it was a huge surprise to receive this prize, it was a great honour. My best friend's Dad was also very pleased.

Firstly, because he studied Civil Engineering but also because a girl won the award. He said when he was at University there weren't many girls doing Engineering. Hopefully awards like this one will encourage more girls in the future.

Thank you for making time to visit our school and I am looking forward to spending my voucher at the ABC Shop.

Yours sincerely

Emily

Emily van Dam
Year 6, Clovelly Public School.

It is exciting to hear of the wonderful opportunities open to girls nowadays. From a personal perspective, the Primary Schools Maths Prize has been a very positive experience for my daughter by opening her eyes to alternative career options. It also lets her fellow students know it's 'okay for a girl to be good at maths'!! The Maths Prize and Yr 10 Engineering Work Experience are fabulous initiatives- and always great to see girls involved in both.

Cheers

Steph

Stephanie van Dam

Thank you to our 2012 Industry Partners & Supporters:

- AECOM
- ANSTO
- ARUP
- Aurecon
- Brookfield Multiplex Ltd
- Cardno
- Evans & Peck
- Gary Johnston
- GHD
- Laing O'Rourke
- Leighton Contractors
- Leighton Holdings
- Macmahon Contractors
- NSW Water Solutions, NSW Public Works
- Parsons Brinckerhoff
- Pells Sullivan Meynink Pty Ltd
- Permathene Australia
- RMS
- Sinclair Knight Merz Pty Ltd
- SMEC Australia
- State Water
- Sydne Water
- Taylor Thomson Whitting
- URS Australia
- Worley Parsons
The School has strong active links with industry and is very committed to continuing and developing these strong ties. Our Industry Partnership Program (IPP) allows for the opportunity to further develop the productive relationship between the School, its staff, students and industry.

Money raised through the IPP is administered by the School’s External Relations Committee and is used for the purpose of raising the profile of the School and the engineering profession - as well as developing ways for our current students to interact with industry partners.

The annual Industry Partners Careers Market is therefore an important School activity, where industry representatives meet with Year 3 and Year 4 students. This event has proved of major value to industry in identifying students for industrial training placements or graduate employment. We also host the Elite Student Breakfast at Botanic Gardens where our top students engage with industry representatives in a more relaxed setting.

Industry partners and supporters are also invited to the annual Year 4 dinner where many companies provide prizes for outstanding fourth year students. Other industry supporters provide scholarships for students. Industry Partners are also invited to the School to give technical lectures within various classes and to provide talks and information on various career opportunities for our students.

Acknowledgement of Industry Partners is made through the School website, and in the widely distributed Annual Report. For Industry Partners only, we can also directly email career information to all relevant undergraduate and postgraduate students.

Raising their profile with the staff and students of the School is just one beneficial aspect of industry partnership. Industry Partners and Supporters are also invited to School research seminars, honours thesis seminars and postgraduate research poster forums. This provides industry with the opportunity to get current with the frontier of engineering knowledge. In recent years some industry partners have actively invested in extending
the reaches and uses of engineering and scientific knowledge and research. Several School academic positions are currently funded through the generosity of industry including:

- The **Australian Nuclear Science and Technology Organisation (ANSTO)** - a public research organisation - provides funding support for a Senior Research Fellow (currently Dr Atsushi Ikeda) at the School’s Water Research Centre whose work on trace element (metal, metalloid and actinide) environmental chemistry – aims for aquatic and soil remediation.

- **Evans & Peck** - an international infrastructure-based advisory company – established a new Chair in 2010 - the Evans & Peck Professor for Transport Innovation. Professor Travis Waller now leads a new and expanding Faculty-wide Research Centre for Integrated Transport Innovation (RCITI) based in the School.

- **Gary Johnston** provides funding support for the Gary Johnston Professor of Water Management, a joint Chair between the School of Civil and Environmental Engineering and the School of Biology, Earth and Environmental Sciences (BEES) in the Faculty of Science, which is held by the School’s groundwater expert Professor Ian Acworth.

- **Pells Sullivan Meynink Pty Ltd**, a high profile firm of specialist geotechnical consultants, provide funding support for the position of Pells Sullivan Meynink Senior Lecturer of Rock Mechanics, Dr Kurt Douglas.

### New research with industry:

Industry Partners are always very welcome to discuss new research projects with us. In 2012 our industry and government-related research income totalled over $15.56m, involving over one hundred partnering organisations from private industry, public utilities, and all levels of government.
Golden Graduates

May saw a day of joyful remi-
niscing as the Faculty of Engineering
graduates of 1962 celebrated 50 years since graduation.

Guests spent the day rekindling friendships and exploring the campus as they were welcomed back for the Golden Jubilee luncheon. The event began with a morning tea, followed by a campus tour and then a formal lunch where the attendees relived their graduation when Professor Wai-Fong Chua (Pro-Vice Chancellor of Students) presented them with a commemorative UNSW pen. Guests were also treated with a book on the history of the UNSW Faculty of Engineering, while civil engineering alumni scored twice – with a copy of their very own School history.

The campus tour was a highlight of the day and included a stop at the Council Chambers at the Chancellery and an exclusive insight, including roof access, into the newest development of the Faculty - the Tyree Energy Technologies Building.

Lunch followed the campus tour where guests enjoyed a two-course lunch in the Tyree Room at the John Niland Scientia Building. John Carrot Moran gave a speech – we wonder if that is the legendary Munro Cup he is wielding.

VALE

Dr Samia Guirguis (1948 – 2012) was the first woman to complete a PhD in Civil Engineering in Australia and she did it in the field of Concrete Technology at UNSW. She then went to work with the Cement and Concrete Association of Australia and was active on many code committees. Samia made a very significant contribution to the structural engineering profession throughout her career. She was awarded the 2011 John Connell Gold Medal in recognition of that fact.
Civil Treasures

The ERC maintains positive links with ex-School staff through organising regular annual functions for the ‘Civil Treasures.’ We aim to stay connected with our elders, and all those who have built the School into the powerhouse of research, teaching and engagement with community which it is today.

Blacka, MJ, & Flocard, F 2012, Coastal Adaptation and Protection Options for Port Sorrell and Shearwater.


Coghlan, IR, Ruprecht, J, & Blacka, MJ 2012, Abbot Point MCF 2D and Q3D Baseline Modelling Study.


Flocard, F, & Blacka, MJ 2012, Seawall Assessment Literature Review.


Mariani, A, Carley, JT, Lord, DB, & Shand, TD 2012, Identification of Coastal Hazard Risk Areas to Projected Sea Level Rise for the Manly Local Government Area.

Mariani, A, & Carley, JT 2012, Manly LGA Seawall Risk Assessment and Plan for Priority Upgrade/Replacement.

Mariani, A, & Coghlan, IR 2012, Seawall Structure Assessment at Bilgola and Clontarf, Sydney, NSW.

Miller, BM, & Tarrade, L 2012, Manning River Saline Dynamic Modelling.

Miller, BM, & Badenhop, AM 2012, Peer Review of Camden Gas Project Groundwater Investigations.

Ng, TS, Htut, TN, & Foster, SJ 2012, Fracture of steel fibre reinforced concrete the unified variable engagement model.


Rayner, D, Carley, JT, & Coghlan, IR 2012, New Brighton Beach Scraping Trial: Analysis of Dune and Beach Profile Data.


Ruprecht, J, Shand, TD, & Miller, BM 2012, Melville Bay - Wind Hindcasting.


Smith, G, & Wasko, CD 2012, Throsby Creek Dredging: Flood Assessment.

Timms, WA, Ruprecht, J, & Greve, AK 2012, Hydraulic Conductivity Testing of Drill Core - Broken Hill MAR.


Research at Civil and Environmental Engineering

CIES
Centre for Infrastructure, Engineering & Safety
www.cies.unsw.edu.au

CWl
Connected Waters Initiative
www.connectedwaters.unsw.edu.au

rCITI
Research Centre for Integrated Transport Innovation
www.rciti.unsw.edu.au

WRC
The Water Research Centre
water.unsw.edu.au

ECM
Engineering Construction and Management

ACCARNSI
The Australian Climate Change Adaptation Research Network for Settlements and Infrastructure
www.nccarf.edu.au
Our Expertise

The Centre for Infrastructure Engineering and Safety is focused on high-level research in structural engineering, geotechnical engineering, engineering materials and computational mechanics. Specifically, we apply our skills to engineering and safety assessments and to the risk management of buildings, bridges, dams, roads and other infrastructure when subjected to both in-service conditions and overload (or limit) conditions, such as may occur in fire, earthquake, cyclone or blast situations, or when structures are exposed to hostile environments. In addition, CIES aims to promote multi-disciplinary collaboration and we actively collaborate with researchers in the fields of mechanical engineering, surveying and remote sensing, and the UNSW Faculties of Science and the Built Environment.

Our Vision

As an internationally recognised research centre our vision is to provide outcomes that improve the design, construction and maintenance of economic, effective and safe civil engineering infrastructure that enhances the quality of human life in a sustainable way.

In 2012:

- The Centre managed over $2.0 million, with 1.5 million derived from competitive ARC Discovery and Linkage grants;
- Our researchers published 4 book chapters, 76 refereed journal papers and 51 refereed conference papers;
- We had 29 research staff and 42 PhD research students
Innovative and advanced building systems

CIES Director of Research and Founding Director Scientia Professor Mark Bradford is leading research in the areas of innovative and advanced building systems. A research project entitled “An innovative and advanced systems approach for full life-cycle, low-emissions composite and hybrid building infrastructure” is funded by the Australian Research Council through a prestigious Laureate Fellowship awarded to Professor Bradford. For more details see p10 in the Big Picture section of this Report.

Building materials of the future - Reactive Powder Concrete (RPC) Columns.

CIES researchers have completed a series of tests in the Heavy Structures Laboratory at Randwick to improve our understanding of high-performance concrete columns that are subjected to impact loading - more particularly, that of high strength concrete (HSC) and reactive powder concrete (RPC) columns that are subjected to the combined effect of impact and axial forces.

Reinforced concrete structures during their construction stage and service life may experience severe loadings such as impact and blast. The behaviour of reinforced concrete structures under such high rate loading is not thoroughly understood and the conventional design guidelines for these structures are mostly empirical.

In the first part of the research, an experimental program was conducted to consider the effect of axial force, loading eccentricity and the use of steel fibre reactive powder concrete, as a replacement for conventional strength concretes, on the impact performance of concrete members. The program included tests on 16 specimens with three types of columns and beams: HSC, RPC, and HSC core and RPC shell. In the second part of this research, the experimental tests were used to validate a numerical model based on the software LS-DYNA and the model then extended to consider the effect of higher axial forces in a parametric study.

Research outcomes: The experimental results showed that axial force and its eccentricity has a significant influence on both the impact performance and the failure mode. The degree of influence was dependent on the magnitude of the axial force and its eccentricity. The RPC specimen exhibited a better impact performance with smaller mid-span displacements and sustained a greater number of impacts to failure compared to the other types of columns tested.

Numerical results showed that using reactive powder concrete provides significant enhancement for the impact resistance of members compared to the high strength concrete. They also show that axial force and its eccentricity cannot be ignored when assessing the impact resistance of a member as they influence both the resistance during the impact and the residual residual capacity of a member to withstand static axial loads after impact without collapse.
2012 CIES Symposium

On 10th October 2012, CIES held its second Symposium. The revised format for the event and its underlying objective, was to enhance the research profile within the local construction industry and to showcase research activities of the Centre. It is planned that this will be the first in a series of such events to be held annually.

The theme for 2012 focussed on “Sustainability in Civil Infrastructure: Design, Construction and Resilience” with an impressive line up of international and national leaders in the field of Sustainable Infrastructure research and practice.

On offer to our industry participants as well as academic colleagues was the opportunity to review trends in infrastructure sustainability - to keep abreast of current and future developments and opportunities; to network with leading researchers and professionals, as well as providing inspiration and opportunities for collaboration on future research projects.

The presenters included Professor David Nethercot (Imperial College London), Professor Jin-Guang Teng (The Hong Kong Polytechnic University), Professor John Wilson (Swinburne University of Technology Melbourne), Professor Robert Melchers (University of Newcastle), Professor Michael Neuman (UNSW), Professor Brian Uy (UWS), Professor S. Travis Waller (UNSW).

CIES Director Professor Steve Foster and Research Director Professor Mark Bradford were also speakers at the Symposium. Deputy Director Professor Ian Gilbert chaired a number of the sessions as well as a very stimulating panel discussion which involved all of the day’s speakers and provided a very thought provoking conclusion to the day’s proceedings.

As part of promoting the Centre, this event provided an excellent opportunity to showcase our PhD students’ research activities by way of poster display for each of their research projects.

CIES – Arnaud Castel - further “cementing” our expertise in concrete structures

Arnaud is an expert in the durability of concrete structures in aggressive environments, life cycle assessment and sustainability of structures.

Prior to joining CIES as a full-time member of the academic staff, A/Prof Castel had spent a full year sabbatical at UNSW within CIES (2010-2011), collaborating on two existing research projects with CIES researchers. Arnaud’s appointment will facilitate growth in both the breadth and depth of CIES research and will greatly enhance the capability of CIES in the development of solutions to the provision of durable and sustainable infrastructure in Australia.

The performance of modern structures is also influenced by problematic material attributes that can compromise the safety and appearance of structures, such as the low permeability of some concretes and the resulting chloride infusion that may lead to corrosion of reinforcement. A/Professor Castel is an internationally respected scholar in these areas. Assessing the ramifications of the impacts of extreme actions on structures and accounting for the problematic attributes of modern construction materials are relatively recent research areas that will be of increasing importance for structural engineering research over the coming decades.

Associate Professor Arnaud Castel joined CIES from the University of Nice-Sophia Antipolis (UNS) in September 2012 bringing with him his internationally recognized expertise in the areas of concrete technology and concrete structures.
John Connell Gold Medal awarded to Scientia Professor Mark Bradford

CIES Director of Research and Founding Director, Scientia Professor Mark Bradford, has been awarded the John Connell Gold Medal by Engineers Australia’s Structural College for 2012. The John Connell Gold Medal is awarded to an eminent structural engineer who has made a significant contribution to the standing and prestige of the structural engineering profession. Professor Bradford’s medal was presented by Richard Eckhaus, Chairman of the Structural College of Engineers Australia, at the Australasian Structural Engineering Conference in Perth. Professor Bradford was also one of the three keynote speakers at the Conference, his presentation was entitled ‘Innovative applications and behaviour of composite slabs with deep trapezoidal sheeting,’ which was based on research work undertaken in two ARC Linkage Grants awarded to Professors Ian Gilbert, Stephen Foster and himself, and supported by BlueScope Lysaght, BOSFA, Fielders Australia and Prestressed Concrete Consultants Pty Limited.

Dr Michael Man awarded the prestigious Mike Crisfield Prize

Dr Michael Man, a Research Fellow in the Centre for Infrastructure Engineering and Safety (CIES) at the School of Civil and Environmental Engineering, was awarded the prestigious Mike Crisfield Prize at the 20th Annual Conference on Computational Mechanics (ACME) in Manchester, UK 2012.

Michael presented his paper titled “A Semi-Analytical Technique for Plate Bending Analysis with Pade Expansion” (The co-authors of the paper are Chongmin Song, Wei Gao and Francis Tin-Loi - all of CIES). The development of this new technique has so far led to two A* international journal publications. The continuous extension of this technique assures to bring a highly accurate and efficient numerical tool to the analysis and design of smart composite structures under static and dynamic actions.
The Connected Waters Initiative Research Centre (CWI) is UNSW’s Groundwater Research Centre. The CWI is a cross-faculty research grouping. At the start of 2012, staff were based in the Schools of Civil and Environmental Engineering and the Biological, Earth and Environmental Sciences. However, new appointments within the year saw the CWI extend its post-doctoral, professional and academic staffing to the School of Mining Engineering, the Mark Wainwright Analytical Centre, and UNSW Law. Groundwater research at UNSW now has a truly multi-disciplinary team.

Our research in 2012 focussed on our two largest and on-going research grants. Within the Australian Research Council and National Water Commission co-funded Centre for Excellence for Groundwater Research and Training (NCGRT), we reached and maintained full staffing capacity throughout 2012. The NCGRT provided approximately $6.9M funding for the training of Honours, PhD and post-doctoral researchers from 2009 to 2014. In 2012, $1.5M of funding was available and supported our post-doctoral, PhD and Honours team across the University. As well as supporting salaries and scholarships, the NCGRT team made numerous presentations of their research findings at the International Association of Hydrogeologists Congress in Canada and the American Geophysical Union Fall Meeting in San Francisco. The NCGRT also supported a workshop investigating ‘Heat as a Groundwater Tracer’ at UNSW, led by Martin Andersen, and the attendance of all NCGRT supported staff at the annual NCGRT Summer School, this year held at the Shine Dome in Canberra.

The second significant research grant managed by CWI throughout 2012 is the DIISRTE Groundwater Education Investment Fund (GEIF), supporting $15M of groundwater infrastructure over the period 2010 to 2013 for the establishment of long term monitoring sites for groundwater research. In 2012, $4M of investment was made at research sites within NSW, Victoria, South Australia, Queensland and the Northern Territories.

2012 saw the successful completion of two major research projects: the Cotton CRC project: The impact of climate change on surface water groundwater resources: Maules Creek case study and the New South Wales Office of Water project: Anna Bay Coastal Groundwater. One new research project commenced: Drs Gabriel Rau and Martin Andersen were successful co-applicants for an EU grant (BARDEX-II, headed up by Plymouth University, UK) together with Dr Ian Turner (WRL) which enabled them to visit the Deltares Flume in the Netherlands for 5 weeks in May-June to conduct heat and solute tracing experiments in a full-scale coastal sand barrier.

Several members of the CWI team moved on to new and exciting careers in 2012. We would like to congratulat
The Research Centre for Integrated Transport Innovation (rCITI) represents a strategic effort with research and industry partners (including NICTA and Evans & Peck) that unites and substantially augments the wide range of transport research across campus.

Since its launch in November 2011, rCITI has continued to expand and strengthen its network across campus and with relevant government and industry. Key achievements for 2012 include the signing of an Umbrella Deed with the NSW Government Roads and Maritime Services (RMS), as well as a Memorandum of Understanding with GoGet, the car share company and Better Place, an electric car charge network; and the award of a 2013 Australian Research Council (ARC) Linkage Infrastructure, Equipment and Facilities (LIEF) Grant for a world-first driving simulation laboratory.

The NSW Minister for Transport, The Hon. Gladys Berejiklian visited the School of Civil and Environmental Engineering in March for a presentation about the Research Centre for Integrated Transport Innovation (rCITI). Professor Travis Waller’s overview of rCITI was followed by discussion with the Minister. Attendees at the Minister’s visit included delegates from UNSW such as Professor Graham Davies (Dean, Faculty of Engineering), Professor Les Field (Deputy Vice-Chancellor, Research), Professor T. David Waite (HoS, Civil and Environmental Engineering), and Professor Nasser Khalili (Associate Dean, Research), as well as representatives from Evans & Peck (Mr Ian McIntyre and Mr Paul Forward, Principals) and NICTA (Mr Rob Fitzpatrick, Director, Infrastructure, Transport & Logistics).

Ms Berejiklian was pleased with the university’s efforts and the creation of a Transportation Research Centre and is looking forward to opportunities for cooperation. During her visit, Ms Berejiklian appointed Professor Waller an invited member to the Transport Specialist Advisory Group for Transport for NSW.

rCITI staff held numerous other governmental meetings in 2012, including with Mr Mike Mrdak, Secretary at the Department of Infrastructure, Transport, Regional Development & Local Government who invited Professor Waller for discussions with him and his team to Canberra.

Professor Waller and Dr Dixit from rCITI, Professor Dennis Del Favero, Director of the UNSW iCinema Research Centre for Interactive Cinema, jointly with Professor Bliemer from the University of Sydney, have been awarded a 2013 Australian Research Council (ARC) Linkage Infrastructure, Equipment and Facilities (LIEF) for a driving simulation laboratory, the Travel Choice Simulation Laboratory (TRACSLab). TRACSLab is a world-first facility to observe collective travel choice in a realistic lab environment. It is unique due to the focus on travel choice, networked interaction and strong teaming. The findings of the lab will support a new generation of transport analysis techniques for emerging issues such as sustainability, reliability, and ITS.

rCITI lead an international consortium (including Monash, IIT Delhi, IIT Madras, NICTA, DIMTS, CRRI and GoGet) for an expression-of-interest (EOI) submission on “Integrated Network Planning Methodologies for the Sustainable Convergence of Transport and Energy”, to the Australian Government Department of Industry, Innovation Science, Research and Tertiary Education for the Australia-India Strategic Research Fund (AISRF) Grand Challenge. The EOI was successful in the pre-proposal stage and the team was invited to submit a full application. The outcome will be announced in 2013.

In October, Dr Taha Hossein Rashidi from the University of Toronto, Canada, joined the Centre’s core academic team.
and was welcomed by Centre Director Professor S. Travis Waller, Senior Lecturer Dr Upali Vandebona, Senior Lecturer Dr Vinayak Dixit and Lecturer Dr Lauren Gardner. Dr Rashidi’s research expertise complements rCITI’s research efforts in key areas, including land-use and vehicle ownership models, as well as goods movement data collection and modelling methods.

At the same time, Visiting Fellow Dr Hironobu Hasegawa joined the transportation group from the Akita National College of Technology. Dr Hasegawa will work with rCITI on a variety of research areas, including his key expertise in applications of machine learning and data mining algorithms in the field of transportation. In particular, he is currently collaborating on the development of a micro-simulation travel demand model for the City of Melbourne.

Professor Waller has attended and been invited to present at a variety of conferences this year. He participated in TRB (Transportation Research Board 91st Annual Meeting, Washington D.C.), presenting research contributions and chairing several TRB Committee Meetings. In addition, he gave an invited talk at the Intelligent Transport Systems (ITS) Workshop at Beijing Jiaotong University in May and was a plenary speaker at the 17th International Conference of the Hong Kong Society for Transportation Studies (HKSTS) in Hong Kong in December.

The 4th International Symposium on Dynamic Traffic Assignment (DTA) took place on Martha’s Vineyard in June and was co-organized by Professor Waller, who also presented new developments in the field of DTA including better methods for addressing day-to-day volatility in traffic flow within the transport planning process.

In December, Professor Waller was invited to Japan to participate in an exclusive meeting of the National Institute of Informatics (NII) on “Social Issues in Computational Transportation Science”. The meeting consisted of research leaders spanning computer science, big data, transport engineering, and urban planning with the aim of identifying emerging themes and cutting-edge concepts which impact numerous adjacent domains.

Throughout the year, rCITI has also attracted and welcomed a variety of guest speakers to the School for relevant research seminars. Visitors and seminar topics included Associate Professor Karen Smilowitz of the Department of Industrial Engineering and Management Sciences at Northwestern University (“Transportation and logistics models in non-profit settings”), Professor Lisa Rutstrom from Georgia State University (“Experiments on Driving Under Uncertain Congestion Conditions”), Dr Majid Sarvi from the Civil Engineering Department at Monash University (“Crowd Safety under Panic Conditions: Linking Non-human Biological Organisms to the Development of a Crowd Dynamic Model”), Associate Professor Satish Ukkusuri from Purdue University (“Integrative Modeling Tools for Sustainable Transportation Systems” and “The Use of Large Scale Geo-Location Data for Traffic Analytics”), as well as Professor Sahotra Sarkar from the Section of Integrative Biology at the University of Texas at Austin (“Climate Change and the Risk of Vector-Borne Diseases”).

It has been a successful year for rCITI in expanding and strengthening key relations and commencing new research projects. In fact, even though 2012 represents the first year of operation for the transport centre, rCITI has already developed multiple key relationships with industry, attracted global attention for research done at UNSW, worked on internationally funded projects, led global consortia, received substantial funding from the Australian Research Council and built a world-class staff of researchers and educators.
The UNSW School of Civil and Environmental Engineering has a 60 year history of leading development of water technology in Australia. Apart from maintaining the largest postgraduate and undergraduate teaching programmes in water engineering in Australia, the School remains active in Australian fundamental water research:

- surface and groundwater hydrology – ongoing Australian leadership of the quantifying of rainfall, runoff and groundwater flows at catchment scales. (This history includes development of the lead Australian design document, Rainfall and Runoff, now published and developed by Engineers Australia).
- public health and water treatment – fundamental investigations of the chemistry and microbiology of water for urban use have been focussed within the Centre for Water and Waste Treatment over the last 20 years.
- civil and environmental hydraulics – practical Project-based and theoretical hydraulics research undertaken using the unique large-scale facilities of the Water Research Laboratory at Manly Vale.

There are two primary Centre nodes: at Kensington with staff and students accommodated within the Vallentine Annex; and, at the Water Research Laboratory at Manly Vale.
The Centre is co-supervised by Richard Stuetz and Bill Peirson, who are respectively responsible for each node. The new centre activities are grouped around three dominant research themes:

1. Water Supply

Australia is a continent of low rainfall and its development and economic robustness is constrained by presently available and potential water supplies.

2. The Coast

Over 86% of the Australian community live in the coastal zone with consequent environmental impact and climate vulnerabilities.

3. Sustainability

To maintain Australia’s current level of population and economic growth, water and contamination management need innovative solutions in terms of environmental, energy and social considerations.

Highlights at WRC Kensington include:

Dr Richard Collins was awarded a prestigious Fulbright scholarship in Nuclear Science and Technology, sponsored by the Australian Nuclear Science and Technology Organisation (ANSTO). Richard will undertake research in the United States at the US Department of Energy.

The 2012 NSW Young Tall Poppy Award went to Dr Rita Henderson for her research into water quality and treatment. This highly sought after award, presented by the Australian Institute of Policy and Science, recognizes early career researchers who excel in their field and are actively engaged in community outreach and education.

PhD student Eytan Rocheta has been awarded the 2012 Peter Cullen Postgraduate Scholarship at Parliament House by the Minister for Primary Industries, Katrina Hodgkinson and Peter’s widow, Vicky Cullen.

We congratulate UNSW Water Research Centre (WRC) staff, Dr Richard Collins, Associate Professor Bellie Sivakumar, and Dr Shikha Garg for their success in securing Future Fellowships (FF) and Discovery Early Career Researcher Awards (DECRA). Each year the Australian Research Council (ARC) funds research and researchers under the National Competitive
WATER RESEARCH LABORATORY

During 2012, the Water Research Laboratory (WRL) celebrated its 53rd year as a leading international research laboratory in hydraulics, groundwater and coastal engineering. WRL academic and research staff continue to undertake fundamental research with WRL Projects staff providing specialist professional engineering advice on specific projects across the water engineering discipline.

A historical strength of WRL is the strong collaborative interaction between academic and project-based activities. With the unique large-scale physical facilities at the Manly Vale site, a track record for addressing computationally-demanding numerical modelling in water engineering and significant experience in undertaking field investigations, WRL continues to maintain an international reputation in the specific disciplines of:

1. Civil and Environmental Engineering Hydraulics;
   Understanding the turbulent flow of water, air and sediment through pipes, turbinomachines, open channels and across the landscape is one of the most challenging of technical disciplines. Engineering design must recognise the inherent uncertainties of measurement and modelling methods when providing practical solutions to industry need.

2. Coastal Engineering;
   Approximately 86% of Australians live in the coastal fringe with consequent major development of urban areas, industry and supporting infrastructure. Many of the processes of wave formation and impact as well as shoreline and structural response remain poorly understood. Robust coastal engineering design techniques are essential for sustainable coastal development. Coastal engineering design must be undertaken in an ecological context containing interacting marine and freshwater ecosystems. Present concerns regarding greenhouse gas emissions are prompting a fresh look at the potential to harness energy in the coastal zone.

3. Groundwater;
   In a country dominated by long droughts interspersed with floods, groundwater is a key water reserve: protected from evaporative loss but subject to contamination and potential overexploitation. Capturing key field information is critical to an adequate understanding of groundwater movement and its coupling to surface waters. The development of large-scale geophysical techniques to "see" beneath the ground surface is a key aspect of groundwater assessment.
4. Estuarine Engineering.

Estuaries are highly productive and complex ecosystems due to the high levels of nutrients available from catchment runoff and their large and diverse habitats. As coastal development occurs, engineering design is required to:

- Mitigate adverse environmental effects and minimize impacts;
- Find appropriate means of discharging treated wastewater;
- And, develop strategies for determining appropriate estuary freshwater flows to minimize ecosystem and threatened species impacts.

While continuing our efforts within Australia, 2012 will be remembered as a great year for international collaboration and interaction at WRL.

International Conferences

A large contingent of WRL staff and students, past and present, contributed to ICCE2012 (the International Conference on Coastal Engineering) in Santander, Spain in early July 2012. The conference brought together over 500 worldwide representatives from universities, industry and coastal administrations to showcase the latest advances in coastal engineering.

The rapid expansion of groundwater research at WRL in recent years, primarily through the Connected Waters Initiative, enabled 6 past and present staff/students to attend the 39th International Association of Hydrogeologists Congress at Niagara Falls in September. Nine hundred delegates from 62 countries around the world gathered to consider the theme “Confronting Global Change”. Amongst the attendees was Doug Anderson a previous WRL staff member, who will be returning to WRL in February 2013. Internationally, WRL staff and students also presented at: 8th PIANC International Conference on Coastal and Port Engineering in Developing Countries (Chennai, February); 12th International Coastal Symposium (Plymouth, April); 9th International Symposium on Environmental Geochemistry (Portugal, July); 6th International Conference on Scour and Erosion (Paris, August); Association of Pacific Rim Universities (San Diego, September); American Geophysical Union Fall Meeting (San Francisco, December).

International Visitors

In 2012 WRL welcomed many international visitors including:

- Professor Herbert Huppert, Professor of Theoretical Geophysics and Director of the Institute of Theoretical Geophysics, University of Cambridge
- Dr Kate White, senior lead for global and climate change, US Army Corps of Engineers, Institute for Water Resources
- The U.S. National Ground Water Association 2012 Darcy Lecturer, Professor Seyed Majid Hassanizadeh of Utrecht University
- John Headland, Commissioner to PIANC USA and a Board Director for the American Society of Civil Engineer’s Coasts, Oceans, Ports, and Rivers Institute
- Professor Mark Donelan of the Rosenstiel School of Marine and Atmospheric Science, University of Miami

Many of our visitors, including those from overseas, continue to contribute to our seminar series, in our recently renovated Lecture Room.
Developing International Collaborations

During 2012 Associate Professor Ian Turner, Dr Chris Blenkinsopp, Dr Martin Andersen, Dr Gabriel Rau and Daniel Howe were all involved in a major European Union funded coastal engineering experiment at the Delta Flume in the Netherlands. The project, BARDEX2 (standing for BARrier Dynamics EXperiment), is a follow-up to a previous successful experiment and is a collaboration between leading coastal researchers from the Universities of Plymouth, Southampton, Delaware, UNSW, Utrecht, Algarve Bordeaux and New England. The experiment involved the construction of a sandy barrier-beach at prototype-scale in the Delta Flume facility with WRL providing specialist expertise on wave tracking and ground/surface water interactions.

Alessio Mariani is WRL’s third Churchill Fellowship recipient. The focus of Alessio’s 2012 fellowship was the mitigation of beach erosion. His fellowship included collaborative visits to the Port and Airport Research Institute (located at the entrance of Tokyo Bay, Japan); the Hazaki Oceanographic Research Station (on the Japanese east coast); the commercial beach drainage installation (Les Sables-d’Olonne, French Atlantic coast) and Deltares (Delft, the Netherlands).

In June, WRL Director Bill Peirson visited the North China Electric Power University in Beijing to discuss the future of wave power in China and Australia with senior staff within their School of Renewable Energy and Research Institute of Water Resources and Hydro-Electric Engineering. After presenting at ICCE in early July, Bill met in New York with representatives of the U.S. Army Corps of Engineers and the U.S. National Oceans and Atmospheric Administration to discuss on-going collaborative projects. Bill then visited the University of Valparaiso in Chile to discuss possible future collaborations in coastal engineering. Subsequently, Dr Chris Blenkinsopp has recently been invited to participate in field experiments along the coast of Chile.

WRL Projects Manager Grantley Smith was invited to deliver a keynote address at the DHI Modelling forum. He subsequently visited hydraulic laboratories at HR Wallingford, DHI in Copenhagen as well as those of NUS and NTU in Singapore. During these visits he discussed possible collaborations with these organisations and presented recent WRL work on people and vehicle stability as well as 2D Numerical modelling approaches to floodplain management and evacuation planning.

During 2012, WRL was commissioned to assess the coastal adaptation needs for extreme events and climate change of the Cook Islands. The focus of this investigation is Avarua in Rarotonga - the administrative, economic and tourism hub of the Cook Islands. Late in 2012, Project Engineers Matt Blacka and Duncan Rayner travelled to the Cook Islands to undertake a detailed topographic survey of the Avarua area, with a specific focus on the coast and the fringing lagoon system - regions that are difficult to capture using conventional or airborne techniques.

More details of the ongoing exciting activities of the Water Research Laboratory can be found at www.wrl.unsw.edu.au.

Acknowledgements

WRC staff and students would like to thank our many supporters and collaborators throughout industry, government and at Universities.
Planning for the impacts of a changing climate has seen a concentrated effort by government, industry and the research community to prepare our settlements and infrastructure for more frequent climate extremes in the future. Climate change adaptation planning continues to be a high priority for all sectors, with collaboration across sectors essential for an effective and robust response. All levels of government are looking to the research community to help inform and support them in their climate change adaptation planning processes.

In NSW, the state government has been engaging with ACCARNSI and other research institutions in the development of its adaptation plan for Sydney. This approach is key to preparing a relevant well considered plan for implementation at all levels. ACCARNSI research based at UNSW concentrates on adapting the built environment and infrastructure to weather well in periods of future climate extremes. 2012 has seen ACCARNSI collaborating with VCCCAR (the Victorian Climate Change Centre for Adaptation Research) and the NCCARF Adaptation Research Network for Emergency Management based at RMIT Melbourne to further link and emphasise the importance of an integrated response around these areas.

ACCARNSI’s goals for 2012 and into the future are to continue to lead research in the climate change adaptation space particularly around coastal processes, to strengthen its partnerships across sectors and to encourage a culture of sharing in order to identify, innovate and inform.

ACCARNSI SNAPSHOT

- Funded by the National Climate Change Adaptation Research Facility and the Commonwealth Department of Climate Change and Energy Efficiency
- Hosted at the School of Civil and Environmental Engineering, UNSW
- Partners include Griffith University, the University of Adelaide, the University of South Australia, Sydney Water, the NSW Department of Public Works and Engineers Australia
- Research areas and discussion papers span across Infrastructure, Coastal Settlements, Urban Management, Transport and Social Inclusion, and the Built Environment, Innovation and Institutional Reform
- Outreach events including fully subscribed early career researcher forums and workshops, honours and masters research grants, focussed streams on Climate Change Adaptation at national conferences and EIANZ/ACCARNSI ‘Learning to Adapt’ professional development breakfast seminar series
- Facilitating a network of close to one thousand established and emerging researchers, educators, local, state and federal government professionals, industry leaders and innovators, and NGO and community representatives across Australia

2012 FOCUS on strategies for local government climate change adaptation planning in collaboration with the Australian Local Government Association and the State and Territory Local Government Associations. This research initiative culminated in the release of a decision making guide to adaptation tools selection and has generated interest from IPWEA and local councils across NSW.

2012 PROJECTS including collaboration on regional chapter for IPCC Fifth Assessment Report (ARS), ‘Sydney Adaptation Research Review’ technical briefs on Infrastructure, Settlements and Communities, and Buildings and Neighbourhoods for the NSW Office of Environment and Heritage, and joint research on climate change adaptation and coastal processes with the US Army Corps of Engineers

2012 STANDOUT Dr Kate White’s guest lecture to our early career researchers at ACCARNSI’s 8th ECR Forum and Workshop in Melbourne. Kate is the Senior Lead, Global and Climate Change, US Army Corps of Engineers’ Institute for Water Resources. Her presentation informed, inspired and affirmed the belief that engineers when faced with a problem know what needs to be done.
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