sustainability initiatives such as: Without Borders (EWB QUT). It ran a number of aid projects and planning for sustainable development,' James says.

‘My involvement with SERF is through a student project designing organic waste needed to be quantified to entice farmers to change their practices.

‘My engineering degree has taught me how to work logically and thinking outside the box. These skills are highly sought after in the workforce and I’ll be able to apply them to almost any profession that I choose to take up,’ he added.

James has a Bachelor of Civil Engineering with a minor in Economics at QUT and is a Dean’s Scholar with a GPA of 6.78. He advises clients on how to reduce their environmental impact and abide by new legislation.

The first few months of this year have been eventful with an upgrade to infrastructure at the property. The existing access to the site on Upper Camp Mountain Road was deemed unsafe due to its location at the crest of a hill. As a result, a new location was proposed on Camp Mountain Road. The new driveway was a requirement of our Material Change of Use approval from Moreton Bay Regional Council. A new, safer driveway was planned which minimised disruption and disturbance to the vegetation and surrounding landscape during construction. The old driveway has been upgraded as well and will only be used for emergency vehicle access.

A car park accommodating 30 cars and six minibuses has also been built. Both the car park and the driveway have been built using sustainable materials, consisting of a constructed road base driveway with a gravel surface. The car park is constructed from permeable material such as pavers to allow partial water absorption.

The Bentinck Island project – A project involving QUT students building amenities blocks using recycled materials for indigenous communities across the Gulf of Carpentaria.

PC Program – Donating refurbished computers to refugees.

School Outreach Program – Teaching students about sustainable development through hands-on workshops in schools.

James was also involved as a student representative in the Vice Chancellor’s Sustainability Working Party. This group actively promotes, implements and develops environmentally sustainable practices within QUT and across the broader university community as well as promoting and developing a culture of awareness of environmental sustainability issues within the university.

James is now a consultant at Ernst & Young in the Climate Change and Sustainability Services division. He advises clients on how to reduce their environmental impact and abide by new legislation.

Lastly, I would like to thank Harminder Bhat for her contribution towards coordinating activities at the SERF and her outstanding work in engaging with the community at Samford as an Outreach Leader. Sadly, Harminder is moving on to greener pastures and we wish her all the best in her future endeavours.

As always, please feel free to contact me or any of the other leaders with related enquiries and feedback. The SERF website at www.serf.qut.edu.au is a great resource for information related to the property, including our research and educational activities.

Thank you.

Professor Peter Grace
SERF Director
### Monitoring greenhouse gas emissions

A field-level analysis of contributors to global warming is currently being trialed at the SERF to gain a better understanding on the impact of agriculture and other land uses on greenhouse gas (GHG) emissions. GHG emissions from agriculture contribute substantially to Australia's total GHG emissions and this is expected to increase with future changes in land management.

The increasing atmospheric concentrations of the GHGs carbon dioxide, methane and nitrous oxide (N₂O) due to human activities have long been linked to climate change.

In many agricultural systems, N₂O emissions produced from soils have the greatest impact on global warming, accounting for up to 40–50% of emissions from the entire system. Thus, reducing N₂O emissions through improved management techniques has the possibility of making substantial reductions in global warming as well as increasing resource-use efficiency and profitability.

Field experiments assembled at the SERF use modern, automatic, GHG-monitoring equipment developed in an international collaboration with German and Chinese scientists. The data collected is combined with in-depth soil analysis, laboratory experiments and environmental data to determine the key processes controlling GHG emissions. Combining these results with process-based soil models and geographical information system (GIS) will provide a reliable estimate of GHG emissions from subtropical land-use systems in south-east Queensland.

Once this is accurately determined, governments will be able to set up mitigation strategies which could potentially use carbon trading schemes to provide the incentive for these reductions to occur.

The data will also be used in the national N₂O Network, funded by the federal Department of Agriculture Fisheries and Forestry (DAFF). The Institute for Sustainable Resources plays a major leadership and coordination role, bringing together detailed emissions information from agricultural soils from sites located throughout Australia. The N₂O Network will develop mitigation strategies for emissions reduction which will be aligned with best management practices from rural industries.

### Solar research

A project involving the comparison and assessment of solar panels has commenced at the SERF. Solar Shop Australia, a national leading provider of premium quality solar power systems, has donated solar panels to QUT and will test the input and output of three types of solar panels over a period of time.

The solar panels involved are:

- Kaneka thin film silicon PV, GEL type
- Kaneka thin film silicon solar module, Hybrid type
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The solar panels have been installed and wired into the Barracks building and data obtained will be made available to all QUT staff and students.

### Flux tower

The SERF forms part of a peri-urban grassland site in south-east Queensland for a collaborative project with the Australian National Flux Network (OzFlux), which is a program administered by the CSIRO Marine and Atmospheric Research division based in Canberra.

OzFlux aims to establish a national network of flux sites to provide nationally-consistent observations at regional locations to serve the land-surface and ecosystem modelling communities.

The flux tower at SERF, which is less than two metres high, will provide the OzFlux network with hourly flux measurements for three years. It measures momentum, heat, water and carbon dioxide exchanged between the grassland and the atmosphere. It also measures a range of meteorological variables such as rainfall, air temperature and humidity.

This major project aims are to:

- provide a national institutional infrastructure network for terrestrial ecosystem research and management
- coordinate national observational networks to provide valuable information about our terrestrial ecosystems and to encourage research collaboration and cooperation nationally
- facilitate improved access for researchers to observational data to answer questions about our environment
- identify future needs for research and strengthen the capability of the terrestrial ecosystem community across Australia.

Gathering data on plant productivity, carbon dioxide exchange and sequestration and water balance, enables scientists to better understand and respond to key questions about how key episodic events influence our environment and what actions can be taken to minimise human impacts.

### Cat's claw research

Cat's claw creeper Macfadyena unguis-cati (Bignoniaceae) is a major environmental weed in coastal and sub-coastal Queensland, where it poses a significant threat to biodiversity in riparian and ripforest communities.

It is a structural parasite and produces stolons and subterranean root tubers. It forms a thick carpet on the forest floor and climbs over canopies, blocking light from the vegetation below. It also produces long runners which cling to objects using adventitious roots and clawed tendrils. The shading and weight of the vine can kill trees and the weed has high seed production so it can spread quickly by wind and water.

Cat's claw creeper is a highly vigorous South American vine that was introduced to Australia as a garden ornamental. It is easily identified by its large, bright yellow, bell-shaped flowers. Each of its leaves has two leaflets, with a three-clawed tendril (hence "cat’s claw") growing between them. The vine bears very long, narrow, flat pods containing many seeds.

A long-term monitoring and manipulation program will be established at SERF headed by Dr Tanya Scharaschkin, lecturer at the Faculty of Science and Technology, to address questions pertaining to the biology of this weed and evaluate the success of various management and eradication strategies.

### QUT students in real world learning

Third-year civil and environmental engineering students from the Faculty of Built Environment and Engineering are taking part in an innovative design project at the SERF. Headed by lecturers Dr Les Davies, Dr Prasanna Egodawatta and Rob Webb, the project is primarily a hydrologic assessment of a proposed sustainable urban development, including a detailed catchment analysis leading to the design of a culvert structure over a tributary of Samford Creek.

The project was formulated based on the actual site conditions at the SERF where the students have controlled access to the site and existing geographical, land-use and ecological characteristics and data.

The project forms 25% of the unit assessment for both water engineering (engineers) and cadastral and land management (surveyors) disciplines. It enables the students in both units to develop skills across their discipline boundaries. Professionals (surveyors) disciplines. It enables the students in both units to develop skills across their discipline boundaries. Professionals in each of these disciplines commonly work collaboratively, so knowing each other’s professional and technical limitations is important.

The project was funded in 2009 by a QUT Small Teaching and Learning Grant focusing on improving student motivation and learning experiences.

The project included teams of students reviewing previously developed concept plans developed by second-year engineering students. The concept plans included a subdivision layout and infrastructure (road and stormwater drainage) layout for a sustainable urban development within the SERF site. This project will produce a detailed design of stormwater drainage structures (culvert), investigate the suitability of the proposed land development against hydrologic and hydraulic scenarios and evaluate the suitability of buffer zones provided for flood protection.
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Dr E.N. Marks’ Sustainability Award winner 2009

The Institute for Sustainable Resources is proud to announce James Tilbury as the winner of Dr E.N. Marks’ Sustainability Award for 2009.

James has a Bachelor of Civil Engineering with a minor in Economics at QUT and is a Dean’s Scholar with a GPA of 6.78. For his undergraduate thesis, James researched the viability of collecting organic waste from households and converting it into compost and energy. It was revealed that that there is a market for the compost and that it was economically feasible to collect the organic waste, however, the benefits of using compost from organic waste needed to be quantified to entice farmers to change their practices.

‘My involvement with SERF is through a student project designing an eco-village for the property which provided me with an understanding of the principles of site analysis, site investigation and planning for sustainable development,’ James says.

‘My engineering degree has taught me how to work logically through a problem, use maths to solve it, understand the systems involved and think outside the box. These skills are highly sought after in the workforce and I’ll be able to apply them to almost any profession that I choose to take up,’ he added.

While at QUT, James founded the QUT Chapter of Engineers Without Borders (EWB QUT). It ran a number of aid projects and planning for sustainable development, ‘The Bentinck Island project – A project involving QUT students building amenities blocks using recycled materials for indigenous communities across the Gulf of Carpentaria. The new driveway was planned which minimised disruption and disturbance to the vegetation and surrounding landscape during construction. The old driveway has been upgraded as well and will only be used for emergency vehicle access.

A car park accommodating 30 cars and six minibuses has also been built. Both the car park and the driveway have been built using sustainable materials, consisting of a constructed road base driveway with a gravel surface. The car park is constructed from permeable material such as pavers to allow partial water absorption.

Trees cleared during this construction were re-used to create an outer edge to the car park where appropriate, and the surplus vegetation was mulched and strewn on site. This is consistent with the sound environmental conservation principles and practices to which QUT subscribes.

We recently hosted a successful government program launch at the SERF. As guest of honour, the Hon. Richard Marles MP officiated the launch of the federal government-funded Terrestrial Ecosystem Research Network (TERN). SERF is one of the ‘supersites’ under the TERN program. QUT is also involved in the Australian National Flux Network (part of TERN) measuring momentum, heat, water and carbon dioxide exchanged between grassland and the atmosphere. Results from this research will enable scientists to better understand and respond to key events which influence our environment and identify actions that can minimise the impact of Australia’s growing population.

Lastly, I would like to thank Harinder Bhar for her contribution towards coordinating activities at the SERF and her outstanding work in engaging the community at Samford as an Outreach Leader. Sadly, Harinder is moving on to greener pastures and we wish her all the best in her future endeavours.

As always, please feel free to contact me or any of the other leaders with related enquiries and feedback. The SERF website at www.serf.qut.edu.au is a great resource for information related to the property, including our research and educational activities.

Thank you.

Professor Peter Grace
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