The Sustainable Engineering Society

...engineering in harmony with ecology

SENG QUARTERLY NEWSLETTER JULY 2023

Welcome to the July 2023 edition of the Sustainable Engineering Society (SENG) quarterly newsletter.

Please contact us if you would like to contribute content to future editions or have any feedback. We look forward to hearing from you.

The SENG Executive Committee

MESSAGE FROM THE CHAIR

Dear SENG members,

I've been avidly learning all I can about regenerative agriculture lately and you may be interested to know that Percival Yeomans, an Australian inventor known for his keyline system, was an engineer. With an interest in hydrology and equipment design, Yeomans developed his keyline concepts which are now part of the curriculum of many sustainable agriculture courses and which are seen as a key factor in the development of permaculture design.

Yeomans reminds us all that we have all the knowledge and tools we need to address many of the worlds wicked environmental and sustainability challenges facing the planet today – so maybe all we need is the curiosity and willingness to do things differently.....

What are you doing to be the change?

Michelle Bruce
SENG Chair

THIS ISSUE

SENG IN ACTION

FUEL EFFICIENCY STANDARD

SENG contributed to Engineers Australia's submission during the public consultation for this strategy.

The National Electric Vehicle Strategy – DCCEEW can be viewed here.

NATIONAL ELECTRIC VEHICLE STRATEGY

The Australian government released a consultation paper as part of preparations to introduce a fuel efficiency standard, which can be found here.

SENG in consultation with Engineers Australia provided comment. The full submission can be found here.

EVENTS

NSW

How Sydney's engineers can help champion climate action

Date: 29/06/2023
A Sydney Division event focused on briefing and gathering feedback from our local members. If Sydney Division members can't attend in-person at that time, they will have the option to dial-in.

Find more details and Register here.

SA/NT/OS

Making the Circular Economy a Reality

Date: 27/07/2023
SENG are supporting EA in delivering a presentation delivered by Prof. Ali Abbas, the first Chief Circular Engineer in Australia. This hybrid event will aim to educate our members on the exciting happenings within this space. You can read more about the event and register here.

EA Executive Breakfast

Date: TBC
Engineers Australia are collaborating with the Young Engineers Australia (YEA) SA and the SA/NT/OS SENG branch to deliver their annual Executive Breakfast event. This event will host a panel who will explore the theme of a Just Transition. Members will walk away with a greater understanding of the engineer's role in ensuring a net-zero future which is inclusive for all people, everywhere. The Executive Breakfast will be hosted in Q3 this year, with more details to follow.

Get to know you series

Date: Ongoing
This casual event series aims to bring our members together over a coffee to meet each other and build a stronger member base. We have run two of these events this year, and would love to continue running them - however, to ensure feasibility, we are searching for an indication of interest. If this event series sounds like the thing for you, keep an eye out for a survey we will circulate via email. If you have other suggestions for social events, please also send them our way - we would love to create not just a group, but a community united by our common interests in sustainability!
We have other events in the works as well currently - so keep an eye on the SENG LinkedIn for updates!

CPD

E-LEARNING

E-Learning reaches another milestone. SENG has rolled out another component, 'Defining the Problem', which is part of the Sustainability Course. Click here to access the course.

That's Growth and Biodiversity done. Although the content has been completed some time ago it takes time to add the animation, hence Global Warming and Probability & Risk will follow in due course. You will also be notified when Biodiversity is upgraded to include the effect of chemicals. This is a serious issue but will take some time for the course creators, Lara Harland, and Steve Posselt, to produce.

The course has been more than four years in the making, with many thousands of voluntary hours plus a good deal of SENG funds to purchase assets. Engineers Australia surveyed office bearers to test response to the course. There were about 70% in the "Quite a Lot" or "Very Much" categories for enjoyment and value questions, with 85% of respondents saying they would recommend it to their peers.

There were many testimonials received like these:

- This really improved my awareness of what sustainability really means and how as engineers we CAN be the catalyst for change. Great use of animation in getting the message across with excellent presentation of supporting factual information.
- Using a highly relatable conversation between engineers from two different generations, this training provides a thought-provoking exploration of economic growth and associated impacts on physical and living systems.
- A thorough way of providing a lot of facts about a vital subject in a relatively easily assimilable form.

SENG is very pleased with the initial responses and looks forward to making a real difference in accordance with our goals.

CHAPTER UPDATES

Want to know more about SENG regional chapters? Keen to get involved?
Reach out at info@seng.org.au

NSW

The NSW committee continues to meet and discuss sustainability matters and there are some CPD events in the early stages of planning. We have one exciting event coming up, which can be viewed and you can register here.

ACT

Goterra, located in Hume ACT, uses insects to process food waste in modular autonomous waste management units. Goterra have created infrastructure to farm black soldier fly larvae. Larvae inside the autonomous waste management units convert food waste to protein and fertiliser in 12 days. The byproducts of this process are natural and used in agriculture. Interestingly Goterra report that managing waste in this way:

- Reduces emissions from landfill by up to 97%
- Produces a third less emissions then composting
- Creates sustainable protein
- Accelerates the transition to circular agriculture

Want to know more about this local ACT company – check out this article in Create: https://createdigital.org.au/from-insect-farmers-to-waste-management/

VIC/TAS

This quarter the Victorian/Tasmanian chapter has been busy planning an event calendar for the year ahead. Our first event was hosted through Engineers Australia on the 24th May titled “Innovation to support the future grid: solar thermal and wave to energy”. If you missed it, this will be available via EA on Demand shortly.

We are aiming to have a full calendar for the year ahead including a variety of events such as after work networking, site visits and webinars. As always, if there is a topic you would like to hear about, or sites/events of interest please feel free to reach out to the team via the contact details below.

We will also be releasing an expression of interest for additional committee members in the coming month so keep your eyes on your inboxes and get involved if you can!

SA/NT/OS

Heard of the term "Circular Economy" and want to know what the fuss is about? One of our awesome committee members, Shaun Deverson, has written an article which explains what a Circular Economy is all about and what it means for engineers living in a time of transition.

One of our recent events, "Transmission developments supporting energy transformation in South Australia and the NEM", was a collaboration with EESA (the Electric Energy Society of Australia) and shed light on a fascinating new project.

You can view both our Circular Economy report and a recording of the Project Energy Connect presentation at our branch home page.

Our SENG members went to a tour of the Tindo Solar PV panel factory located in South Australia! This state-of-the-art facility was a sight to behold, and we gained insight into the production of solar panels (and just how finicky the process is!).

DISCUSSION

END OF NATIVE FOREST LOGGING IN VICTORIA

This month the Victorian Government announced a revised timeline for the transition away from Victoria's native forest logging industry. The announcement has brought forward the scheduled transition from 2030 to the 1st of January 2024.

This will also see the Government bringing forward the intended support for the industry including free TAFE programs to upskill and retrain workers into emerging industries, offering employment in other areas such as forest and land management and financial support.

The announcement has generally been supported, especially since the "After the Logging" report by Victorian National Parks Association (VNPA), identified the failing of the industry to successfully regrow the forests as claimed. However, questions have been raised over the stability of source of timber supply to meet demand, the sustainability over replacement timber, and the ability of communities to efficiently transition into new industries.

For more on the Government's announcement see here.

DIGITAL TWINS AND URBAN SUSTAINABILITY

Digital twins' technology is emerging as an important solution to address the urgent need for improvement in urban sustainability. By creating virtual replicas of physical entities and processes, digital twins offer valuable insights for sustainable decision-making.

Digital twins allow users to develop environments and model processes that impact these environments, for example a city environment and the traffic through it. When implemented with real-world sensors they provide real-time data into the digital environment. With AI, users can understand these processes to a higher level of detail and model future scenarios. This enables informed, sustainable decision making.

As with all new technologies there are a number of obstacles to overcome. Some of these obstacles include the decision makers having the digital literacy skills to understand the technology, the level of trust in the AI software and the need for a multidisciplinary approach from fields such as IT, Engineering and Policy.

State based Digital Twin initiatives that have been announced include:

- NSW Spatial Digital Twin
- Digital Twin Victoria

Digital twins offer valuable insights for sustainable decision-making in urban environments. Through combining expertise and investing in education programs, the gap between digital data and sustainable urban design can be bridged, leading to the development of sustainable future cities.

CIRCULARITY IN SEYMOUR, VICTORIA

Mitchell Shire has opened an $8 million resource recovery center in Seymour, aiming to divert 80% of waste from landfill by 2030. The facility features a clean and organized design, encouraging residents to recycle and change their perception of waste disposal.

The drive-through center has separate areas for various waste categories and incorporates educational materials and a classroom to promote waste reduction and the transition to a circular economy. With sustainable construction practices, a solar system, energy-efficient lighting, and a rainwater harvesting system, the center exemplifies environmental responsibility and supports Mitchell Shire's commitment to a sustainable future.

WIND TURBINE BLADE RECYCLING

The issue of recycling and end of life has long plagued renewables with questions over the relatively short lifespan and the difficulty in recycling equipment such as solar panels and wind turbines. In February of this year, Vestas, a Danish Wind Energy organisation, announced that they had developed a new process that was able to break down the difficult chemical composition of the turbine blades and restore them to virgin-grade materials.

According to Lisa Ekstrand, the vice president, and head of sustainability as Vestas, this means that “Going forward, we can now view old epoxy-based blades as a source of raw material. Once this new technology is implemented at a scale, legacy blade material currently sitting in landfill, as well as blade material in active windfarms, can be disassembled, and re-used. This signals a new era for the wind industry and accelerates our journey towards achieving circularity”.

The announcement from Vestas can be read here.

VICTORIA TARGETS 75-80% EMISSIONS REDUCTION

The Victorian Government has set an ambitious emissions reduction target for 2035 of 75-80% of 2005 levels, making it one of the most ambitious climate targets globally.

Environment Victoria CEO Jono LaNauze stated “In legislating this target, Victoria will have shifted from having the dirtiest power system in the country to the cleanest, driving down emissions and the cost of energy”. The target aligns with achieving net zero emissions by 2045.

This comes after the Victorian Government has announced other key components in the decarbonisation of the state including the powering of all government operations by renewable electricity by 2025, and the resurgence of the State Electrical Commission (SEC).

More can be read on this statement here.

OPENNEM

For energy geeks and curious people alike, OpenNEM is a great dashboard that provides overview of the Australian electricity sector.

It provides details on the generation mix, value of wholesale electricity, individual power stations and percent coverage of renewables all on an easy-to-use interface.

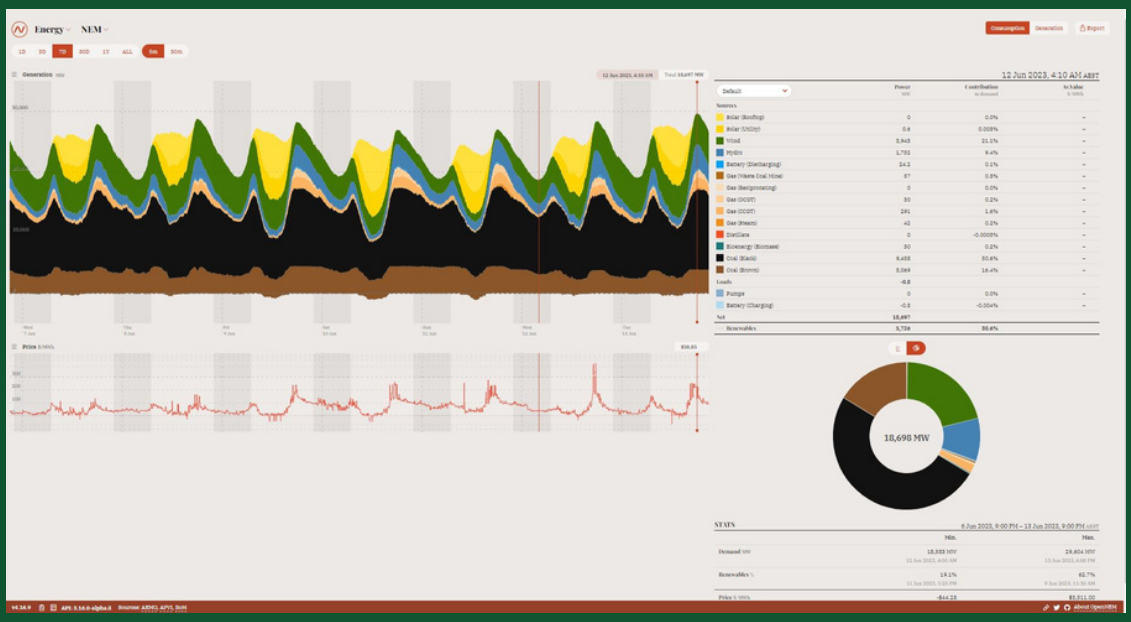


Figure I: OpenNEM dashboard, Sourced from https://opennem.org.au/energy/nem/?range=7d&interval=30m

If you are curious about the national electricity market, need publicly available data to use as a reference, or are just bored on a Sunday afternoon, we recommend you jump on and having a look. To access to site, click here.

THE GREEN BUILDING PREMIUM: DOES IT EXIST?

Earlier in 2023, CBRE published a research paper entitled 'The Green Building Premium: Does It Exist?' which provides recent insights into adoption of building certifications across office buildings in the Asia-Pacific region.

Key insights include:

- Controlling for other factors, office buildings with strong green credentials command a higher rental premium (circa +9%) while office buildings with poor green credential exhibit a rental 'brown discount' (circa -6%).
- Australian office buildings with comparatively higher National Australian Built Environment Rating System (NABERS) ratings commanded a rental premium of between 2-8% compared to those with poorer NABERS ratings.
- Circa 30% of real estate investment firms stated that they were unwilling to pay any price premium to purchase a green certified property, and less than 30% stated that they would be willing to pay more than a 5% premium to purchase a green certified property.
- Sydney, Brisbane, Melbourne, Canberra, and Perth were among the top 10 cities in Asia-Pacific with the highest percentage of office buildings that exhibit green building certifications. All office buildings constructed in these Australian cities during the past three years obtained green building certifications (e.g., NABERS).
- CBRE forecasts that office buildings without green building certifications will become obsolete and the rental 'brown discount' will continue to increase for office buildings without green building certifications.

This research paper is accessible online here.

DELEGATE'S PERSPECTIVE ON UNEP INTERGOVERNMENTAL NEGOTIATING COMMITTEE ON PLASTIC POLLUTION IN PARIS, FRANCE 2023: SUMMARY OF EVENTS

By Kala Senathirajah

The second session of the UNEP Intergovernmental Negotiating Committee (INC-2) on plastic pollution took place at UNESCO in Paris, France from 28 May to 2 June 2023. The meeting was attended by representatives from over 185 countries and many non-governmental organizations including Engineers Australia.

The main objective of the INC-2 was to make progress on the development of a legally binding international instrument to end plastic pollution. The primary aim of the negotiations was to mandate the Secretariat to develop a zero-draft based on the options developed from the submissions made following the INC-1 for discussions at INC-3.

To the relief of many, this aim was achieved late Friday night. INC-2 was riddled with challenges raised by a select group of countries over most of the week.

The first three days comprised of many theatrical arguments on the rules of procedures that were argued would set precedence for decision-making based on majority rather than consensus.

This was not actually resolved at INC-2 but were provisionally adopted late Wednesday evening, allowing for INC-2 to continue, but not without hiccups.

Even at that late hour, there was in fact a false start, but the drama finally subsided, and delegates split into two contact groups to discuss the potential (i) core obligations and (ii) means of implementation to be included in the global treaty to end plastic pollution. Interestingly, rather than kicking off immediately, some time was in fact expended on discussing the order of discussions that should take place. One can only wonder if these were strategies orchestrated to reduce the available time further.

Fortunately, thanks to the perseverance and commitment of the majority, salvaging what time was left (Wednesday and Thursday were very late nights – finishing early in the mornings), there was broad agreement that the instrument should cover all types of plastic pollution throughout the value chain and that a range of measures to reduce plastics production and consumption, use of alternative materials, knowledge and technology transfer, capacity building, improve waste management, increase recycling (while noting that simply recycling and/or switching to alternative materials including bioplastics would not solve the problem).

There was also agreement that businesses and industry should play a key role in reducing pollution with consideration for extended producer responsibility and provisions for financing implementation of measures needed to be included in the treaty.

There were also some issues where certain countries had differing views, such as plastics being a sustainable material of choice, the agreement to ban or reduce problematic or avoidable plastics such as single-use-plastics, what constituted polymers of concern, implications of plastics (including microplastics and nanoplastics) to human and environmental health, upstream and/or downstream approaches, adoption of legally binding rules vs. the development of National Action Plans as per the Paris Agreement (It should be highlighted that the IPCC has stated that we cannot achieve the 1.5oC target, demonstrating the effectiveness of allowing countries to establish their own measures).

Moreover, there were differing options regarding the use of the precautionary principle, rights and risk-based approaches. However, there was consensus that the treaty should be based on scientific evidence. It will be important to ensure that independent scientific information is utilised throughout the process.

There were several side events during the week that provided relevant information, experiences and perspectives on plastic pollution that raised awareness and promoted understanding for consideration during negotiations.

Additionally, several groups such as the Scientists' Coalition (affiliated with) were on hand and actively engaged with delegates, sharing scientific information such as chemicals and polymers, climate change and circular economy and also identifying gaps. Concerns about the potential impact of the treaty on trade were also raised and the presence of UNCTAD, OECD, WTO members was helpful.

At the juncture of the member states to accept the report of the two contact groups and agree on intersessional work (Friday afternoon), there were questions raised about the way forward, leading to a four-hour discussion. It was well past COB when the mandate for a zero-draft was finally given to the Secretariat. Input for inter-sessional work is now being welcomed until mid-August from accredited organisations (e.g. Engineers Australia), and until mid-September from member states.

In addition to scientific and technical information on issues such as defining and identifying polymers of concern, safe additives, white-lists, black-lists, life cycle analyses of plastics and alternative materials, common understanding of circular concepts, design initiatives etc., it would be highly beneficial if inter-sessional work is undertaken to ensure that the rules of procedures are adopted unconditionally before INC-3 so that INC-3 will be bereft of delay tactics based on procedural matters.

Further elongated discussions were held regarding the venues for the next INCs, and agreement was finally obtained for INC-3 to be held in Kenya (Nov 2023), INC-4 in Canada (May 2024) and INC-5 in South Korea (Nov 2024).

There was undoubtedly room for improvement, but overall, the INC-2 was successful in meeting its objective to make progress on the development of a legally binding international instrument to end plastic pollution. Most of the delegates were constructive with a strong sense of shared commitment to find a solution to this global disaster, and with genuine intentions to develop a legally binding agreement by 2024.

Many connections and relationships were established that should help to accelerate future work on the treaty development and foster additional initiatives.

Drawn into research of microplastics for numerous years now at the University of Newcastle through partial funding from Water Research Australia by Water Corporation of WA's sponsorship, I have become acutely aware of the threats of microplastics to human and environmental health.

My water industry background, with a focus on the provision of safe water, was a natural segway to helping to raise awareness of the threats microplastics pose - through the estimation of the global average rate of microplastics ingested, a study for WWF Your Plastic Diet campaign. Since then, my research has developed a polymer prioritization framework to determine polymers of concern to enable targeted mitigation strategies and delved into building resilience to microplastics in the water supply cycle.

Thus, representation as an Engineers Australia's delegate following roundtable discussions at the Open Ended Working Group (20 May to 1 June 2022 in Senegal), INC-1 (28 Nov to 2 Dec 2022 in Uruguay) and INC-2 (28 May to 2 June 2023 in Paris) has allowed us to provide direct input into the discussions, negotiations and elements to be included in this global instrument to address this disaster that compounds the triple planetary crises of climate change, loss of biodiversity and growing waste. This instrument will have a significant impact on the entire engineering sector as well as the water industry.

BOOK REVIEW

"The Big Switch" is an insightful and thought-provoking book written by Saul Griffith, which explores the current state of and the necessary scaling up of the transition from fossil fuel-based energy systems to renewable energy sources. Griffith presents a compelling argument for the urgent need to shift to sustainable energy solutions in order to mitigate the impending consequences of climate change and foster a more environmentally conscious future.

"The Big Switch explores why Australia is best positioned to lead the energy transition globally and the key areas that need to be targeted, including electrification in the homes and the transition of energy sources. Griffith discusses the economics of the transition and conveys complexities in a simple and clear manner.

Any great plan is not without its challenges. The Big Switch addresses the difficulty in developing policy and regulation, in social buy in and in ensuring a strong economic future, which are fundamental to the success of Australia's decarbonisation.

Saul Griffith is an Australian-born inventor, engineer, and entrepreneur. Griffith is known for his expertise in renewable energy, energy efficiency, and materials science. He has received several prestigious awards for his work, including the MacArthur Fellowship (commonly known as the "Genius Grant").

With "The Big Switch," Griffith contributes to the ongoing dialogue on sustainable energy and the imperative for global action.

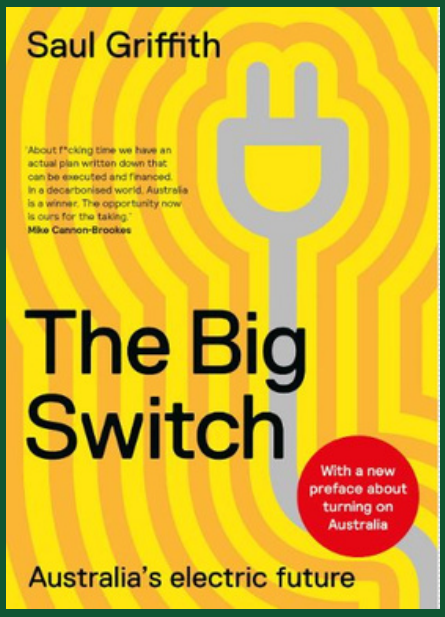


FIGURE 2, THE BIG SWITCH, SAUL GRIFFITH

REGENERATIVE DESIGN OF DRAINAGE INFRASTRUCTURE

SENG-WA hosted an event on 1 June which used case studies of drainage upgrade projects to illustrate the concept of regenerative design.

Various types of projects can be considered as existing on a sustainability continuum. At the middle of this continuum are sustainable projects which are akin to the idea of net zero - where there is no net degradation of environmental, social, and economic conditions. Although sustainability has become an increasing focus of projects, in many instances the reality is that projects are simply moving towards sustainability compared to a Business-as-Usual baseline, rather than truly achieving the goal of no net negative impact.

The distinguishing feature of regenerative projects is that they provide significant net positive impact in each of the environmental, social, and economic areas.

It is important to showcase regenerative projects to inspire exceptional sustainability performance, so that our design teams can know that it is achievable, and it is also important so that we can redress historic damage (to the environment, society, and the economy) by helping reverse biodiversity decline, improving liveability, and providing economic uplift including sharing benefits with those less fortunate.

The speakers were:

- Georgina Hurst (Manager – Drainage and Liveable Communities & Water Sensitive Cities, Water Corporation of WA) and
- Amanda Best (Principal Engineer - Drainage and Liveable Communities, Water Corporation of WA).

They explained that historically, drainage design at the Water Corporation was focussed on the objectives of flow control and flood mitigation.

Typical designs consisted of straight engineered channels, devoid of native vegetation and with the waterway regarded as a public safety risk which in many cases is fenced to exclude public access.

However, there are a number of pressures leading to that design approach to be questioned. For example, changing urban form (higher density living) is resulting in a shortage of public open space and the urban heat effect.

This has resulted in an opportunity to provide local government with access to land reserved for drainage infrastructure which can be adapted to provide public open space, urban tree canopy, and improved liveability.

FIGURE 3, POSITION OF REGENERATIVE PROJECT ON THE SUSTAINABILITY CONTINUUM

Local government receives economic benefits by obtaining access to land without having to purchase land, the water utility obtains economic benefits in the form of funding for revegetation works undertaken as part of the local governments urban tree canopy program and transformation of utilitarian drainage infrastructure to living streams provides an uplift in property values which provides economic benefit to the local residents.

FIGURE 4, WHAT A WATER SENSITIVE CITY LOOKS LIKE

Environmental benefits include restoration of habitat, improved biodiversity, improved micro-climate, and improved water quality especially downstream with reduced nutrient loads into rivers, plus in many instances use of nature-based solutions has lower or a net reduction of greenhouse gas emissions.

Social benefits from providing public with access to natural environment include recreational opportunities which in combination with being amongst nature provides physical and mental health benefits.

A well-designed channel profile (refer below Figure 3) can provide further benefits once a diverse ecosystem of native vegetation establishes because little or no maintenance is required since the fringing trees provide shade that suppresses growth of invasive weed species, and there is no longer a need to mow the banks which is a feature of the engineered channels.

One of the case studies showcased a rural drainage project: Harvey River Habitat Restoration 2022 - YouTube

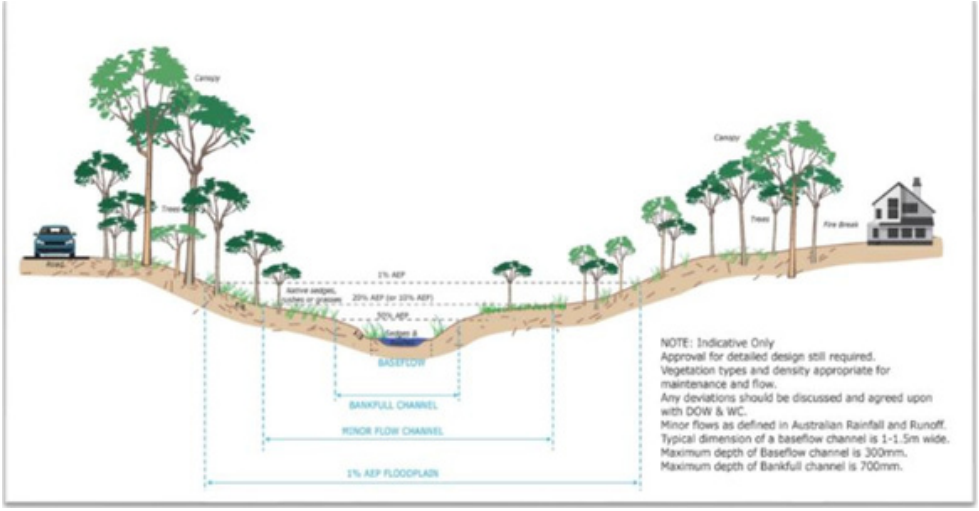


FIGURE 5, CONCEPTUAL PROFILE OF STREAM CHANNEL

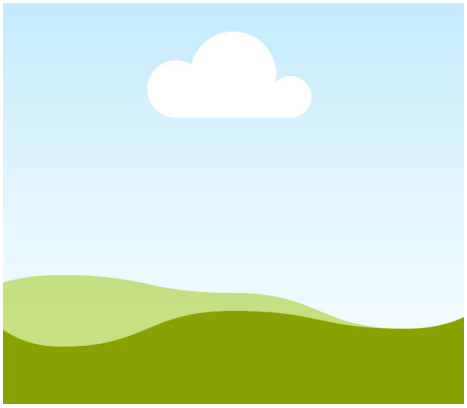
FURTHER READING

The SA/NT/OS committee has collated a list of links to interesting projects and technology developments related to sustainable engineering. These are updated regularly, and can be found on our website at https://www.seng.org.au/node/857

CONTACT

MEMBER STORY

SENG would like to feature stories from our members as part of our future newsletter issues.



If you know any individuals, specific projects or organisations that are leading the way in sustainability in their respective fields, and deserve to be recognised we encourage you to submit a short biography to be featured.
The submissions can be received through any of the contact methods detailed below.

We look forward to hearing about the sustainability champions out there!

GET IN TOUCH!

We welcome your feedback, ideas, and comments on the SENG newsletter.

You can contact us via the contact form on our website or by emailing info@seng.org.au.

Please visit our website and LinkedIn for updates regarding SENG events, news and more.

INFO@SENG.ORG.AU

LINKEDIN.COM/COMPANY/SUSTAINABLE-ENGINEERING-SOCIETY-SENG

WWW.SENG.ORG.AU/