



Engineers Without Borders Australia

engineering a better world

2010 EWB CHALLENGE Bendee Downs

PARTNER



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2010 EWB Challenge - Letter of Invitation

Dear students,

Welcome to the EWB Challenge, a challenge that will take you into a remote and isolated community of Aboriginal Australia. It is not often that that you'll be given an opportunity to be part of such an exciting program. We look forward to seeing the innovative solutions you produce.

2010 is shaping up to be a very exciting year for a number of reasons. Not only is it the year of the EWB Challenge, but it is also the ten year celebration of the Kooma Traditional Owners getting their land given back. This is a significant event for the Kooma Nation.



The Bendee Downs Shearing Shed, which the focus of the EWB Challenge, was the original site of a pastoral station, which we now own. This place was an important landmark for the people who lived and worked on the properties for over 150 years. For Kooma Traditional Owners we feel it is very important now to reclaim the shearing shed and to turn it into a really exciting place of learning, art and culture. We also want to create a space where people can come and sit and have a coffee, grow a garden of organic vegetables and be a place of healing that all people can enjoy.

The shearing shed sits on about an acre of land and includes an accommodation block which is very, very basic. The rooms are small with no windows. This site provides a basic look at how people lived at the time. We hope the accommodation once again can become a place where people stay and feel a part of something much bigger. This bigger picture is the opportunity to share experiences with people from the Kooma nation, learn some of our culture and cultural values and in exchange you can teach us too.

From an engineering point of view, this is an exciting part of your experiences too. When you're young you have the whole world in front of you and anything is possible. I was young once too and believed I could conquer the world. The EWB Challenge is very important in your lives too because your future path in life may come from this experience. You could become very involved in social issues, really caring about other people and other nations in this beautiful planet we live on. For other people this is an opportunity to be creative, flexible and challenge your own minds to look at something from a new perspective and create something wonderful.



Australia is a beautiful country and our Nation is a beautiful part of that country. We welcome you to our country and look forward to being involved with you over the coming months through the 2010 EWB Challenge.

Enjoy the challenge,
Cheryl Buchanan
Chair

Kooma Traditional Owners Association Incorporated

Dear students,

I'm excited that so many first year engineering students will be actively involved in working with the Kooma Nation for their first-year design projects.

I first met Cheryl Buchanan, the Chair of the Kooma Traditional Owners, in 2006 on the banks of the Murray River at an environmental workshop. I was challenged and inspired by her conviction to care for country and her fight for sustainable development. In subsequent years, EWB has been fortunate enough to be able to listen, learn and be challenged and inspired by Kooma people as we've developed personal and organisational relationships.

The EWB Challenge is a fantastic opportunity for you to learn, understand and participate in a wonderful culture and group of people. At the same time it gives you the opportunity to assist the Kooma Nation meet their aspirations to care for country and develop a sustainable livelihood.



EWB has an Indigenous Advisory Committee which is made up of Indigenous leaders from around Australia. They too were excited by the EWB Challenge and when I asked what they'd like to see students get out of the challenge this is what they came up with:

1. An ability to work cross culturally.
2. An understanding of the reality of working in remote communities and appropriate technology.
3. An awareness and sensitivity for incorporating significant sites and cultural aspects into designs.
4. An understanding of how to work with communities rather than simply fix problems for them.



These four concepts are extremely valuable for working with Indigenous communities but they also apply to many other communities, places and people you'll work with. In fact, chances are you'll need to understand how to work cross culturally within your EWB Challenge teams!

So, I encourage you to embrace the EWB Challenge, delve into a wonderful new world and learn as much as you can by working on a terrific Kooma project.

Yours sincerely,

Lizzy Skinner
Indigenous Australia Programs Coordinator
Engineers Without Borders

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SUPPORTERS



1 Introduction

1.1 Program Overview

The EWB Challenge is an Australasian design program for first-year university students coordinated by Engineers Without Borders Australia (EWB) and delivered in partnership with Australasian universities. It provides students with the opportunity to learn about design, sustainable development, team work and communication through real and inspiring sustainable development projects.



Each year, the EWB Challenge design brief is based on a new set of sustainable development projects identified by EWB with its community-based partner organisations. The inaugural EWB Challenge ran in 2007. Over 3,500 students at twenty-one universities developed project ideas and concepts to support the expansion of Uluru Children's Home in India. In 2008, over 6,600 students at twenty-six universities participated in the EWB Challenge and created innovative project solutions to support the development of rural communities in Kandal Province, Cambodia. Last year, nearly 7,500 students took part in providing innovative solutions to the many problems faced by the disadvantaged communities living on and around the Tonle Sap Lake and River in Cambodia.

In 2010, students are invited to contribute towards EWB's work with the Kooma Traditional Owners Association Incorporated (KTOAI), supporting remote Aboriginal communities living in south-western Queensland. Teams of four to six students are invited to work together on engineering and design projects that address project ideas identified by KTOAI. Students' designs and ideas make a direct contribution towards EWB's work with the Kooma people.

The EWB Challenge is open to students undertaking a first-year university¹ course registered with the EWB Challenge. The course may run in Semester One or Semester Two. Students studying in the disciplines of engineering, architecture, urban planning, landscape architecture, science, business and social science are encouraged to participate.

Each university may nominate up to four team submissions for external judging. The 2010 EWB Challenge submission process closes on 23 July 2010 (Semester One courses) and 22 October 2009 (Semester Two courses).

A multidisciplinary panel of judges will select six Outstanding Achievement teams. These six teams will be announced on 5 November 2009 and will be invited to present their work at the annual EWB Conference. Awardees will be announced at a special awards ceremony following the presentations.



Awards presented to outstanding team projects include:

- EWB Challenge Overall Champion Award including study tour to visit the partner organisation
- BHP Billiton Award

¹ International universities affiliated with an Australian or New Zealand university may participate in the EWB Challenge. However team travel expenses to the awards ceremony are not covered by the program.

1.2 Developing Engineering Graduate Attributes

The EWB Challenge supports the integration of authentic project-based work into undergraduate courses with international and domestic, social, cross-cultural and sustainability dimensions. The program is designed to develop four engineering graduate attributes (from a total of ten) specified by the national accrediting body Engineers Australia.

The EWB Challenge develops the following graduate attributes:

- understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development
- understanding of the principles of sustainable design and development
- understanding of professional and ethical responsibilities and commitment to them
- ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams

The program also contributes towards the development of other important graduate attributes related to skills in problem solving, the application of basic science and engineering fundamentals and communication.



Section 5.4 of this report includes full details of the EWB Challenge aims and objectives, along with specific learning outcomes for the 2010 program.

1.3 Supporting EWB's Work with Communities



The EWB Challenge provides undergraduate students with a unique learning opportunity based on real EWB projects. The program provides EWB's community-based partner organisations with another pathway for connecting with the engineering and design sector in Australia. It enables them to source innovative and creative ideas and conceptual designs for a broad range of projects of interest to them.

EWB works collaboratively with our community based partners to identify projects that students can undertake as part of the EWB Challenge. Student projects of interest to EWB's community partner are identified at the completion of the year and students have the opportunity to be involved in the further development of their

design.

Through participation in the EWB Challenge program the KTOAI will receive valuable engineering proposals which can be further developed when KTOAI are ready. These projects also provide KTOAI the opportunity to raise awareness about their land and work and encourage EWB Challenge participants to learn about Aboriginal History and the Kooma Nation.



2 The Indigenous Development Agenda and Engineering

2.1 Indigenous Australia Context

Australia's Indigenous population is the longest surviving continuous culture in the world. The oldest proven ancestor of Indigenous Australians is 40,000 year ago but it is widely believed that Indigenous Australians have been here for 60- 100,000 years. Before colonisation Australia had between 750,000 and 1.4 million Indigenous people forming 250 distinct Indigenous nations with over 700 dialects and language groups (Commonwealth of Australia, 2009).

British colonisation of Australia began in 1788 with the First Fleet. The First Fleet brought a wave of European diseases such as small pox which decimated the local population. Small pox alone is estimated to have killed 50% of the Indigenous population. The Indigenous population were a nomadic people, so the government felt free to take over their land. Throughout the following 2 centuries Indigenous land was taken for sheep and cattle grazing. Despite being told not to harm the Aboriginal people, British settlers moved onto Aboriginal land and many Indigenous people were killed (Commonwealth of Australia, 2009). Settlers were not usually punished for these crimes. Between 1869 and 1969 Indigenous children were forcibly removed from their families by Australian federal and state governments empowered by acts of parliament. On February 2008 the federal government formally apologised to Indigenous Australia over the Stolen generations. In 1992 the High Court of Australia overturned the previous declaration of *terra nullius* and granted land rights to Australia's Indigenous population (Commonwealth of Australia, 2009).



Today, the Indigenous population is approximately 2.6% of Australia's population. They have great diversity of culture and language with strong cultural traditions still in place and around 145 languages still spoken throughout Australia. Indigenous Australians are part of the rich diversity of Australian culture contributing to art, dance, politics, sports, academia and the environmental movement (Commonwealth of Australia, 2009). However, the impact of colonisation and government policy on Indigenous Australians has resulted

in a gap in living standards compared to other Australians.

Australia is one of the most urbanised nations in the world however 69% of Australia's Indigenous population lives outside major cities (Steering Committee for the Review of Government Service Provision, 2009). Approximately 132,000 (~25%) Indigenous Australians live in either remote or very remote areas, with 61% of this population living in a discrete Indigenous community (Steering Committee for the Review of Government Service Provision, 2009). This compares to 2% of the non-Indigenous population that live in remote or very remote locations (Steering Committee for the Review of Government Service Provision, 2009). The high percentage of Indigenous Australians living in remote and very remote areas contributes to the gap in living standards between Indigenous and non-Indigenous Australia. The gap in living standards can be addressed through reconciliation.

Reconciliation within Australia is about building mutually respectful relationships between Indigenous and other Australians that allow us to work together to solve problems and generate success that is in everyone's best interests. The EWB Challenge assists with reconciliation through raising awareness and knowledge of Indigenous history and culture, bringing about behaviour change and encouraging people to take action.

2.2 Development Priorities

Australia's Indigenous population have a gap in living standards compared to other Australians due to issues around Health, Education and Employment, these areas are development priorities for Australia's Indigenous communities. The Coalition of Australian Governments has identified six development priorities that focus on closing the gap between Indigenous and Non-Indigenous Australians. They include (Steering Committee for the Review of Government Service Provision, 2009):

- the Life Expectancy Gap – Seventeen years
- Young child mortality - Two to three times higher than the national average
- Early childhood education
- Indigenous students reading, writing and numeracy skills – Lower than the national average
- Completion of grade 12 – 36% of 19 year olds have completed year 12 or equivalent
- Indigenous Employment – 48% of the whole population are employed

The development of industry, education institutions and health care in remote and very remote Australia will assist in reducing this gap between Indigenous and non-Indigenous Australia.

Improvements have occurred in health, education and employment (Steering Committee for the Review of Government Service Provision, 2009). However, statistics have shown that whilst there have been improvements for Indigenous people, a similar level of improvement has occurred within Australia's non-Indigenous community (Steering Committee for the Review of Government Service Provision, 2009). As a result, no reduction in the gap has occurred between the two populations.



2.3 Success stories



The successes of Indigenous Australia are often overlooked in the media or overshadowed by gloom statistics. EWB works with a number of inspiring communities. Since 2005 Reconciliation Australia, in partnership with BHP Billiton, has been highlighting success in Indigenous Australia through the Indigenous Governance awards. These awards identify, celebrate and promote effective Indigenous governance through strong leadership, good management, effective partnerships and brave, creative thinking.

Some of the past winners include (Reconciliation Australia, 2009):

- **Murrijabree Aboriginal and Torres Strait Islander Association Inc, QLD** – State and Federal representatives of the people of Deception Bay. They are working to improve local conditions and work closely with young mums, babies and families.
- **Traditional Union Credit, NT** – Provides financial services for remote indigenous communities, whilst respecting Indigenous cultural heritage. 13,000 members own \$10 million in deposits.
- **South West Aboriginal Medical Service, WA** – Provides health services and assistance with dietary requirements and settling grievances. They also support renewal of traditional medicines.



These are just some of the excellent examples of the great work being undertaken around the country to assist Australia's Indigenous population.

3 Working With Engineers Without Borders Australia

3.1 Introduction to EWB

Engineers Without Borders Australia (EWB) is a not-for-profit organisation with over 4,000 members in Australia. EWB brings together engineering students, young graduates, experienced professionals and non-engineers as a team to tackle the issues of sustainable development and help address basic, small scale engineering problems faced by many people in need.

EWB's vision is of a world where every individual and community has adequate access to the resources, knowledge and technology necessary to meet their self-identified human needs. To achieve our vision, EWB members and volunteers work in partnership with disadvantaged and developing communities in Australia and the Asia Pacific region, assisting them to improve their livelihoods.



Engineers Without Borders' vision for a reconciled Australia is of a nation whose past is acknowledged, shared, taught and understood both as a common history and a contemporary reality. We look in hope to seeing a nation that celebrates the wide variety, complexity and value of the many cultures of Aboriginal and Torres Strait Islander people.

We envisage a future Australia in which Indigenous and non-Indigenous people are proud of having worked together to overcome the inequalities currently experienced by Aboriginal & Torres Strait Islander peoples in terms of life expectancy, health, education, meaningful employment, justice and self-determination.

The EWB Challenge is a vehicle that contributes to EWB's work with disadvantaged communities. Students have the opportunity to make a difference through real projects for sustainable human development.

3.2 EWB's Work with Indigenous Communities



EWB has partnerships with Indigenous Communities around Australia. In 2009, a total of thirty-one EWB volunteers undertook field work with EWB's Indigenous community-partner organisations. Twelve volunteers travelled to Murra Murra to work with KTOAI on the Kooma Energy Project. This project aims to identify energy reduction opportunities and install solar panels to provide sustainable energy to the community. A further nine volunteers travelled to Bentinck Island in the Gulf of Carpentaria to work with the Kaiadilt Aboriginal Corporation and the Centre of Appropriate Technology (CAT) to build an amenities block and shelter. This

team has now begun their preparation for the next trip to assist with the island maintenance program. Six Melbourne Water staff travelled to Murra Murra to work on waterway assessments and water management projects with the KTOAI. Four EWB Volunteers travelled to Shiptons Flat to work on infrastructure with the Bana Yarralji Bubu Aboriginal Corporation Ranger Program.

EWB has formed a number of other partnerships with Indigenous communities. The Western Australian Chapter (member group) has been developing a partnership with the Leedal Aboriginal Corporation, located in Fitzroy Crossing. Melbourne Water have signed a partnership agreement with KTOAI and EWB and completed their first site visit in August 2009. In Shipton's Flat in Cape York, a unique model for working together has been developed with CAT, Aurecon, EWB and Bana Yarralji Bubu Corporation. This team of organisations will work towards constructing an amenities block.

3.3 EWB's Indigenous Strategy & Approach

The mission for EWB's Indigenous Australia program is to work proudly with Indigenous and non-Indigenous Australians to improve the quality of life of Indigenous people through education and sustainable engineering projects.

Through these projects the engineering profession and Indigenous Australians will build strong relationships based on a two way sharing of knowledge and cultures. This will further our ultimate goal of a reconciled Australia by becoming more culturally aware and responsible, developing our knowledge and skills, and inspiring others into action.

Our knowledge base can be expanded by building on the knowledge and experience we have already obtained. This is achieved by connecting returned volunteers with new EWB volunteers, our corporate partners and to schools and universities. The connection between corporate partners will enable our corporate partners to understand how they can effectively engage with a community and take responsibility for making a contribution in this space. As these activities and engagement continue, the partnerships between EWB and our Indigenous community partners will grow, become stronger and be of more value for both parties.

Students who participate in the EWB Challenge are contributing to EWB's Indigenous Australia program. The champion team will have the opportunity to visit the site of the EWB Challenge and work on the further development of their design project. Once the EWB Challenge is complete students will have the opportunity to participate in a number of EWB programs and activities including but not limited to:

- Local Chapter coordination and events
- Undergraduate Thesis program (final year students)
- Development Education Experiences (Cambodia and India)
- Local Project Support Teams for overseas volunteer placements
- National Knowledge Hubs



4 Kooma Traditional Owners

4.1 Background

The Kooma Nation is located in south-west Queensland. Murra Murra and Bendee Downs are two adjoining properties which were acquired by the Indigenous Land Corporation (ILC) in 1998 and officially granted to Kooma Traditional Owner's Association Incorporated (KTOAI) in January 2000. The properties are situated approximately 100km east of Cunnamulla. Figure 1 shows a map which defines the original Aboriginal Language Group boundaries in Australia and the location of Kooma Traditional Country.

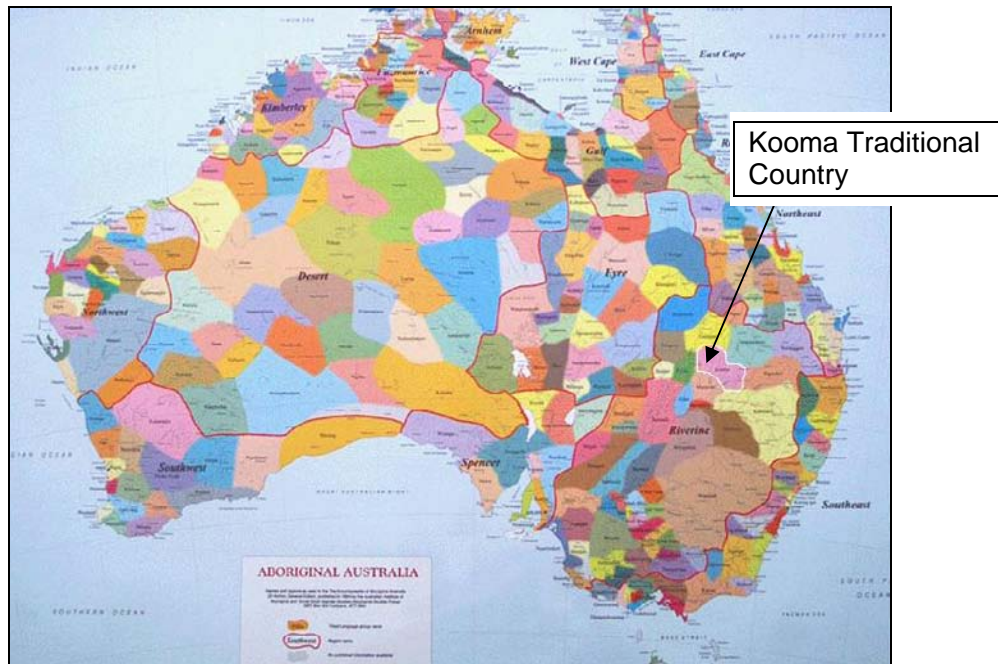


Figure 1: Original Aboriginal Language Group Boundaries and the Location of Kooma Traditional Country

The properties consist of two pastoral lease holdings and a small area of free-hold land with a total area of approximately 87,159 hectares (215 374 acres). This is substantially larger than any of the other properties in the region. There are currently two families who live permanently at Murra Murra and Bendee Downs, both acting as caretakers for the property. Other Kooma people visit for official business, courses, family gatherings and cultural reasons. The Kooma people experience many of the development challenges facing Indigenous people across Australia, as identified in section 2.2. The community is trying to address these issues, particularly education and employment, whilst creating hope and renewed pride in their people. Figure 2 shows a map of the region near the properties.

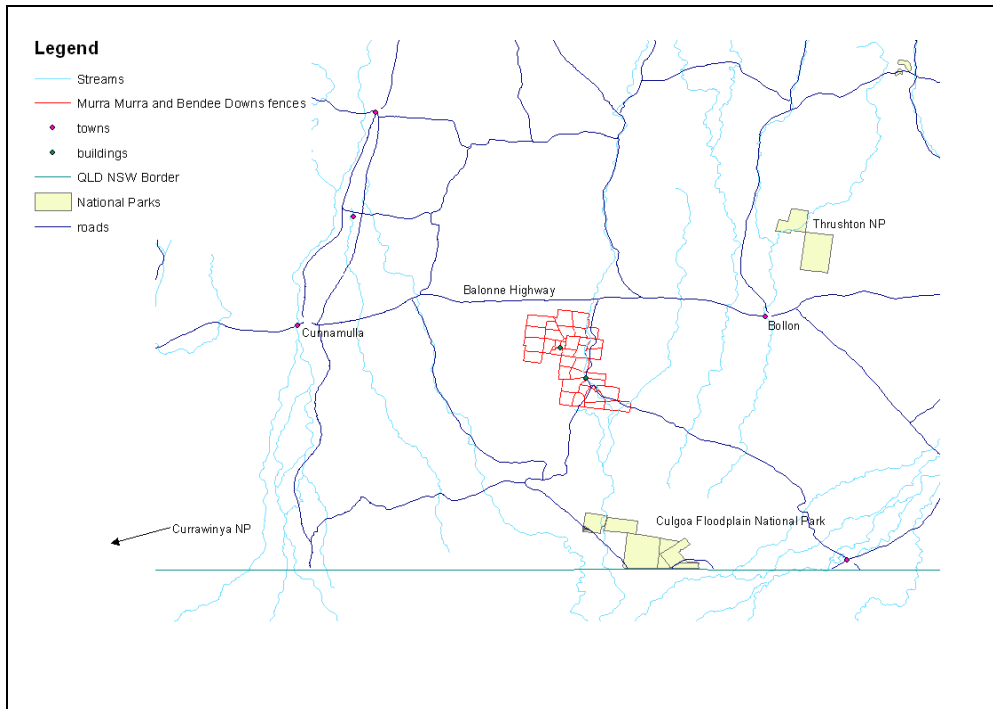


Figure 2: Murra Murra and Bendee Downs Location (28°S, 146° W)

KTOAI wish to plan and manage Murra Murra primarily for cultural and natural heritage protection. It is now their challenge to manage for sustainability, cultural protection and nature conservation, as did their ancestors for thousands of years.

4.2 Aspirations



Cheryl Buchanan is the current Chair of the KTOAI. Cheryl and KTOAI's vision is *“to use the properties as a ‘regional hub’, a training ground and base for the renewal of all our people and the protection and wise management of all of our traditional lands. We wish to meet their cultural responsibilities; and further to set an example in our country of the importance of a sustainable and continuing connection to country through inclusive management as their ancestors did and make Kooma people proud.”*

The properties will provide a base for many social activities and programs. Some of these programs will be formal and generate income. Others will be informal. Future programs may include:

- Programs and activities focused on education for at-risk youth
 - Emufest has been held at Murra Murra in May 2007 and July 2009 for twenty-six and forty Aboriginal youth respectively in partnership with the Queensland Department of Health and the Qld Department of Communities.
 - Green School gathering held in May 2007 and August 2009 at Murra Murra which continues informal recreation activities for families and individuals.
- Training and Education Resource Centre for Kooma people.
- An informal and formal meeting place for the families and official business.

4.3 Partnership with EWB

The EWB-Kooma partnership is mutually beneficial to both organisations. EWB works collaboratively with KTOAI as an engineering representative of the community. KTOAI provides cultural exchange activities for EWB volunteers to assist with breaking down cultural barriers between Indigenous and Non-Indigenous cultures and to enable EWB members to better understand Aboriginal issues. It is hoped this partnership will encourage shared learning's and experiences with the Kooma People and empower the KTOAI to further their vision.

EWB's partnership with the KTOAI will provide the opportunity to pioneer innovative, sustainable and culturally restorative projects within Indigenous Australia. This partnership also supports EWB's Reconciliation Action Plan (RAP) as it will allow members of EWB to learn about Indigenous Australian culture and contemporary Indigenous issues. Working together with KTOAI will also strengthen the confidence of EWB members in working with Indigenous communities.

EWB hopes that this partnership will not only culturally enrich members of EWB but also provide interesting projects with real and deliverable outcomes where progress can be seen. As a result of this partnership, EWB hopes members will be enthused, inspired and have an understanding of contemporary Indigenous issues. Most importantly, EWB intends for this partnership to be a long term partnership with the KTOAI so that both organisations can experience shared learning's and successes.

4.4 Past Projects with EWB

The three main prior collaborations between KTOAI and EWB are:

- Development of a Waste Management Plan
- The Kooma Energy Project
- Melbourne Water Wetlands and Waterways Management Program

4.4.1 Murra Murra Waste Management Plan



In January 2007, Cheryl Buchanan contacted EWB to request the development of a waste management plan to deal with rubbish. Both Murra Murra and Bende Down properties have been worked as pastoral holdings for approximately 100 years using traditional outback farming practices. During this time, rubbish was dumped near the Murra Murra homestead on the banks of the Nebine Creek which left a major environmental footprint on Kooma Land.

In 2007, EWB volunteers Nicole Teo and Chris Devitt developed a waste management plan with KTOAI and participated in initial efforts to clean up existing waste dumped on the property. The waste management plan was implemented during a Green School held at Murra Murra by the Greens Institute of Australia. The success of this project has led to a strengthened relationship with the KTOAI.





4.4.2 Kooma Energy Project

KTOAI requested assistance in assessing the feasibility and costs of installing solar power at Murra Murra. Within the 90,000 ha of land, there are many clearings that would be ideal sites for solar generation. Further, the property experiences a high level of sunlight in both summer and winter with a maximum temperature of 54°C on an average day in summer.

The key objectives of the Kooma Energy Project were to make Murra Murra and Bendee Downs as energy efficient as possible through:

- Investigating and implementing energy saving options.
- Installing solar energy panels to connect into the grid.

This project includes two stages of work: installation of solar panels and energy use management.

Solar Panel Installation

Following a feasibility study, a technical specification was written for the supply and installation of a solar energy system. The supply and installation of the solar energy system was contracted out and overseen by EWB. It was essential that KTOAI were part of the project team involved in the decision making process throughout the Project.

This stage of the project was successfully completed in September of 2009 and represents a significant step forward for the relationship between KTOAI and EWB. 12 EWB volunteers were involved in the project over a 18 month period. Project highlights included the Kooma Energy Team attending Emu fest and teaching the Indigenous Children about energy and 65 people present (including 7 Kooma Elders for the solar panel commissioning.

Energy Usage Management

Options for reducing energy usage at the Murra Murra and Bendee Downs Homesteads are currently being investigated. The process for this will involve:

- Developing educational tools about energy usage around the homesteads and options for reducing energy.
- Developing a plan with KTOAI about how to reduce energy consumption.
- Assisting the community to implement energy saving measures and budget for efficient appliances.

This part of the project is planned to be completed by August 2010.



4.4.3 Melbourne Water Waterways and Wetland Management Program

The purpose of the Melbourne Water program is to deliver on the following objectives:

- Improve Waterway Management at Murra Murra and Bendee Downs
- Obtain greater understanding of Aboriginal and natural values of water and land by all parties
- Increase knowledge and experience in delivering natural resource management projects in remote communities in Australia

The first site visit occurred in August of 2009. This visit enabled Melbourne Water staff to identify the resources already available, collect detailed data on the current water management practices and conduct a baseline survey of the property. This information will be used as a benchmark for future visits and assist in identifying ways to improve Kooma Country waterways.



5 The 2010 EWB Challenge

5.1 Bendee Downs Background Information

The site of the EWB Challenge in 2010 is the Bendee Downs Shearing Shed. For the past 100 years, Murra Murra and Bendee Downs were cattle and sheep stations. Today, the KTOAI still lease out part of the property for sheep and cattle grazing in order to provide some income to assist with property management. However, KTOAI is committed to conservation of the properties. About 24,000 ha, comprising about one-quarter of the Bendee Downs property, was gazetted as the Jamba Dhandan Duringala Nature Refuge in March 2007.

Grazing has been removed from all of the Nature Refuge on Bendee Downs for five years. Conservative stocking rates could be reintroduced in five years time, in economically necessary. However KTOAI are keen to find an alternative source of revenue to prevent this from occurring.

The Nature Refuge has much of the infrastructure associated with a modern cattle and sheep station including an air strip, shearing sheds, bore drains and accommodation. However, this infrastructure has fallen into disrepair with the end of grazing on the property five years ago.

Bendee Downs has spectacular diversity of species which makes it a site that should be protected for future generations and shared with all Australians. The landscape is dominated by Mulga country, Spinifex, Soft Mulga, and Gidgee plains. The region is very flat and sandy and has 40km of the Nebine Creek flow through the properties with a 4km permanent waterhole behind the old homestead. Wetlands are a feature of both properties after rain, which adds further to bird and fauna diversity. The landscapes contain regional, national and international conservation values.

The current site was previously a shearing shed and accommodation for shearers. Due to the surrounding area being declared a nature reserve the site is no longer in use. On the Bendee Downs Property the following buildings exist:

- Shearing Shed –Not in use
- Shearers accommodation – Not in use
- Shower Block - Not in use or operational
- Toilet Block - Not in use or operational
- Wool Classing Room - Not in use
- Generator Room - Not in use or operational
- Airstrip
- Homestead – Caretaker accommodation

All buildings are located on the Bendee Downs site as detailed in the map below except the Airstrip and Homestead. The Homestead is approximately 1.3 km from the Shearing Shed, whilst the airstrip is between the two approximately 800 m from the Shearing Shed. The Bendee Downs Homestead is not to be considered as part of this design brief.

The accommodation block previously housed 16 shearers and one cook. The shower block contains 4 showers, whilst the toilet block has two toilets. The Generator room contains the old generator which used to power the site but it is no longer operational.

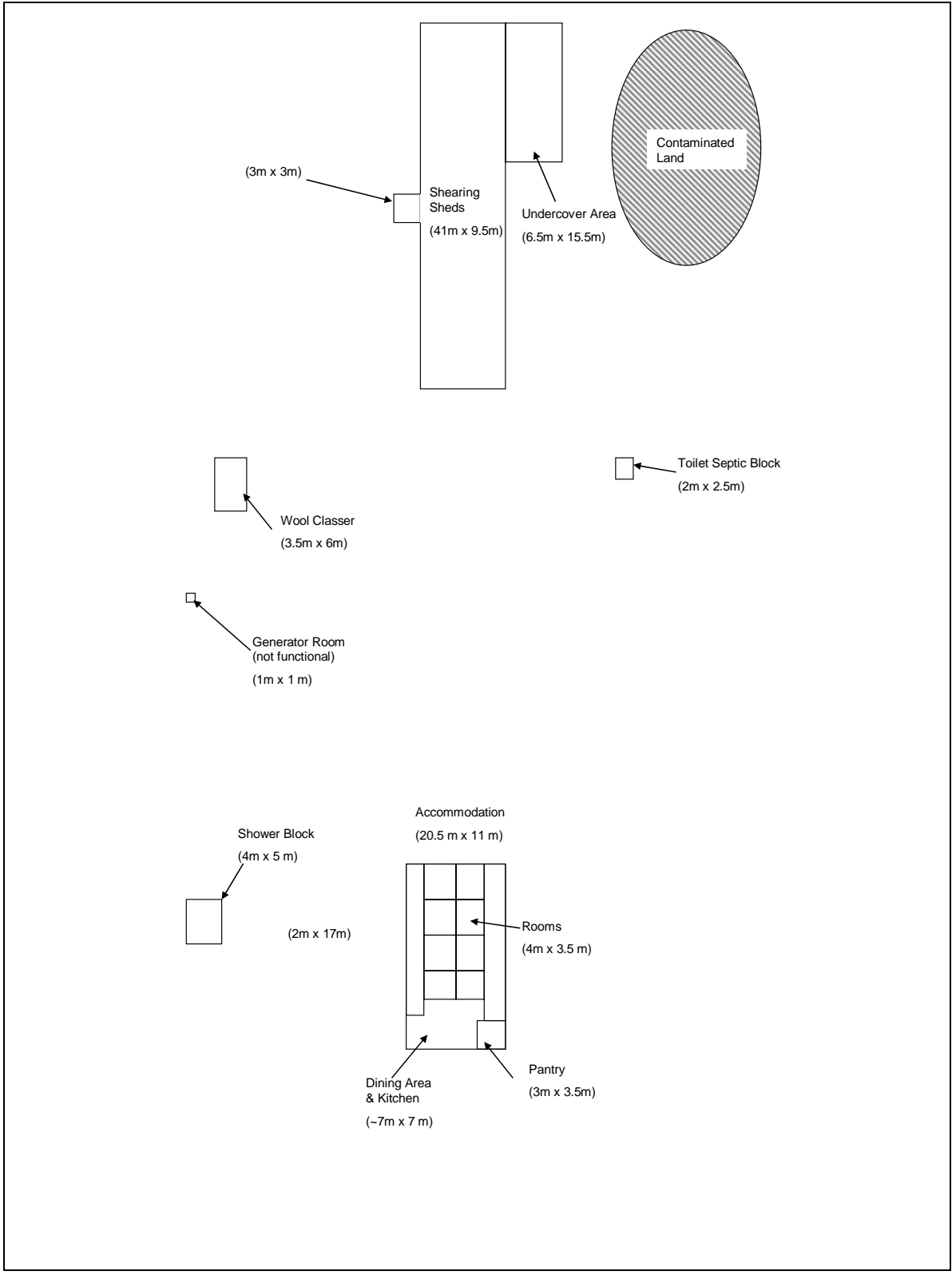


Figure 3: Shearing Shed, Accommodation and surrounding building layout

5.2 Bendee Downs Site Development



The KTOAI vision is to create a regional hub for training and cultural renewal. The Bendee Downs site needs to be redeveloped to bring about this vision. A business built around eco-tourism and provision of housing for guests and the Kooma people is a central part of this concept.

KTOAI would like the Bendee Downs site to be redeveloped to provide overnight accommodation for twenty guests and five permanent staff. It is expected that between fifty and one hundred visitors will come to the site every week so all designs must take this capacity into consideration. All energy consumption, water consumption, food requirements and waste production can be determined from these figures based on reasonable assumptions about the average consumption per person.



5.3 Student Proposals

The key focus of the EWB Challenge in 2010 is the redevelopment of the Bendee Downs site as a financially viable regional hub that can assist with maintaining the spectacular ecology that surrounds the Bendee Downs site. Through this redevelopment, the nature refuge and amazing ecology will be maintained for years to come.

The project topics outlined below have been identified in collaboration with the KTOAI. A number of potential student projects have been identified which will help fulfil the KTOAI vision for the Bendee Downs site. There are a number of buildings on the Bendee Downs property, however the focus of the EWB Challenge unless specified otherwise is the Shearing Shed.



Not all information is available to complete a detailed design for a number of the projects. Students will need to make assumptions to fill these gaps in knowledge which is a necessary part of the engineering process. All assumptions need to be explained to justify the basis of the assumption.

5.4 Student Learning Outcomes

The EWB Challenge is designed to develop a number of engineering graduate attributes specified by Engineers Australia.

Table 1 identifies the aims and objectives of the EWB Challenge and maps them against the engineering graduate attributes. Table 1 also includes specific learning outcomes and judging criteria for the 2010 program.



Table 1: EWB Challenge Learning Objectives & Assessment Criteria

EWB Challenge		2010 EWB Challenge		
Aim	Graduate Attributes	Learning Objective	Judging Criteria	
Demonstrate application of technical knowledge to the specified problem.	ability to utilise a systems approach to design and operational performance.	Ability to use a systems approach to the design process that considers the appropriateness of the design to the project context	Students are able to explain their design process and how this was influenced by the indigenous community context of the project.	<ul style="list-style-type: none"> Students to explain how their design criteria were developed to suit the specific needs of the Kooma Nation. (E.g. unacceptable to have any negative impact on the Nebine river)
	ability to undertake problem identification, formulation and solution.	Ability to undertake problem identification, formulation and solution whilst considering the specific context of the project.	Students understand how their approach to problem solving should consider principles for indigenous community development. Their community development problem solving approach needs to have a clear process explained and a description of the final solution and how it meets the communities needs.	<ul style="list-style-type: none"> Students to develop a problem solving method that includes consideration of the indigenous community context.
	ability to apply knowledge of basic science and engineering fundamentals.	Where appropriate, ability to design, construct and test a prototype from locally available materials.	Where construction of the prototype is undertaken students recognise the benefits of a working prototype over a theoretical design and the benefits of utilising locally available resources.	<ul style="list-style-type: none"> Where constructed, demonstration of an operational prototype which has been tested Where constructed, percentage of material obtained from locally available resources
	ability to apply knowledge of basic science and engineering fundamentals.	Ability to apply basic science and engineering concepts to the cultural setting and develop innovative solutions to the design problem.	Students understand how they can apply basic engineering and science to overcome some of the challenges of working in indigenous communities.	<ul style="list-style-type: none"> Students demonstrate how they have utilised their scientific and engineering knowledge to create new solutions to the design problems encountered.
Develop skills in integrating Sustainable Development and Design Context into the decision making process.	understanding of professional and ethical responsibilities and commitment to them.	Ability to integrate ethical considerations into the decision-making process.	Students are aware of some of the issues involved in undertaking community development activities in line with the Engineering Code of Ethics.	<ul style="list-style-type: none"> Students detail how the approach they have chosen meets the requirements outlined in the Engineering Code of Ethics.
	understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development. understanding of the principles of sustainable design and development.	Ability to evaluate the environmental benefits and impacts of a design against other decision drivers to find the optimal design solution	Students understand the environmental footprint of the design, the high potential impact a proposal can have on fragile Australian Ecosystems and the potential implications for the local population of environmental degradation occurring.	<ul style="list-style-type: none"> Students outline the positive and negative environmental impacts of the design and explain why the recommended design is better than the other options considered including the option to do nothing at all. Where the proposed design does not result in the best environmental outcome, students to explain why this design is recommended (e.g. social /
	understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development. understanding of the principles of sustainable design and development.	Recognition of the need for Community Development / Engagement Principles to be applied to inform the development, design and decision-making processes (as well as implementation)	Students understand the key role of community engagement in any engineering development activity with and for indigenous communities, and that success or failure of a project is reliant on the level and quality of participation.	<ul style="list-style-type: none"> Students outline the social and cultural benefits and impacts of the proposal in a form that the community can readily understand and use as the basis for making a decision. Students outline how their proposal has considered principles for indigenous community development / engagement.
	understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development. understanding of the principles of sustainable design and development.	Understanding of the key principle that the positive values of a design proposal must be greater than the costs to the community	Students understand the full lifecycle costs of a proposal i.e. they have considered not only the building phase but maintenance, and the ongoing impact on the community of e.g., usage, upkeep, development.	<ul style="list-style-type: none"> Students to consider capital expense, ongoing running costs and potential revenue streams in determining their final design. Students explain why they would choose to make this investment if they were the community rather than another option or doing nothing at all (maintaining the status quo)
	understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development.	Awareness of the implications for their design of the physical context of the site i.e. geographic location and environmental factors	Students understand some of the ways in which remote indigenous communities have constraints and challenges imposed by their location e.g. reduced access to the every-day resources easily obtained in in urban areas; climate factors; terrain; transport challenges; etc	<ul style="list-style-type: none"> Students demonstrate how they have attempted to use locally available materials for the proposed design. Where local materials are unavailable students have detailed how the materials and resources will be obtained and transported to the remote location in a manner that minimises negative impacts.
Develop effective communication and teamwork skills for a development context.	ability to communicate effectively, not only with engineers but also with the community at large.	Ability to communicate effectively, not only with engineers but also with the community at large	Students understand some differences in communication patterns and values and strategies for effective communication with Kooma traditional	<ul style="list-style-type: none"> Students outline the approach they would use to communicate their proposal to an Indigenous community such as Kooma Traditional Owners. Students outline how they would maintain dialogue with the indigenous
	ability to communicate effectively, not only with engineers but also with the community at large.	Ability to communicate effectively through written, oral and/or visual medium.	Students submit a well-structured and organised submission (presentation, video, written report)	<ul style="list-style-type: none"> Students are required to submit their report via electronic media. This could come in the form of a written report, oral presentation or video demonstration of their design. Students should consider which method is best for them to convey their proposal to the judging panel and Kooma Elders and explain how they have addressed the assessment criteria.
	ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams	Ability to communicate effectively in multi-disciplinary and multi-cultural teams and settings.	Students have reflected on cultural differences and strategies for working well within their own team, and how this can apply to their work with the Kooma	<ul style="list-style-type: none"> Students outline their own teamwork group agreement Students outline the communication differences they might expect to encounter working with the Kooma Nation.
	ability to communicate effectively, not only with engineers but also with the community at large.	Ability to critically and constructively reflect on the community engagement and consultation in the design process	Students recognise the importance of community consultation throughout the design process.	<ul style="list-style-type: none"> Students to undertake reflection of the effectiveness of their consultation with the community throughout the design process.
Develop an appreciation of some of the complexities of working cross culturally.	understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development; ability to communicate effectively, not only with engineers but also with the community at large;	Recognition that differences between cultures impact on our behaviour including our approaches to problem solving	Students understand that there are cultural differences in core values that affect interactions between indigenous and non-indigenous Australians	<ul style="list-style-type: none"> Students compare a problem solving approach used by an Indigenous and a non-Indigenous community and outline how this impacted on their approach.
	ability to communicate effectively, not only with engineers but also with the community at large;	Sensitivity to cultural difference in approaches to problem solving	Students have considered the differences between their own and Indigenous problem solving approaches.	<ul style="list-style-type: none"> Students detail how their problem solving process included indigenous perspectives and how this impacted on the final design solution. Students outline the cultural sites that they've considered in their design.

6 Project Topics

EWB and the KTOAI have worked together to identify a range of relevant student projects. Students are invited to develop innovative and appropriate project solutions that can make a real contribution towards the sustainable development of the Kooma Nation.

The following information is provided to assist in the development of concept designs for various projects such as physical infrastructure and appropriate technologies. These designs, coupled with knowledge and skills sharing, aim to support the KTOAI to improve the quality of their lives from a social, environmental and economic perspective.

Design teams may wish to address a single issue or provide an integrated design solution for two or more issues. Alternative projects may also be considered. The EWB Challenge is an open-ended learning experience and the breadth and depth of design is left to individual universities and design teams to scope, within the context of the Submission Requirements (see Section 8).

6.1 Design Area 1 – Bendee Downs Redevelopment Plan

6.1.1 Context

It is the KTOAI's vision that all their people will be able to return to Kooma Country at any time and be housed. To enable this to occur it is necessary to develop a thriving community which has industry and purpose. There is currently no overall redevelopment plan to bring about this transition for the Bendee downs site. This redevelopment plan will need to consider all of the contextual issues outlined in section 6.1 to 6.8. An integrated solution which incorporates each of these aspects is required. The most critical aspect of this solution will be the creation of livelihoods from any businesses that are proposed. These proposals need to be financially viable to ensure that Kooma people are able to return to country and remain there long term.



6.1.2 Suggested Design Projects

EWB and KTOAI invite you to consider one or more of the following design projects:

- Integrated site Bendee Downs site redevelopment
- Business Case for site development (including eco-tourism, education and accommodation)

6.2 Design Area 2 - Building Design

6.2.1 Context

The current site was previously a shearing shed and accommodation for shearers. Due to the surrounding area being declared a nature reserve the site is no longer in use. Temperatures within the building can reach above 50°C in summer and below freezing in winter. There are no active or passive forms of cooling or heating as part of the building design. The building is also in some disrepair. The existing floor boards, eight of the structural roof beams and 25% of the roof need to be replaced. There will be a requirement for locally sourced appropriate building materials to redevelop the site. The site has a large clearing that KTOAI suggest could be used as a camp site, however infrastructure such as power and amenities will be required.



Part of the KTOAI vision is that each clan, of which there are sixteen, will have their own house. These houses will be built in line with the community's requirements of suitability and environmentally friendly materials. Conventional urban housing is designed for the nuclear family of two parents and a number of children. Within Indigenous communities the family size is much larger. Current statistics show that the average Indigenous house is approximately 2 bedrooms too small for the average family. Proposals need to be designed for a 5 to 7 bedroom house to address the space requirements of large family groups.

6.2.2 Suggested Design Projects

The primary focus of the EWB Challenge is the Bendee Downs Shearing Shed. Future proposals for developing the shearing shed should take into consideration how to effectively heat and cool the space, how it will be lit and what materials the renovations or new structures will be constructed from. The use of locally available materials that can be obtained from the property is an important consideration in any design. Passive cooling, heating and lighting are preferred in designs to reduce energy demand and running costs of the site.

Students can also consider the construction of an appropriate house for the family clans of the Kooma Nation. These houses would need to accommodate ten to fifteen people and be constructed from appropriate and sustainable materials. This project can focus on the building design or provide an integrated building, water, waste and energy development proposal. The construction of accommodation for the Kooma clans is a separate project to redevelopment of the Shearing shed.

Both projects can consider how the building can be made to look like animals significant to KTOAI culture such as the kangaroo and emu. This would serve the dual purpose of appropriate housing and create a tourist attraction.

EWB and KTOAI invite you to consider one or more of the following design projects:

- Modified building design for the shearing shed on Bendee Downs
- Appropriate housing for the Kooma family clans
- Low cost insulation for the Bendee Downs Shearing Shed
- Appropriate heating or cooling technologies for the Bendee Downs Shearing Shed

6.3 Design Area 3 – Transportation



6.3.1 Context

An effective method of transporting people to Bendee Downs and around the Bendee Downs site is required. Bendee Downs is located in a remote area of Queensland, 120 km away from the nearest town, Cunnamulla. Transportation is a major challenge due to the area's isolated location. The Bendee Downs property airstrip and hanger have not been used since the property was acquired by the ILC in 1998. Before 1998 the frequency that the airstrip was used is unknown. An upgrade of the airstrip is required and will allow for easy access to the property in times of emergency. It is understood by community members that the airstrip was used by the royal flying doctors in the past.

Travel by road is currently the only cheap means of visiting the site. The Bendee Downs site is a ten hour car trip from Brisbane, the closest city with a major airport. The main access for Bendee Downs is via the Murra Murra Road off the Balonne Highway. The Murra Murra road travels north-south running beside the Nebine Creek. Bendee Downs can also be accessed further west via the Munda Munda Road and east via Fernlee Road. These dirt roads are generally in poor to fair condition.

Access to the Bendee Downs site requires vehicles to travel across the Nebine Creek. The road is a simple dirt track which becomes impassable during the wet season. The width of the river is approximately 20 m. Any proposed upgrades must consider the cultural significance of the Nebine Creek.

In terms of internal transportation, limited resources make maintaining the vast land property very difficult. Management tracks on the property vary from very good condition to overgrown and completely impassable to four wheel drive vehicles. Generally, they are in good condition in the areas that have been under sub-lease or agistment since the KTOAI took possession in 2000 and poor in the areas not commercially grazed. Most of the nature refuge area on Bendee Downs has not been grazed commercially since KTOAI's occupation and consequently tracks have not been maintained.

6.3.2 Suggested Design Projects

Site transportation needs upgrading. Student projects could include road, air or any other modes of transport. The current use of diesel 4WD's is an inefficient form of transportation and not practical for larger groups of people. The site consists of lakes, geographical points of interest, and other cultural sites. The selected transportation method must be able to access these sites without causing damage and be operational during the wet season, where the water rises and floods sometimes occur. The safety risk of hitting animals in transport vehicles must also be considered. Animals crossing the roadways and sun shining in people's eyes at dusk represent a significant hazard and should be taken into account during design.

Developing footpaths and fences as well as roads, are a requirement of any potential eco-tourism proposal. Access would be required throughout the property to areas such as the ephemeral lakes and Indigenous sites of significance. Any access needs to be low maintenance, cost effective and ensure that it does not damage the attraction.

EWB and KTOAI invite you to consider one or more of the following design projects:

- Improve the road grade of the Murra Murra Rd to enable access to the Bendee Downs site
- Develop a long term road maintenance plan
- Developing the existing air strip on Bendee Downs
- Designing a bridge to cross the Nebine River
- Design an appropriate low cost fence to prevent stock from the pastoral leases crossing into the nature reserve
- Design a low cost and appropriate pathway that will not require significant maintenance to the Ephemeral lake near the Bendee Downs Shearing Shed
- Developing other modes of transport to site
- Develop a cost effective road base that is sourced locally and will not have a long term negative impact on the environment.
- Develop a remote sensing system to detect when gates have been left open, fences are broken or water troughs have run dry. This system would commonly use HF or UHF radio equipment.



6.4 Design Area 4 - Water Supply and Sanitation System

6.4.1 Context

Water Sources

There are many water bodies available on Bendee Downs. These water bodies can be categorised into two either ground water or surface water

Ground Water



Bendee Downs overlays a large rock formation that is part of the Great Artesian Basin. Most of the water below the ground is believed to have originated from rainfall in the Great Dividing Range near the east coast, occurring many centuries ago when the climate was much wetter. The great extractions from bores to date appear to be lowering pressure and are unsustainable.

The main bore at the Bendee Downs house accesses the Hurray Sandstone Formation (550m). This bore is under greater pressure than the other property bores and the water is fresher. It has been used for human consumption since the bores were drilled over a century ago. The dreamtime of the region refers to an Indigenous community called the “hairless ones”. This community was known to drink the bore water, which may present a barrier to its use as an ongoing water supply.

Bore water can also be accessed from local underground aquifers which are recharged by rainfall on the property. The bores that do not access the Hurray Sandstone Formation access a shallow rock formation called the Wyandra Formation. Water is under less pressure causing flows to be quite weak and in some cases requiring wind mills and small dams to access the water. These bores are commonly used for agricultural purposes.

Water quality from the Wyandra Formation is generally not suitable for human consumption. This water is saltier than surface water and contains other minerals which if relied on long term may impact the soil and garden productivity. This has been the case with other properties in the region where continued use (and probably excessive watering) over many years has degraded the land so that the garden/orchard has been abandoned. The productivity and sustainability of the property could be maximised in the long term by alternating between bore water and surface water and utilising water efficient gardening methods (promoted by the permaculture movement).



The current fresh water supply for Bendee Downs is from the Great Artesian Basin. However, a more sustainable source of water is required with the potential for increased people visiting and living on the site.

Surface Water

Surface water at Bendee Downs is limited to:

- The Nebine Creek (also an ephemeral creek). This creek/river only flows following rain in the upper catchment. It is dry for most of the year.
- An extensive system of shallow ephemeral lakes. The lakes are generally less than 1.5 meters in depth and are generally dry. They fill during the wet season.

Sanitation

In 2003 an effective high grade sewage system was installed by Q Build for the Murra Murra homestead.



The system is suitable for use by large numbers of people. Visitor numbers of between twenty and thirty people have been resident for over a week at Murra Murra without difficulty. This system services both the homestead and the cottage. Bore water is held in two 5,000 gal tanks (the common storage for all bore water). The tanks are plumbed into the two houses including the three toilets in the homestead and one toilet in the cottage. Waste is transported to two buried polyurethane septic tanks. These septic tanks move and mix the waste by an electric motor which also pushes the then liquefied effluent through a buried pipeline under the road in front of the houses then sprays the effluent across a large grassy paddock. The effluent is then

evaporated and sterilised by the sun and ground bacteria. The existing Bendee Downs site has a small septic system but needs to be replaced with a larger sanitation system for the proposed fifty to one hundred visitors per week.

Recently, there have been problems with the sprayed effluent pooling in a natural ephemeral wetland (a small depression) very close to the houses on Murra Murra. This was causing unpleasant odours, degrading the wetland and creating a disease threat should children or adults walk or play in the area. In February 2007, volunteer Kooma people extended the pipeline a further 80 meters into the paddock which has effectively dealt with this problem.

A creative solution to handle sanitation waste is required for the Bendee Downs site. An effective sanitation system is particularly important due to the risk of contamination to the natural wetlands (located approximately 50 meters from the current site) and the bore water supply under Bendee Downs. To model the bore water aquifer and potential contamination would be very difficult. Students should consider how they can design a sanitation system to prevent this being an issue.

6.4.2 Suggested Design Projects

The community requires an onsite water supply and sanitation waste treatment system. The waste treatment system needs to avoid contamination of the bore water supply and natural lakes. As outlined above, there is a concern that drinking the bore water might cause health problems. Any engineering design that addresses bore water must include water testing and include a community consultation plan. This plan must communicate the results in a simple and straightforward way to locals and prevent any confusion. The Bore water arrives at the surface at approximately 45°C and requires cooling prior to use. All proposals developed concerning bore water usage should consider the opportunity to use the bore water cooling as a future energy source. This would provide added value from the proposal to the local population.

EWB and KTOAI invite you to consider one or more of the following water and sanitation design projects:

- Cost effective rainwater capture and storage system
- Grey and black water recycling
- Water consumption efficiency measures
- Low cost water pumping devices
- Toilet waste treatment systems e.g. waste Biodigester systems
- System for cooling the bore water for hot and cold applications
- Determine a method to distil the bore water for consumption



6.5 Design Area 5 - Energy

6.5.1 Context



Murra Murra and Bendee Downs are connected to the main grid power. Current energy bills for the properties are extremely high. The last quarterly electricity bill for Murra Murra was close to \$6,000 and Bendee Downs bill is similar. With little current financial income, Bendee Downs is in need of a sustainable energy source to lower the cost of proposed infrastructure. The climate and location limit the energy source options. The KTOAI vision for their properties includes the adoption of an alternative environmentally-friendly energy supply system or a complimentary system to reduce the amount of energy sourced from the main power grid.

The remoteness of the Kooma community means a reliable power source is required. If there is a fault in the energy system, outside maintenance assistance is far away and repair visits are expensive. Designs must also consider the wide temperature fluctuations, dusty conditions and lightning strikes.

There are periods of both high winds and large water flows throughout the year. Neither source is a reliable energy for Bendee Downs. However the periods of high energy production may align with peak demands from the region when there are large numbers of tourists travelling in south -western Queensland.

In September 2009, EWB and KTOAI commissioned solar panels for the Bendee Downs Homestead to meet the current electricity demand onsite. Development of the shearing shed will increase demand for power.



6.5.2 Suggested Design Projects



There is an opportunity for renewable technologies to further replace mains power from the grid and diesel and petrol used for vehicles. Increased residents and visitors will result in increased food consumption. Sustainable cooking practices present an opportunity to replace current electric cooking practices. With tourism also comes the need for air conditioning and an increase in energy use. These demands must be offset by some sustainable, preferably local energy source.

The energy sources required for the Bendee Downs site include; lights, fans or air-conditioning for summer, heating for cold winter nights, cooking, pumps for the water supply and sanitation system and electricity for ten computers. Students are encouraged to develop their own estimate of the total energy requirements for the Bendee Downs Shearing Shed, making an assumption on the electricity demand based on the information provided. Cooking facilities will need to be sufficient to provide thirty breakfast and dinner meals and up to 150

lunchtime meals.

EWB and KTOAI invite you to consider one or more of the following design projects:

- Solar energy
- Wind Energy
- Water Energy from the Nebine River
- Building Energy Efficiency
- Alternative cooking systems
- Bio-digesters

6.6 Design Area 6 - Information, Communication and Technology (ICT) for Educational Activities

6.6.1 Context

Current communications for Bendee Downs are reliant on satellite technology and are unable to carry broadband². Kooma people at Bendee Downs only have access to dial up internet which is very slow and unsuitable for expanding facilities. The current internet system at Murra Murra can provide service to a maximum of one or two people at a time. A new dish installed in 2008 provides only 512 kb/sec band width. If Bendee Downs plans to become a centre for education, training, and business facilities it must improve communication to provide for this expansion. An effective and reliable method of communicating with the outside world is



required to enable day to day communication and to use online education resources on site. Accessing resources via this media is of great importance. A total of ten computers will be installed at Bendee Downs for use by visitors for cultural exchange activities and by local staff and Kooma people to undertake vocational training programs.

6.6.2 Suggested Design Projects

Information and communication technology can provide opportunities to develop innovative education programs for KTOAI and visitors to Bendee Downs.

EWB and KTOAI invite you to consider one or more of the following design projects:

- Cost effective internet and communication system
- Software for educational games relating to Indigenous history, culture and development
- Software for educational games relating to primary and secondary education
- Hardware for interactive educational games
- Interactive software program that explains the history of the Kooma nation from dreamtime through to white settlement, including the relative magnitude of each of these periods of history.
- Develop a cost effective radio transmitter to linked to repeater stations to enable communication throughout the property. Utilised to locate missing people or vehicles and improve safety.

² Property Management Report

6.7 Design Area 7 – Waste Management

6.7.1 Context



EWB volunteers visited Murra Murra in April 2007 to assess the site and develop a plan for the property. EWB is currently working in partnership with KTOAI to clean up old rubbish dumps at Murra Murra and Bendee Downs in accordance with the plan developed by these volunteers. In May 2007, at Murra Murra, KTOAI hosted a Green School to discuss conservation of the Murray Darling Basin. Green School participants, supported by EWB, assisted with cleaning up the rubbish dump and began to implement a waste management system.

Due to its

remote location, Bendee Downs does not have access to a conventional waste management system that would normally occur in urban areas. The current practice on site is to burn any waste. Opportunities to prevent waste production, reduce consumption, reuse waste and recycle should be considered, including any wastes that are brought to site by visiting tourists. There are opportunities to link waste management with other design proposals such as energy production and building insulation.



6.7.2 Suggested Design Projects

KTOAI are interested in waste management systems that integrate waste reduction, re-use and recycling strategies with livelihood and energy generation. It is recognised that many waste streams can be reused or modified to become a valuable product. Proposals will be viewed more favourably that result in an income stream or reduction in costs for the community, rather than an expense.

EWB and KTOAI invite you to consider one or more of the following design projects:

- Integrated waste management systems including recycling and reuse opportunities
- Composting system for household waste
- Waste collection devices
- Waste reduction and management education
- Alternative packaging materials to plastics and foam

6.8 Design Area 8 – Sustainable Use of Biodiversity

6.8.1 Context



KTOAI hope to start an eco-tourism business on their land. This business venture will give them financial security and start generating opportunities and employment for their people. Opportunities to showcase the biodiversity of the region and create enterprise from the sustainably harvesting the land is a significant opportunity for KTOAI. It is particularly difficult and expensive to obtain fresh fruit, vegetables and meat and these costs are a deterrent for people returning to Kooma traditional land.

A conservation assessment has identified forty-seven plant species on the property with traditional uses for food, medicine and healing. Sustainably harvesting the produce of the land is critical to KTOAI. Students need to consider that any harvesting of animals needs to be respectful to the animals in line with the KTOAI cultural values.

There are currently a number of pest species which are causing significant degradation of the property. These species include feral pigs, rabbits, feral cats and goats. These animals are destroying the natural vegetation of the property and present a

long term environmental hazard for Bendee Downs. The nearby Nebine River contains a number of native fish species, such as the yellow belly. Unfortunately, the introduced carp is a significant pest in the waterways, disturbing the bottom of the rivers, which increases the waters turbidity and impairs the survival of other aquatic species.

Historically, fires in the region have been a significant threat to the community and have the potential to destroy any proposed development overnight. Back-burning the native vegetation is a traditional activity of Indigenous people and could be integrated into other design proposals for Bendee Downs.

Snakes in the area also present a hazard for local people and tourists. Plants such as red geraniums act as a natural deterrent to them. Not providing a hiding place for snakes as another effective way to prevent them from injuring people.

The Kooma ecosystem also has a number of endangered species. These animals must be protected but also represent a potential tourist attraction.



6.8.2 Suggested Design Projects

One of the objectives of KTOAI is to become self sufficient in fruit and vegetables, due to the high travel time and cost of these items in the region. Utilising the local plant species is part of the cultural/social renewal aspirations of the KTOAI. A business based on local plant harvesting could contribute to the self-sufficiency of people living on the property. Native shrub, tree, grass and herbaceous species represent a significant potential community resource. Certain native species may have commercial potential under cultivation such as the limebush (*Citrus glauca*). Use of these local plant species to feed visitors to Bendee Downs is a secondary objective. This would be operated as a commercial enterprise and potentially from part of the eco-tourism business development.

An opportunity exists to hunt the feral animals and kangaroos as a tourism activity. This has the potential to attract tourists to the area, whilst at the same time assisting in controlling the pests on the country and providing a food source. Project proposals need to take into consideration safe hunting practice and ensure that used shells are collected. Kangaroo hunting is a traditional activity of the Kooma people. Hunting pregnant female kangaroos is culturally unacceptable to the KTOAI. It is not culturally appropriate to eat the Emu or to farm animals on Kooma country.

A requirement of hunting of animals on Kooma Nation is that anything which is killed must be eaten. Farmers on neighbouring properties commonly bait to manage pests, which is a risk that must be addressed when the animals are eaten. Hunting pests and hunting the native Kangaroo should be considered as separate proposals.

EWB and KTOAI invite you to consider one or more of the following design projects:

- Local plants on Bendee Downs to feed the local community
- Local plants on Bendee Downs as a commercial enterprise to feed visiting tourists
- Tours that show the local bio-diversity
- Market garden which will thrive in the remote Kooma environment
- Fish trap to capture carp in the Nebine Creek.
- Cage to feed fish with dead animals from hunting and improve fish stocks
- Fire management plan for the site to protect the proposed infrastructure and projects.



7.8 Design Area 8 – Eco-Tourism, Accommodation & Education site

6.8.3 Context



There are increasing numbers of tourists travelling in the south-west Queensland region. There is a growing awareness of Indigenous culture which represents an excellent opportunity for the KTOAI. The projects identified in section 6.2 to 6.8 will provide the relevant infrastructure to support an ecotourism site and many of them will be an attraction for tourists in the region. However there is no cohesive proposal to integrate these design concepts with the surrounding attractions, such as the ephemeral lakes, cultural and historical sites and natural ecosystem on the Bendee downs and Murra Murra property.

6.8.4 Suggested Design Projects

The surrounding attractions have no facilities available including access to water or toilets. Projects should consider the requirements for rangers and other staff to maintain the facilities near any attractions. Projects should consider the safety of tourists whilst on the property.

EWB and KTOAI invite you to consider one or more of the following design projects:

- Eco-tourism Development
- Property tours including:
 - Rock art
 - Local hot springs
 - Cultural heritage
 - Emu nesting
 - Walking tours
 - Ephemeral lakes tours
 - Bird watching
 - Horse riding utilising local community stockmen skills
 - Motorbike tours, which consider the environment and significant sites
- Indigenous Cultural Heritage museum & visitor centre
- Indigenous art centre & gallery
- Performance centre for corroborees
- Provision of camping and picnic spots around the property
- Development of an education centre for the local community and visiting tourists
- Identify opportunities to convert the location into a scientific centre to study the unique ecology of the region
- Design a golf course for visiting tourists



7 Supporting Resources

The 2009 EWB Challenge provides a range of supporting resources including:

- EWB Challenge website at www.ewb.org.au/ewbchallenge
- Monthly e-Newsletter
- Online FAQ Forum
- Maps
- Videos
- Images
- Suggested readings
- Previous student reports

EWB has developed a process to equitably manage student queries regarding the EWB Challenge. Students can view all questions on the FAQ Forum which is linked via the EWB Challenge website. Students may post questions on the forum related to any aspect of the EWB Challenge. EWB will manage the forum and questions will be answered by EWB, KTOAI and other students via the forum.

Note that all queries regarding the EWB Challenge must be directed to either supervising academic staff or EWB. It is important that students and universities do not contact KTOAI directly. EWB thanks you in advance for your co-operation.

8 Key Design Considerations

According to KTOAI, all student proposals must meet the following criteria:

- Align with the cultural responsibilities of the KTOAI, such as protecting cultural sites of the Nebine Creek;
- Set an example of sustainable land management;
- Provide opportunities for Kooma people so they can come back to country;
- Redevelop the site so that it can become a base of renewal, cultural exchange and education for all people.
- Outline the method of communicating the design proposal to the Elders of the community. You will need to meet with the Elders and undertake a presentation.
- Proposed solutions must consider the capacity of the community to maintain the equipment and build on their existing community strengths

9 Submissions Requirements

Design teams may wish to address a single issue or provide an integrated design solution for two or more issues. Alternative projects may also be considered.

9.1 Reporting Requirements

Each university may nominate up to four team submissions for external judging. The 2010 EWB Challenge submission process closes on 23 July 2010 (Semester One courses) and 22 October 2010 (Semester Two courses).

Each participating team submission should include a design report or folio written in English or complete a multimedia presentation explaining or demonstrating their proposed design. As a minimum, each team design submission should:

- Contain a coversheet downloadable from the EWB Challenge website.
- Summarise the design addressing each of the selection criteria for the written submission.
- Reflection on students' learning / experience gained
- Identify the alternative options considered during the design process and a justification for the selected technology, approach and/or process.
- Provide details of the conceptual design, analysis and final design. Design calculations or an explanation may be included, appropriate to the level of team experience.
- Identify schedules and detailed design, construction and maintenance costs associated with completion and construction of the design.
- Identify how the selected design is appropriate to the social, environmental, economic and cultural context of the Bendee Downs.
- Discuss ethics, long term sustainability and maintenance of the engineering work that would be completed as a consequence of the design.
- Provide basic advice on the construction and operation of the design including the role of KTOAI and volunteers and other relevant groups or organisations.
- Outline the details of any external support provided to the design team and identifies any content that is not attributable to the design team.
- Refer to Table 1 for further details of assessment criteria

10 EWB Challenge Rules

Participating teams must comply with the rules of the EWB Challenge. Failure to comply will result in disqualification from the program.

Teams are eligible to participate in the EWB Challenge on the provision that they:

- Abide by the rules of the program.
- Are enrolled in a first-year university course in Australia or New Zealand (International universities affiliated with an Australian or New Zealand university may participate in the 2010 EWB Challenge. However team travel expenses to the Australasian awards ceremony are not covered by the program).
- Have 4 – 6 members.
- Respect the privacy of all participating organisations and communities.
- Comply with the EWB Challenge Submission Requirements.
- Acknowledge that ideas and designs entered into the EWB Challenge program become the right of EWB to use for the development of its projects at no cost.

Universities are eligible to participate in the 2010 EWB Challenge based on the following provisions:

- A participation fee of \$1000 (AUD) per university per year. This fee provides important funding to support the administration of the EWB Challenge including presentations at universities, communication with students and lecturers, website, resources and the development of future design briefs.
- The EWB Challenge will be incorporated into first year design subjects offered by universities during Semester One and/or Two.
- Individual universities will decide how to integrate the program into their curriculum. The design could typically consume around 15% of one semester's work loads for students.
- Each university may enter an unlimited number of teams into the program within the home institution.
- Each university will be responsible for assessing their own teams' submissions and selecting up to four team submissions for external judging in the international finals.
- All submissions for Australasian judging will be judged against a common set of criteria and guidelines. These criteria will be provided to all participating universities.
- A multidiscipline engineering judging panel will decide upon a short-list of six entries for the Australasian awards presentation.
- Final judging will be based upon both the original entry and the presentations. Awards will be presented.

11 Beyond the EWB Challenge

11.1 Beyond the 2007 EWB Challenge

The 2007 EWB Challenge focused on the work of The East West Overseas Aid Foundation (TEWOAF) at Uluru Children's Home (UCH) in southern India. Student projects contributed towards the expansion of existing facilities including water supply and treatment system, renewable power supply, solid waste management and housing infrastructure. Over 3,500 first-year students were involved.

Six teams received Outstanding Achievement awards for their projects. The RMIT team was invited to continue their involvement with EWB and TEWOAF beyond the EWB Challenge. The students have worked with EWB to develop their proposal for the expansion and upgrade of the rainwater harvesting system at UCH. They are also working with TEWOAF and EWB volunteers on the design of an aquifer recharge system.



“We are still in the research stage but we are really looking forward to working on the final design with assistance from the EWB Victoria Chapter, TEWOAF and the EWB national office” said the RMIT team.

“It has been extremely rewarding to be involved in the whole process; from the inaugural EWB Challenge, to RMIT selection, to finalists and now having a hands-on involvement in the project!”

In 2009, two EWB volunteers spent three months at the Uluru Children's Home in India conducting a energy audit and sustainable energy assessment. These volunteers used the student reports as their basis for their final recommendations. The Uluru Children's Home have already implemented a number of these recommendations and are assessing funding options to implement the larger scale opportunities.

11.2 Beyond the 2008 EWB Challenge

In 2008, over 6,600 students developed design concepts to support the sustainable development of Resource Development International Cambodia (RDIC) in Kandal Province, Cambodia. The 2008 EWB Challenge focused on a range of projects including water supply and treatment, sanitation systems, wastewater management, energy supply, portable education unit and rural infrastructure development.



The EWB Challenge Champions will be visiting Cambodia on the EWB Cambodia Development Education Experience. Some of these students have elected to continue with the project in second year and hope to see their project through to implementation. Some of the other ideas which came out of the Challenge that RDIC are keen to develop are an interactive educational software that incorporates Cambodian's love for karaoke and an innovative method to construct spherical water tanks using plastic balloons.

EWB will continue to work with Resource Development International Cambodia (RDIC) to identify innovative student designs and project priorities arising from the 2008 EWB Challenge. The following projects are of particular interest:

- Washing Machine Systems
- Hemisphere Construction for concrete water tanks and biodigesters
- Permaculture designs
- Karaoke Education Software

11.3 Beyond the 2009 EWB Challenge

In 2009, over 7000 students participated in the Tonle Sap, Cambodia EWB Challenge with EWB's partner organisation Live and Learn (L&L) Education. The Challenge focus was on Living on the Water and addressing the various issues of sanitation, food supply, transportation, energy and waste management that are specific to floating communities. Many of the challenges faced by the Tonle Sap community are specific to their environment making the student proposals the first of their kind.

EWB and L&L are currently identifying the key projects they would like to develop further. This process will continue throughout 2010.



12 Contact Details

For more information about the EWB Challenge, go to www.ewb.org.au/ewbchallenge

For EWB Challenge or other EWB education initiatives, contact:

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