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About the Cover

Despite the many added challenges of 2020, over the past 12 months Garwood International has not only continued delivering a range of innovative solutions for the waste & recycling and sweeping industries, it has also been formally certified as a *100% Australian Owned* business and won the *2020 Local Government Procurement Approved Contractor of the Year Award*.

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The NIMBY Challenge...

Everything has to go somewhere

Dear Readers,

While things have come a long way in the past decade, it's clear that as a growing country, with rapidly growing and expanding cities – and hopefully, in the post-COVID world, revitalised commercial, industrial, agricultural and manufacturing sectors – we are still facing array of major challenges when it comes to developing and delivering the mass of infrastructure that is required to provide for our burgeoning water, energy and waste management needs.

Unfortunately, it also appears that one of most significant challenges – regardless of the solution on offer – is still that of choosing an appropriate location for the new infrastructure or facility.

From wind farms, eco-generation facilities, water recycling infrastructure and desalination plants, through to waste disposal / processing / recycling facilities and the proposed development of nuclear power generation plants as a sustainable alternative to fossil fuels (including any proposed nuclear fuel disposal and containment sites) one of the biggest challenges facing governments and industry alike is the age-old and ever-present NIMBY (Not In My Back Yard) mentality.

Despite the many advancements that have occurred in the fields of waste management, water supply and power generation, when it comes to siting and establishing new facilities, it appears that the general consensus is largely unchanged, viz: *“...these*

new facilities may be fine... as long as they are nowhere near me”.

More precisely, they may be all well and good in terms of reducing our environmental footprint, enhancing sustainability and even ensuring our long-term economic viability, but in terms of location, *“...the further away the better”.*

While one may have expected that improvements in technology, environmental monitoring and the general flow of information may have resulted in a softening of the NIMBY mentality, it appears that the opposite is true. So much so in fact, that NIMBY seems to have further developed into a more serious condition where many ideas are dismissed ‘out of hand’ as totally unacceptable - regardless of need, quality or possible benefit.

This is not only true when it comes questions of nuclear power and coal seam gas, but also applies to facilities such as wind farms, solar farms, Waste-to-Energy facilities, desalination plants, water treatment plants and any form of waste processing, resource recovery or recycling facility.

In short, it seems that the NIMBY mentality (and the resulting ‘emotive’ media campaigns that inevitably flow from both sides of this type of argument) are a still a major issue in terms of preventing the flow of accurate information.

The result - those who are not intimately acquainted with the specifics of desalination, eco generation, nuclear power, Coal Seam Gas, waste processing, recycling

or any number of critical issues, will find it extremely difficult to work out who and/or what to believe.

Needless to say, this constant flow of contradictory arguments makes it all but impossible to make an informed decision in relation to these most important issues - issues which each have a major impact on the future of our country and the way we live.

That said, one thing is clear... *everything has to go somewhere.*

Furthermore, the only way that we can be expected to make an informed decision as to the suitability of the technology being proposed and, more specifically, an appropriate location, is to be provided with the full (and accurate) story.

We must not be prevented from accessing current, accurate and where possible, unbiased information relating to the pros and cons of critical issues such as the siting of critical infrastructure. What's more, wherever possible (and to whatever extent possible) we must attempt to resist ‘emotive’ arguments and campaigns.

After all, accurate information is critical when it comes to making an informed decision - and I, like many, wish to make informed decisions.



Anthony T Schmidt
Managing Editor


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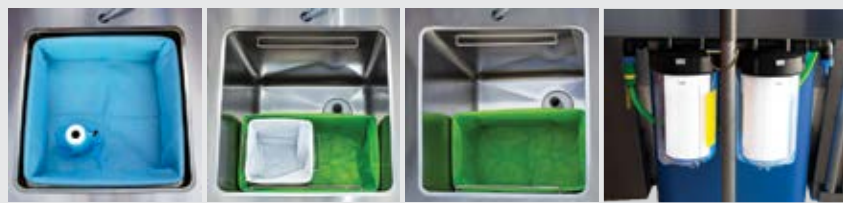
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Analysis by researchers at CSIRO, Australia's national science agency, have found areas in the Murray-Darling Basin suitable for long term underground water storage and could help build drought resilience. Image ©CSIRO, Mat Gilfedder

CSIRO finds up to eight Sydney Harbours could be stored under the Murray-Darling Basin

Analysis by researchers at CSIRO, Australia's national science agency, have found areas in the Murray-Darling Basin suitable for long term underground water storage and could help build drought resilience.

Water banking – known more technically as managed aquifer recharging (MAR) – is when water is stored underground for later uses, such as irrigation and town water supply.

The study, published in the journal *Water*, found that across the entire Murray-Darling Basin, there were storage opportunities of between two and four cubic kilometres in underground aquifers close to rivers – the equivalent of between four and eight Sydney Harbours of water.

Study co-author Dr Declan Page said the recent announcement of a La Nina weather pattern – indicating a higher likelihood of rainfall – was a timely reminder to regional communities that they had opportunities to secure water supplies before the next drought.

"Drought resilience starts well before droughts hit – it's planning and preparing by implementing practices that are water efficient and developing infrastructure that enables water conservation and storage," Dr Page said.

"Recharging aquifers at times of higher rainfall, storing the water, and discharging them during droughts is a cost-effective way to manage regional water security.

"Water banking allows communities and their industries to potentially limit the economic impacts of a drought, operating at far less restrictive levels, for far longer."

Australia's most recent widespread drought in 2018-20 resulted in some towns reaching "Day Zero" events where water supplies were exhausted, requiring water cartage for community and business use.

Many towns faced severe water restrictions to preserve what little water they had until it rained, and for some towns, the drought still has not truly broken. Water banking can be a very economical option in regions that have existing groundwater users and were likely to have some drawdown of groundwater levels, in alluvial or sandy aquifers with low salinity.

Other water banking options do exist, such as using treated wastewater or in confined aquifers, but tends to be more costly.

The study investigated the economic case for water banking in the Dubbo region, and proposed a solution where water was purchased from the water market at lower rates when it was plentiful.

The water is then stored underground where it does not evaporate until needed such as in a drought when water prices increase.

"This method of buying low and selling high is a way to fund the sustainable long-term operations of water banking schemes to enhance water security," Dr Page said.

The paper identified water banking opportunities for regions in the Murray-Darling Basin area, including the Warrego River, Condamine-Culgoa Rivers, Darling River, Macquarie-Bogan Rivers and Namoi River.

Each have the potential for more than 200 gigalitres of regional underground storage.

"Dams and more recently water desalination are often seen to be the main option for increasing water security," Dr Page said.

"However, in areas where the topography, climate or environmental impacts don't make dams suitable, or towns are too far away from the ocean for desalination, water banking can be a cost-effective opportunity for regional Australian towns to improve their water security against times of drought."

Water banking is not entirely new to Australia, though its use has been limited.

Perth utilises water banking via the *Beenyup Groundwater Replenishment Scheme* and Adelaide harvests urban stormwater via aquifers to supplement their urban supply.

The next step to progress these opportunities is to work with interested local communities and industry to develop specific use cases and operational demonstration sites.

The study was part of CSIRO's work to develop a mission to improve Australia's drought resilience and protect regional communities, industries and the environment from droughts.

Waste not, want not: Towards a Waste Free Future

Australia needs to completely rethink its approach to waste – to consider it not as an accident, but as a design flaw in the products and services we consume.

That's the argument of a major new report produced by the Australian Academy of Technology and Engineering (ATSE).

Australians create around 67 million tonnes of waste each year. *The National Waste Policy Action Plan* sets a target of an 80 per cent average recovery rate from all waste streams by 2030, but ATSE's report '*Towards a Waste Free Future*' found that Australia will struggle to meet that if it focuses on recycling alone.

ATSE Chief Executive Office Kylie Walker said the report makes clear more effort is needed at the start of a product's lifecycle.

"Australia can become waste free, but only if we shift the focus to waste avoidance," Ms Walker said.

"We should be designing products from the start so that they have a long and productive first life, and can then be re-used, repaired, or made into something else once they reach the end of that first life."

Following extensive consultation, ATSE believes there is huge potential for technology to support the design of products and services that make the most of finite resources, with positive effects for the economy, society and the environment.

"Moving to a more circular economy would have enormous benefits – not just for the environment but also for jobs creation," Ms Walker said.

"It's been estimated that just a 5% increase in material efficiency in Australia could produce a \$24 billion increase in the economy."

Research and consultation for this report has revealed the work that needs to be done on the economic, policy and regulatory

frameworks to incentivise investment and innovation in the waste and resource recovery sector. It's also found that Australia already has the necessary skills and will to make this transformation.

The report '*Towards a Waste Free Future*' is available for download from:

<https://www.atse.org.au/wastetech>



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New Swedish technology to support a greener aviation recovery

Flying is like competition sailing: it is all about using good winds and avoiding unfavourable air currents. To allow airlines to fully use the favourable winds there is a new weather optimization service available that shows exactly how the wind blows and where there is bad weather in the atmosphere. With this knowledge airlines can save hundreds of tons of fuel per month which also means less emissions.

The best feature of the new optimisation service, delivered by AVTECH Sweden, is that airlines don't have to make any investments to use it. All heavy calculations are made on the ground and just a small amount of data is uploaded to already existing on-board equipment.

Low cost airline Norwegian is acknowledged as one of the most fuel-efficient airlines in the world. The company is also one of the early adopters of AVTECH's services, including tools to optimize the climb, cruise and descent phases for any single aircraft.

"By optimizing the different phases of a flight, we can easily avoid unnecessary use of the engines, which means fuel savings," says Norwegian pilot and project manager Stig Patey. "Just by flying smarter, we have counted an average fuel saving of 22 kg per flight in the descent phase and about 1.6 % in the cruise phase."

At first glance it may not sound very much but multiplied by the 4.4 billion passenger flights that operated worldwide during 2018 pre-COVID-19, the overall fuel savings in the aviation industry in a normal year without a pandemic could be over 1.24 million tonnes per year. A saving that corresponds to the

yearly CO₂ emissions of around 300 000 Swedish households.

Today, things look very different as many airlines have been forced to heavily reduce their operation due to the pandemic and thus, for these companies, survival is paramount. With these potential savings in mind, when the travel situation begins to return to normal the Cruise Profile Optimizer is a great tool to return as a smarter and greener airline. Both saving money on fuel and heavily reducing emissions is achieved with very little effort from the airlines' side.

"The savings we have achieved is good business for us and good news for the environment", Patey says. "The best thing is that we did not have to invest in any new onboard equipment to achieve the reductions, since all calculations are delivered as a service individually to all aircraft."

Among AVTECH's other customers, are for instance Southwest Airlines, Easyjet and Eurowings. David Rytter, CEO of AVTECH, is sure that more airlines will sign up for the services now that the portfolio has expanded to cover all phases of the flight and proven to deliver as promised.

"The cost per flight for the weather service is about the price of a cup of coffee, while the saving is far greater, so the price tag should not be an obstacle", Rytter says. "The aviation business is, however, generally speaking conservative and cautious with new ideas. But we are speaking with several interested airlines and I am confident that our services will be seen as a simple way for airlines to be more efficient and environmentally conscious."

Drones help Gippsland Water save money and improve safety



Gippsland Water's industry-leading use of drones is saving money and improving safety, the organisation has reported.

Managing director Sarah Cumming said the organisation had embraced the use of drones to improve the way its team carries out essential tasks, like inspecting sites with limited access.

"We have a lot of infrastructure that can be difficult to access and inspect, like water towers.

"Flying a drone around a water tower to take video can eliminate the need to work from heights and enable us to perform an inspection from the safety of the ground.

"Then a year later, at the click of a button, we can record the exact same path to observe if there are any changes to that tower worth investigating."

Ms Cumming said drones had also been used to create maps, monitor environmental sites and perform land surveys, all while meeting Civil Aviation Safety Authority regulations for drone use and safety and privacy.

"Our maintenance engineers have used drones to create photographic 2D maps and 3D models of various sites."

"The drone does this by hovering above the site, taking hundreds of photographs and then stitching them together to create one very detailed image.

"From a computer in our Traralgon office, our engineers are using 3D models of our facilities to plot exactly where new buildings can be located before any detailed designs are completed."

Ms Cumming said while the organisation and its contractors were already leading the water industry with extensive use of drones, it would continue to explore other new, beneficial ways to use the technology.

"Embracing new technologies that make the job safer for our team, reduce costs for our customers and improve reliability at an affordable cost is all part of our strategic shift towards becoming a more digital utility," Ms Cumming concluded.

A new global standard for energy at low wind sites

Siemens Gamesa has added a new turbine to its 4.X platform, the SG 4.7-155, combining the company's expertise and track-record in the 4 MW segment with a 155-meter rotor and state of the art blades to significantly increase energy production at low wind sites.

The SG 4.7-155 has a nominal power rating of 4.7 MW and is equipped with OptimaFlex technology, enabling it to operate between 4 MW and 5 MW depending on site conditions. The platform will be enhanced by one of the two rotors developed for the more powerful Siemens Gamesa 5.X platform, representing an important step forward in the company's strategy to adopt the best technology across all its platforms.

This approach, which was also implemented on the SG 3.4-145 launched

in July, optimizes the R&D investment and industrial capital expenditure, and reduces the development cycle, improving the time-to-market of new products.

The development of low wind turbines is especially important for already well-developed onshore wind markets where the space for higher wind sites is limited. By increasing the size of the rotors, wind turbines are therefore capable of providing a successful business case to produce higher clean energy production even with lower wind conditions.

"The new model will make us much more competitive in the low wind market segment, complementing our SG 5.8-170 to offer our customers broader options depending on their project characteristics and needs," said Siemens Gamesa Onshore CEO, Lars Bondo Krogsgaard.

"This type of modular approach using the best of our onshore innovation will help us lower the cost of energy for them and offer the best solutions for the energy transition."



The model will use a 76-meter blade made of fiberglass reinforced with pultrude carbon, integrating innovative aerodynamics to guarantee the best balance between high energy production and reduced noise emission levels.

Indeed, the Annual Energy Production in average low wind conditions is 5% higher than that of the SG 5.0-145. The turbine also has a low noise output of 105 decibels, making it suitable for countries with strict noise restrictions such as France. In addition to these functionalities, the lifetime of the new turbine has been increased to 25 years from 20 years at IEC-Class 3 sites.

A prototype of the new model is expected to be ready by mid-2021, with the start of production planned for the end of 2021.



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Victorian state budget

New funds announced but the devil is in the detail

The National Waste and Recycling Industry Council (NWRIC) has welcomed the establishment of three new funds announced in the recent Victorian state budget that are in addition to the *Recycling Victoria* allocation, saying it is looking forward to more detail on how the waste and resource recovery industry can participate.

NWRIC CEO Rose Read acknowledged that while the focus of the budget is on supporting Victorians in a COVID normal recovery, business and industry rightly form a key part of the equation.

"Going into the budget, Premier Andrews flagged that a focus on 'skills and jobs, confidence and investment' would be the catalyst for Victoria's economic recovery beginning in 2021.

"That is exactly what the waste and resource recovery industry is positioned to deliver, when the right economic and policy frameworks are in place," Ms Read said.

"The announcement of a \$2 billion *Breakthrough Victoria Fund*, a 10-year commitment to invest in research and innovation across key industry sectors is encouraging. The sectors noted include health and life sciences, agri-food, advanced manufacturing, clean energy, and digital technologies.

"We'll be looking at this Fund in more detail and seeing how the waste and resource recovery industry can contribute as a supplier of quality recovered resources for manufacturing, agriculture and construction as well as a provider of innovative resource recovery services.

"The new *Manufacturing and Industry Development Fund* announced to the tune of \$60 million, while focused on the production of medical products, medicines and food manufacturing, should not lose sight of the importance of a product's whole of life and the circular economy. The

waste and resource recovery sector should be involved as these initiatives roll out.

"Similarly, the new \$40 million *Industry Recovery and Growth Fund* will aim to attract more investment and create jobs in areas like manufacturing, clean energy and digital technology, and this again is another area where the waste and resource recovery sector should have a seat at the table," Ms Read said.

"NWRIC welcomes the establishment of these funds, and together with the Recycling Victoria initiative announced in February this year, they should serve as a solid foundation to shift Australia to a circular economy and encourage greater resource recovery and reuse.

"There is a very real economic argument for this approach. According to the Centre for International Economics, just a 5% improvement in material efficiency would add \$24 billion to Australia's GDP," Ms Read said.

Ms Read also acknowledged the recent launch of Victoria's Circular Economy Business Innovation Centre to help businesses streamline how they can reuse and reduce waste as well as create new revenue streams.

"Reducing food and organic waste is the Centre's initial focus, which is important if the National Waste Policy Action Plan target of halving the amount of organic waste sent to landfill by 2030 is to be achieved."

Ms Read said other key announcements in the budget included the increase in landfill levies from 1 July 2021 to a rate that aligns with neighbouring state landfill levies, something NWRIC has long advocated.

"Importantly, the Government has provided sufficient notice to the industry regarding the increase in landfill levies. This gives businesses time to plan and adjust any contracts in time for the increase from 1 July next year.

However, Ms Read called for an increased level of transparency on how the additional levy funds will be invested.

"In 2017-18 just 16% or \$35 million of the \$215 million raised from the Municipal and Industrial Landfill Levy (MILL) went to local government, community or industry led waste projects.

"We need to know how much of the levy raised is actually going towards Recycling Victoria initiatives, as the Victorian Government, via its Sustainability Fund has used the levy to fund its greenhouse gas emission reduction and climate change initiatives.

"The only way we can achieve the National Waste Policy Action Plan's target of 80% average resource recovery rate by 2030, is to invest more of these levy funds into creating local markets, stamping out waste crime and fast-tracking the approval of material, organic and energy recovery infrastructure," Ms Read said.

Ms Read said the budget was also a timely reminder that Victoria has yet to match the Commonwealth's *Recycling Modernisation Fund* announced in July to ramp up Australia's processing capacity necessary for the successful implementation of the export ban.

"The Commonwealth has put \$190 million on the table for states and our industry to match and yet we've still not seen any action from Victoria in signing up to the *Recycling Modernisation Fund* and initiating projects. Tardy progress by eastern states in rolling out the *Recycling Modernisation Fund* will result in unwanted stockpiles.

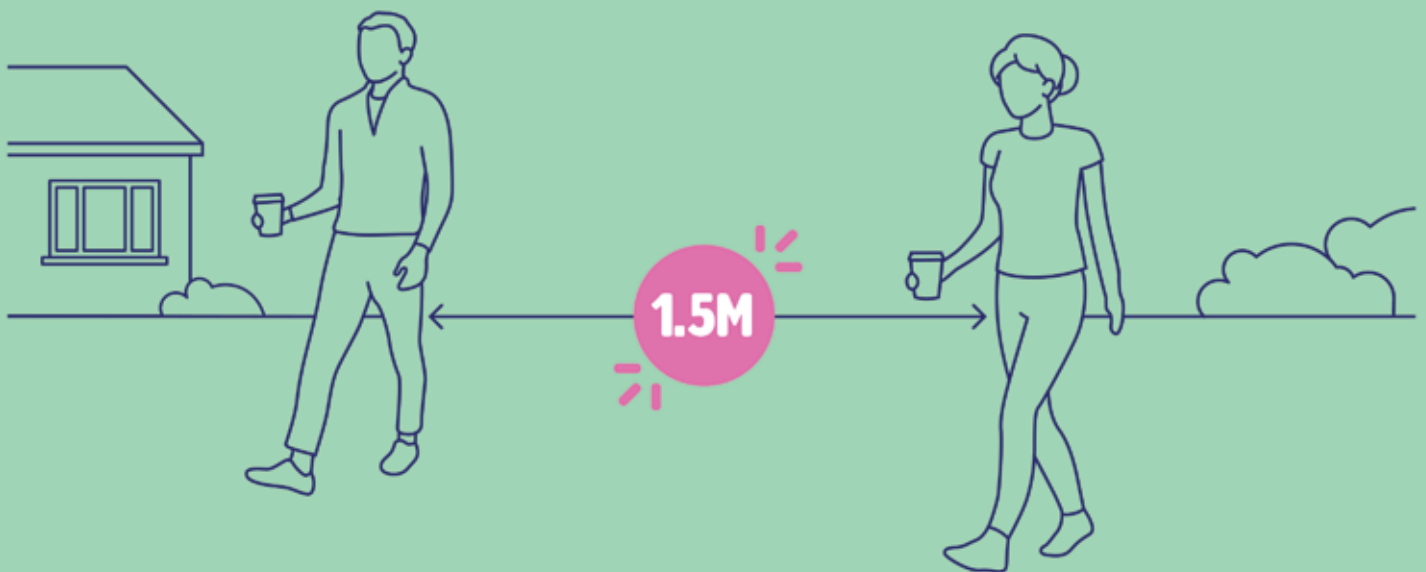
"Together we can rapidly scale up Australia's paper, plastic, glass and tyre recycling capacity to become world class, but there seems to be slow progress from the majority of the states, Victoria included," Ms Read said.

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Australian Government

GARWOOD INTERNATIONAL

An Australian Success Story



As Australians, we all love an Australian success story – this year, perhaps more than ever!

While 2020 has proven to be one of the most challenging years for many decades across Australia and around the globe, it's truly heartening to see that one Australian family-owned business, Garwood International, is continuing to 'kick major goals' on a number of fronts.



Local Government
PROCUREMENT

**APPROVED CONTRACTOR
OF THE YEAR - 2020**

Despite the many added challenges of 2020, over the past 12 months Garwood has not only continued delivering a range of innovative solutions for the waste & recycling and sweeping industries, it has also been formally certified as a *100% Australian Owned* business and won the *2020 Local Government Procurement Approved Contractor of the Year Award*.

Not surprisingly, with some 40 years in the waste and compaction manufacturing business, Garwood's latest achievements are certainly not a case of 'overnight success'. Indeed, the 'Australian-Owned' certification and the LGP Award are in reality the culmination of a massive four-year business development program which saw the company expand its product and service offerings to include specialist sweeping equipment, as well as a number of innovative collection vehicles. Garwood International Managing Director Daniel McHugh, explained:

"Winning the 2020 Local Government Procurement Approved Contractor of the Year Award was not only a great honour and a fantastic surprise – especially given

the kind year that 2020 has been – for us, it also came as a positive vindication of over four years of work spent expanding our product offering and moving into sweepers."

The Local Government Procurement Approved Contractor of the Year Award is chosen from a pool of over 900 Approved Contractors and recognises achievements in working with councils under LGP contract.

The Award focuses on a range of key criteria, including excellence in sustainability, continued innovation, commercial business growth and demonstrating achievements.

When announcing the Award, the LGP Panel noted that Garwood International "... *make quality products and deliver excellent customer service.*" The Panel also highlighted

Garwood's focus on "... *doing what they can to minimise environmental impact, and that they focus on ensuring that their sustainability focus is driven through the products they deliver.*"

The Panel went on to congratulate Garwood on the win, saying it was "... *great to be able to celebrate a small Australian-owned family company for the work they do in our sector.*"



AUSTRALIAN OWNED CERTIFICATION

In addition to winning the prestigious LGP Approved Contractor of the Year Award, Garwood International has also recently been certified by 'Australian Owned' – a business licensing initiative that enables certified 100% Australian-owned businesses to include the widely recognised 'Australian Owned' logo on their promotional material and company livery.

The Australian Owned initiative has been specifically developed to support the Australian business community and help rebuild the economy in the wake of Covid-19, while also helping to bring about the change that is needed to strengthen local communities with jobs and investment which contribute to the long-term prosperity of the country.

While there has always been a preference by much of the Australian public to support locally-owned businesses, there has not always been a clear-cut way of identifying them amongst confusing marketing campaigns and sometimes misleading claims

from companies. For this reason, the Australian Owned licensee certification was introduced as a way to communicate authenticity to consumers and businesses alike. A simple way to connect people to genuine Aussie-owned businesses.



"As a 100% Australian family-owned business, we're extremely proud to have been formally certified as such," Daniel McHugh said.

"Indeed, being able to display the 'Australian Owned' logo is not only a massive point of pride for us, we believe it also highlights an important point for consideration for many of our customers."

"2020 has been an extremely difficult year for everyone both personally and professionally, and it's only thanks to the ongoing support of our customers that we've been able to keep going through what have been, quite frankly, horrendous business conditions for everyone," Daniel added.

"We really want to thank each and every one of our customers for their support and the fact that they place their trust in us - an Australian family-owned business."

"As we start to make our way towards some sort of normality and rebuild the economy, we believe there's never been a more important time to support Australian-owned businesses. The Australian Owned certification makes finding and choosing businesses significantly easier," Daniel said.

AUSTRALIAN INNOVATION

While the past five years have seen Garwood expand its product and service offering to include a wide range of sweepers, the company was built on its extensive range of Australian-designed and built waste and recyclables collection vehicles.

Used by councils, authorities and collection contractors across Australia, Garwood International's innovative range of rear-loader and side-loader collection vehicles have gained an enviable reputation for quality, performance and reliability.

From the compact Garwood Miner through to the 28m³ capacity Maxipact rear-loader, Garwood manufacture collection vehicles to suit an array of applications and operating conditions.



REAR LOADERS

Miner

The award-winning Garwood Miner is Australia's smallest rear load compactor body. For the first time, collection contractors can now service underground basements with roof heights as low as 2.1 metres.

DualPact

The DualPact is a split chamber rear loading compactor which has been specifically designed to cater for multiple waste and/or recyclables streams. Available in a choice of 50/50, 60/40 or 70/30 tailgate configurations, and body sizes from 8m³ up to 22m³, there's a Garwood DualPact to suit most applications.

Bantam

Delivering the ideal combination of full-scale performance and compact manoeuvrability, the Garwood Bantam series full-width rear loading refuse compactor body is available in a choice of 4, 5 and 6m³ body sizes. Built tough to withstand the harshest operating conditions, the Bantam is ideal for councils and contractors' parks and gardens services and street litter clean ups.



Compact

Specifically developed for services in urban centres or public place collection runs, the Garwood Compact delivers reliable, efficient performance. The Compact's 8m³ body is designed for payloads of between 3 and 4 tonnes, depending on the cab-chassis and options selected.

Powapact

With body sizes from 10 to 16m³ cubic metres and maximum payloads of up to 4-6 tonnes (depending on the cab-chassis and options selected), the Garwood Powapact's powerful compaction force is ideal for larger volume general and commercial waste runs.

Maxipact

With body sizes ranging from 16 to 28 cubic metres, the Maxipact is Garwood's largest rear-loader unit. Ideally suited for applications such as hard waste collections and commercial waste runs, the Maxipact can accept payloads of up to 10 tonnes.

Best suited to 6x4 cab-chassis configurations, the Maxipact is also available with Garwood's innovative Wide Comb Lifter & Platform combination. Capable of lifting up to 800kg, the platform helps to significantly reduce the lifting and effort required by operators during hard waste collection services.

SIDE LOADERS

Garwood International's unique range of smaller side-loaders provide innovative equipment solutions for areas with difficult and/or limited access.

LitterPact

Ideally suited to parks and gardens, the LitterPact's compact, but robust light-weight body enables it to access all roads a conventional 4WD can. The Garwood LitterPact is also ideally suited to remote or regional communities with small collection runs.



The Gopher

Garwood's Gopher allows mechanised access to even the smallest areas, including recreation and sporting facilities and small urban cul-de-sacs. The Gopher is available as both a tipping and non-tipping body - allowing for aggregation of refuse for skip to hook-lift collection vessels.

INNOVATIVE SWEEPING SOLUTIONS

OUTSTANDING PERFORMANCE...

ZERO EMISSIONS

In keeping with their focus on providing innovative, high-performance, technologically advanced, and environmentally sustainable equipment, Garwood International is also the exclusive Australian distributor of the remarkable *Urban-Sweeper S2.0* 100% electric, zero-emission compact sweeper.

Designed and manufactured at Boschung's state-of-the-art facility in Payerne, Switzerland, the Boschung *Urban-Sweeper S2.0* has been specifically optimised for Australian conditions - especially in terms of being able to cope with Australia's harsh summer conditions.

The Australian *Urban-Sweeper S2.0* uses the same battery technology as the Tesla car, which not only has the benefit

of being widely proven both throughout Australia and internationally, but also offers the added benefit of an outstanding power-to-weight ratio. In fact, with a Gross Vehicle Weight of 3,500kg, the *Urban-Sweeper S2.0* weighs exactly the same as its diesel-powered counterpart - but with the added benefit of zero emissions and no engine noise.

As well as ensuring that the new sweeper would be able to provide both the required sweeping performance and comfortable conditions for the operator in the height of the Australian summer, Garwood has also focused on developing a full Australia-wide after-sales service and support capability.



A SWEEPER TO MEET EVERY NEED

Garwood International was appointed as Schwarze Industries' exclusive Australian and New Zealand distributor in 2017, taking over sales, service and after-sales for both the Schwarze and Bonne branded sweepers.

Since that time, Garwood International has continued to build both the Schwarze and Bonne brands, with its sweeper

business going from strength-to-strength.



"We extremely proud to be the exclusive distributor for Schwarze throughout Australia and New Zealand," Daniel McHugh said.

"Together with the fact that both brands are held in extremely high regard in terms of their quality, reliable and performance in the field, for us, signing the agreement with Schwarze also represented 'the last piece in the puzzle' in terms of us being able to provide our customers with a high performance sweeper to meet every need," Daniel concluded.

FEATURES & BENEFITS:

- **No Engine Noise** – the extremely 'low-noise' operation makes it ideal for late at night use in inner-urban areas
- **No Emissions** – full electric 'zero emission' operation
- **8+ hour Battery** – sufficient capacity for a full 8-hour sweeping shift
- **No Weight Increase** – same curb weight and hopper capacity as the diesel-powered variant
- **Extended Service Intervals** – 2,000 hour service intervals vs. 600 hours for diesel-powered variant (fewer moving parts / fewer consumables / simpler layout / fewer possible mechanical issues)
- **Improved Suction** – Full electric operation allows for more control over fan-speeds and suction
- **Smooth & Stable Operation** – balanced design and even weight distribution
- **Outstanding Manoeuvrability** – articulated steering system provides curb-to-curb turning circle of only 6050mm
- **Excellent Hopper & Water Capacity** – large 2m³ hopper capacity and on-board water filtration and reuse system minimise downtime
- **Easy Emptying & Cleaning** – Hopper designed for easy emptying and clean out
- **Operator Friendly** – Comfortable, ergonomic cabin layout and intuitive controls
- **Quality European Design & Build** – built to last and keep on performing even in the harshest conditions
- **Australia-Wide Service & Spares** – National after-sales service and support by Garwood International





A partnership to create value from waste

A partnership between Johnson Screens, Australia and Colubris Waste Solutions, Netherlands will deliver bespoke, waste recycling solutions to the Australian and New Zealand market. Johnson Screens experience in screening applications and Colubris Waste Solutions experience in processing engineering makes the perfect partnership to create real-value commodities from waste and deliver innovative yet robust solutions.

It was once said that “the most consistent thing about waste is it’s inconsistency”, and it is with that statement in mind that Colubris and their worldwide partners have used practical experience to build some of the most innovative yet robust sorting lines with the flexibility to deal with inconsistent waste streams both efficiently and cost effectively.

Colubris combine this practicality with the best of engineering technology to develop affordable, sustainable and energy efficient solutions to ensure future proofing of your business. Energy efficiency and smart technology are key elements to their success.

Proven bespoke solutions for your waste streams.

Since the mid-nineties, Colubris have been developing, producing, and installing complete sorting lines for a variety of waste flows. Colubris sorting lines can distill these waste flows, so recyclates are given a second life, such materials include various types of plastics, metal, wood, paper, sand and stone.

Colubris develop and manufacture the smartest and most efficient sorting lines thanks to this practical experience and installations achieve an extremely high percentage of recovered materials, in some cases this can exceed 95%!

With specialised knowledge and experience, Colubris and Johnson Screens have worked for a wide range of clients throughout our history, with references from a diverse range of sectors including construction and demolition waste, industrial and commercial waste, household waste and organics.

Proven Sector Experience

- ✓ Construction, demolition, and excavation site waste
- ✓ Organic waste and compost
- ✓ Packaging material and co-mingled waste
- ✓ Glass
- ✓ Alternative fuel production, RDF, SRF and biomass
- ✓ Wastewater treatment solutions

Municipal Solid Waste (MSW)



Usually generated by households, this waste stream can consist a diverse range of materials such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspaper, small appliances, paint and batteries.

With Colubris sorting systems, typically 75% can be separated. Re-usable materials, for example paper, cardboard, plastics and metals can be recovered to achieve local authority recycling targets. Organic wastes can be further treated and can be used in bioenergy systems.

Construction & Demolition Waste (C&D)



Demolition waste is mostly crushed heavy fractions, like asphalt, concrete, tiles and aggregates. The rest mostly consists of wood and metals.

Whilst some demolition contractors carry out source segregation, the majority of this waste stream is still heavy and mixed requiring our most robust sorting lines to process effectively.

Construction waste can be much lighter and mostly consists of packaging, general rubble from building and renovation sites. It can also contain a high percentage of wood (both clean and treated), paper, plastic, sand, metals, carpeting and glass. The compositions of these waste streams differ greatly but up to 95% of the total mass can be recovered for re-use.

One of the most common reusable products in construction and demolition waste flows are aggregates. Clean recycled aggregates can be reused as a foundation material in road construction, as a gravel substitute in concrete or as a trench fill material.

Cleaning of these products are paramount therefore, Colubris have developed two kinds of separating and cleaning equipment for these aggregates, namely the windshifters (cleaning with air) and the drum washers (cleaning with water).

With Colubris sorting line it is possible to get much more out of your waste flow. Colubris technology can separate your waste flow and produce materials like wood, metals, plastics, RDF, soil and clean aggregates. Colubris even employ robot technology as well as smart reporting techniques.

Industrial and Commercial Waste (I&C)



Industrial and commercial waste consists of a wide variety of waste. It is a generic name for different kinds of dry waste, such as general container (skip) waste, office and canteen waste, product packaging waste, production waste etc. Sometimes, a coarse shredder is used at the input to achieve higher throughputs.

Flexibility is the key for these very mixed streams and with our sorting systems almost 80% can be recycled. Typical recyclates are, for example, paper, cardboard, plastics, stones, metals and wood.

Compost, Green and Organic Waste



Colubris offers various kinds of systems which are suitable for the treatment of organic waste and compost.

For dry oversize composting operations, size separation takes place first then our windshifters are used to separate the inert fractions like stones and glass. Infrared optical separators can remove plastics and other contaminations.

The windshifter employs blown air as the most energy efficient and controllable method for density separation.

For heavily contaminated organic fractions it may be desirable to use a wet 'up-flow' washing system. Our 30 years' experience of water and sludge systems ensure the effective method of organic and inorganic separation can also be used to split the inert fraction such as stones and glass from the organic material. Sludges can be used for energy in biogas or thermal recovery systems.

"...Colubris and their worldwide partners have used practical experience to build some of the most innovative yet robust sorting lines with the flexibility to deal with inconsistent waste streams both efficiently and cost effectively."

Experience

Investment in sorting line technology is a partnership between manufacturer and operator. Colubris Waste Solutions offer Worldwide supply and installation of the most durable and advanced technology, and in partnership with Johnson Screens, let's make more value from waste.

For further information, please contact: Phil Amor, Business Development Manager, Johnson Screens **T:** +61 427 272 786
E: phil.amor@aqseptence.com



Aussie Trash Pump applies pressure

A new development in trash pump technology is being offered to the market by Australian Pump Industries. The pumps, part of the company's Aussie GMP product range, offer solids handling capability, combined with high pressure performance.

Most trash pumps are reasonably low head with big open non-clog style impellers that are not suited to high pressure transfer applications. Most have a head capability limited to around 30 metres.

Aussie GMP's new range of 3" high pressure pumps will self-prime from six metres but offer high performance, high flow characteristics that includes the ability to pump solids in suspension. The pumps are manufactured from close grained cast iron with high SG iron or, alternatively, 316 grade stainless steel options.

Best of all, the 3" motor pump line provides excellent performance characteristics. For example, the 22kW Aussie model B3ZPM-A will deliver a whopping 600 litres per minute at 70 metres head!

"That's astonishing performance for a pump designed to handle up to 19mm solids," said

Aussie Pumps' Chief Engineer, John Hales.

"The same pump, will produce 800 lpm at 76 m head, showing this is where the pump's efficiency really kicks in."

The new pump line-up is all self priming and built to ISO9001 quality standards.

"Self priming is such an important feature," said Hales. "It means the pump will draw water through a vertical lift of 6 m without the need for priming the suction line or the use of foot valves."

"We know foot valves can be problematic, particularly with solid waste for effluent applications," he added.

The new pumps are a major breakthrough in design and feature a simplicity that makes them extremely easy to service.

"There are very few working parts in the pump," Hales said. "We cast in the volute with the body and fit them all with top quality silicone carbide mechanical seals standard equipment. Tungsten carbide seals are available, with Viton elastomers as an option."

"Customers love the idea that there's simply nothing to go wrong. The pump, once primed and started up, will automatically

draw liquid up through the suction port. It's like drinking Coca-Cola through a straw," he said.

All the new B3ZPM-A range, varying from 15 kW to 22 kW, are fitted with heavy duty 415 two pole motors. Pumps are supplied with stainless steel wear plates to absorb wear of the cast iron body and are all fitted with a front mounted clean out port to facilitate service or pump clean-out without disconnecting pipework.

"It's a breakthrough product," said Hales. "The products are spec'd up for the Australian market with 316 stainless steel stub shafts between motor and impeller and heavy duty steel base to facilitate ease of installation."

Applications are expected vary from concrete batch plants through to liquid waste processing and wastewater treatment plants, abattoirs and livestock saleyards. The company expects the 316 stainless steel variation of the pump to get a lot of attention from the mining industry when it becomes available next year.

Further is available from:
www.aussiepumps.com.au



Photo credit: May Ward (NPWS)

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Developed for NPWS' waste and recyclables services across the Kosciuszko National Park, the Superior Pak 28m³ Pegasus custom 'Snow Spec' front lift vehicle is the only one of its type in Australia.
Photo by May Ward (NPWS)

A truck for all seasons



Superior Pak delivers bespoke, purpose-built Front Loader for NSW National Parks and Wildlife Service

Waste and recyclables collection services across many parts of rural and regional Australia often have to contend with additional challenges - especially in terms of accessibility, which can be severely hampered by factors including terrain, road design and condition, and even the prevailing climatic conditions. These challenges are perhaps no more evident than for the C&I bin collection services within the world-famous Kosciuszko National Park in the NSW Snowy Mountains, which features mainland Australia's highest peak, Mount Kosciuszko, and encompasses several of Australia's premier ski resorts and tourist destinations.

Managed by NSW National Parks and Wildlife Service (NPWS), the waste and recyclables services across the Kosciuszko National Park collect some 750 tonnes of material annually, with the majority of that collected from the Perisher Range Resorts during the peak winter season. Of this, approximately 40% (300 tonnes) is diverted from landfill, with around 150 tonnes being bottles, cans and plastics, 60 tonnes of recyclable paper and cardboard, 80 tonnes being organics which are composted, and 10 tonnes of spent cooking oil which is reused.

NSW National Parks and Wildlife Service state that: "The garbage truck is a critical part of the equipment needed to manage the waste generated annually from the resorts and towns within Kosciuszko National Park."

"During the peak winter season, the truck works 7 days a week, collecting waste from outlying resort areas and on snow bins, and transporting it to either Jindabyne landfill or Australia's highest Waste Transfer Station located in Perisher Valley (at an altitude of 1720 metres)."

"Outside the ski season when waste quantities are lower and the Waste Transfer Station is not operating, the truck is used to remove all waste from the park".

A BESPOKE SOLUTION FOR A UNIQUE ENVIRONMENT

The harsh operating environment, especially in winter, together with the challenges of steep terrain, snow and extreme operating temperatures, and salt from the roads can take a major toll on equipment. Additionally, Transport for NSW require that all non-All Wheel Drive vehicles, including trucks, need to carry and fit snow chains during much of the winter which can be a serious impost for drivers.

Superior Pak was awarded the contract to develop a 'bespoke' purpose-built Front Loader specifically designed to meet these needs.

Anthony Uroda, Superior Pak Sales Manager NSW/ACT, spoke about some of the unique challenges identified with this contract.

"While our business is built on working with our clients to identify their specific equipment needs and provide a suitable solution, developing a vehicle for Alpine environments is just not an application we deal with every day," Anthony said.

"Australia's climate throws up a broad range of extreme conditions, but the majority involves 40+ degree temperatures that test hard working hydraulic systems and generally require cooling everything down, including the driver. In the Snowy Mountains, temperatures can get down well below zero, and its these extreme weather conditions, cold icy roads and the corrosive salt used on roads that required a total rethink in terms of truck design," he said.

"With that in mind we went through the NPWS requirements and what specific challenges existed in operating a waste collection unit in the snowy mountains. We

developed a custom unit from the ground up,” Anthony added.

The result is a unique combination of an Iveco Astra 8x8 chassis, fitted with a Superior Pak front-loading, industrial waste collection & compaction body (Pegasus model) - the only one of its type in Australia.

The 8x8 chassis provides All Wheel Drive to greatly increase safety in the snow and ice conditions in which the truck operates. Importantly, when fitted with snow tyres during the winter months, the truck’s All Wheel Drive capability eliminates the need to carry and fit heavy and cumbersome chains. The new unit also features ‘mine specification’ electrical work and special coatings to reduce the corrosion caused by road salting.

“Not all builds are the same,” Anthony Uroda said. “And never before has there been a most honest statement made in my 8+ years career with Superior Pak.”

“After almost 4yrs in the making, this vehicle has been a pinnacle point of my career that will stand out forever,” he said.

“Having frequented the Perisher Valley during Winter, it was apparent from the

outset that a unit that could take on the harshness of winter and dry heat of summer would need some careful consideration to ensure we provided NPWS with a solution to meet the extremely challenging operating conditions.”

“From snow and ice, to the long-term effects of operating on salt-coated roads, every requirement was considered, and every part of this build was unique. Our specialist our engineering team has delivered a truly remarkable solution.”

“As you might expect, the unseen ‘heart of this beast’ required the most thought and development to meet the uncharted territory of a truly ‘Snow Spec’ vehicle. Indeed, constructing a specialist waste collection vehicle around the 520hp Iveco Astra 8x8 chassis was an integration process that challenged all of our years’ experience,” Anthony said.

“An enormous amount of engineering was required to ensure RMS compliance (particularly in terms of meeting axle load requirements), body/chassis integration, operator performance and expectations... but we did it, and we did it well!”

“From custom electrical and componentry protection, zinc-based primer and paint upgrades, through to remote bin lifter arms, hand-held compacting control and a high-wind loading door, this ‘Snow Spec’ unit has it all and more. Indeed, I believe that our 28m3 Pegasus custom ‘Snow Spec’ front lift is and will be the flagship benchmark for making possible the impossible in some of the most unforgiving climate locations in Australia, the Snowy Mountains,” he said.

To add to the individuality of the vehicle, the NPWS design team used images taken by staff and researchers to highlight the unique environment, heritage and threatened species within Kosciuszko National Park. The truck proudly displays the Perisher landscape, Seamans Hut, and two endangered species being the Guthega Skink and Mountain Pygmy-possum.

“The smiles on all the staff’s faces when I drove the unit to the handover point were priceless,” Anthony Uroda said. “I could tell right away that the dedicated NPWS staff were as proud of this build as I was.”

For further information, call: 1800 013 292 or visit: www.superiorpak.com.au

To add to the individuality of the vehicle, the NPWS design team used images taken by staff and researchers to highlight the unique environment, heritage and threatened species within Kosciuszko National Park.
Photo by May Ward (NPWS)





Wystrach presents the mobile hydrogen refueling station

Wystrach is bringing a mobile hydrogen refuelling station suitable for numerous applications to market. The company, which specializes in high-pressure systems and hydrogen technology, presents the *WyRefueler*: a 350-bar hydrogen refuelling system that can be used for trucks, buses, and trains as well as for vehicles on construction sites, in ports, or at airports.

"From the very start, our goal was to develop a user-friendly and highly flexible plug and play solution," explains Wolfgang Wolter, CEO Operations & Sales.

"The system can be assembled or dismantled in the space of a single day and needs just a 63A connector. The *WyRefueler* makes emissions-free logistics and intralogistics easy—and there's no limit to where the solution can be deployed."

The mobile hydrogen refuelling station comprises two components: the tank container and the mobile refueler. Both can be transported independently of each other as a BDF swap body. This modular solution offers an especially high level of flexibility.

The basic s model features a 20 ft tank container, 313 kg of usable H₂ volume, and 88 kg buffer storage, and can provide 180 kg of H₂ each day.

"The system can be modified to meet a customer's every need, such as a larger tank container, stronger compressor, or additional cooling," Wolter explains.

The *WyRefueler* comes equipped with smart controls as standard and can operate autonomously.

Following several weeks of testing at Breytner, a zero-emission transport service provider in the Netherlands, Managing Director Marie-José Baartmans described her company's experience: "The *WyRefueler* is a huge help in everyday operations. It has a compact design and is very easy to operate, so refuelling is fast and uncomplicated."

This means a major increase in flexibility in day-to-day business, adds Jeroen Baartmans, also a managing director at the logistics company.

"The system made an enormous difference to our everyday business, as we were able to schedule a hydrogen truck for our routes as usual," Baartmans said.

"There was no need for trips to a public filling station and no waiting in line at the pump. In addition, the *WyRefueler* operated without a hitch the entire time, which delivered both time and cost advantages."



He went on to say that obtaining an operating license to use the system at the company's own depot "went quickly and smoothly."

The mobile hydrogen refuelling station comes with a comprehensive consulting and service package, which facilitates obtaining the necessary operating license, for example. The system can be monitored 24 hours a day with the remote-control function, and the service also includes setting up and commissioning the *WyRefueler* for the customer. After a completing a training course, users can operate the system independently.

ABOUT WYSTRACH GMBH

Wystrach is a full-service provider of high-pressure storage and transportation solutions for hydrogen and other gases. Our portfolio includes stationary bundles; containers of all sizes; tank systems for trains, buses, and trucks; and storage solutions, e.g. for power-to-gas applications. We also offer a mobile hydrogen refueling station, the *WyRefueler*, in our range of products. In addition to in-house design and production capabilities, Wystrach offers end-to-end service packages for assembly, commissioning, and maintenance, and also provides support on approval matters. Wystrach's strengths lie in its flexible compatibility with technology: because the company is not restricted as to which cylinder it uses, it can always install the cylinder that best meets the customer's requirements. With over 30 years' experience in the field of high-pressure storage solutions, the company has built up its expertise with a special focus on quality and safety. Wystrach is a family-owned company based in the Lower Rhine region of Germany and employs around 200 people.





Mack LR Electric to begin production in 2021

Volvo Group's American subsidiary Mack Trucks has announced plans to commercialize the Mack® LR Electric, its revolutionary refuse model equipped with a fully electric integrated Mack drivetrain. Orders for the Mack LR Electric will open in Q4 2020, with deliveries beginning in 2021.

"Mack's leadership in the refuse segment goes back more than a century, and we're pleased to build on that heritage today by announcing the commercialization of the LR Electric model," said Martin Weissburg, President, Mack Trucks.

"This clean, quiet and powerful truck demonstrates the very best of Mack innovation and our people, and I couldn't be more proud to announce our plans to build it," Mr Weissburg added.

The production Mack LR Electric model will fulfill the needs of refuse customers, whether commercial or municipal, seeking a true zero-emissions truck that aligns with their own environmental goals and local emissions regulations. With its quiet operation, the LR Electric will meet the needs of customers working in an urban setting who are seeking to cut noise pollution and operate quietly at night.

Introduced as a prototype in 2018, the LR Electric features Mack's fully integrated electric powertrain with twin electric motors and four NMC lithium-ion batteries providing vehicle propulsion, as well as power for all onboard accessories. A unique three-mode regenerative braking system takes into account the truck's increasing load and helps recapture energy from the hundreds of stops refuse trucks make per day.

In a nod to its unique pedigree and fully electric driveline, LR Electric models will feature a copper Bulldog mounted on the front of each truck.

"The LR Electric is paving the way toward widespread acceptance of zero-emissions refuse trucks," Weissburg said.

"As we begin delivering them to customers in the coming year, we remain committed to ensuring these trucks are built to meet the unique needs of the refuse industry."

Like other LR models, the LR Electric may be fitted with equipment bodies from a number of manufacturers, allowing the customer to tailor the truck to their specific application. Customers will be able to choose from the same driver/passenger side driving configurations, seating choices and door options offered on the diesel-powered LR.

In addition, minimal changes to the gauges and select switchgear were made, allowing Mack to carry over the ergonomic driver-designed LR cab.

To maximize customer uptime, the LR Electric will be monitored by Mack GuardDog® Connect, a proactive telematics solution that monitors vehicle performance to help customers avoid unplanned downtime. LR Electric-focused service training and electrical safety curriculum will also be deployed to the Mack dealer network to ensure customers receive the level of support they've come to expect from Mack.

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Coca-Cola, TerraCycle and BMA join hands in cleaning up Lat Phrao Canal and promote behavioural change

The Lat Phrao Canal in Bangkok, Thailand - along with the other eight sites from around the world - have been chosen for support under the *Benioff Ocean Initiative* at the University of California Santa Barbara's Marine Science Institute with a total shared funding of \$11 million over the next three years from The Coca-Cola Foundation. Operated through the partnership of TerraCycle Thai Foundation and the Department of Drainage and Sewerage (DDS), Bangkok Metropolitan Administration (BMA), the Thai project has installed two 'River Plastic Traps' to capture waste from the stream. The collected waste is then dried and sorted for proper disposal and recycling with data being recorded for future use in raising awareness among community members and promote behavioral change as a sustainable solution.

Nuntivat Thamhatai, Public Affairs, Communications and Sustainability Director of Coca-Cola (Thailand) Limited, said: "Driving partnerships that promote debris-free environment is one of our 'World Without Waste' commitments. Coca-Cola believes the biggest differences can be made when business, government and civil society with shared value join hands and work towards the same goal which is precisely the case with this project. While this is still relatively small-scaled, we certainly hope that it serves as the beginning of many great works to come, so that, one day, there will not be the need to install any River Plastic Trap in any canal or river."

Through this partnership, which began in June 2020, the Lat Phrao Canal clean-up operation is being led by the TerraCycle

Thai Foundation, a division of the U.S.-based TerraCycle Global Foundation. The Lat Phrao Canal was chosen after discussions between key stakeholders including DDS, Urban Action, and community leaders, as it represents a large polluted canal in need of further clean up initiatives in addition to the existing efforts of the local authorities and other organizations.

The Lat Phrao Canal is 12.56 km long and located in central Bangkok linking between Saen Saeb Canal and Song Canal. Despite DDS's best efforts, the amount of waste in the canal which comes mainly from the improper disposal of communities located along the canal has been simply too overwhelming.

With Coca-Cola's funding, the TerraCycle Thai Foundation has already installed two locally-constructed 'River Plastic Traps' in the Lat Phrao Canal. These two waste-capturing devices have significantly increased the amount of waste collected from the Canal as well as diverted waterborne plastics away from entering into the Chao Phraya River.

The waste collection from these two devices operates five days a week and is operated by TerraCycle Thai Foundation. The collected waste is subsequently delivered to the sorting site located in Lat Phrao district, where it is then dried and sorted, which means recyclable materials are subsequently rechannelled to proper recycling systems. Throughout the process, the amounts and types of collected wastes are meticulously recorded as this data will later be analysed and utilised in developing educational and behavioural-change programs for communities located along the Canal.

James Scott, Executive Director, TerraCycle Thai Foundation, said: "The rise of plastic pollution is one of the most critical environmental issues today - particularly in oceans and waterways. While our mission globally is to address the complex challenges of collecting and recycling waste by providing meaningful environmental and community-focused solutions. These goals also align with the goals of the Coca-Cola Foundation's and Benioff Ocean Initiative's partnership, we intend to drive a key change in people's behavior here in Thailand to be more aware of the importance of recycling so that it will eventually become everyday practice."

The TerraCycle Thai Foundation is also supporting local workers to work on this project to give them a chance to be part of the solution as well as engaging local stakeholders - especially government, business and community leaders - to ensure sustainable impact of the program.

Tum Piyo, Lead of Canal Garbage and Waste Disposal Lat Phrao 56 Section, Retention Pond Maintenance Sub-Division 1, Department of Drainage and Sewerage, Bangkok Metropolitan Administration, said: "The Lat Phrao Canal is one of the many canals in Bangkok facing an increasing volume of plastic waste and this is causing a great concern over its environmental and societal impact both locally and globally. This includes sewer blockages potentially causing floods in the city and even spillage into the oceans."

"Many organizations in Thailand are working very hard to find sustainable solutions to this growing challenge. So, DDS is delighted to support The TerraCycle Thai Foundation in executing this project. Together, this represents a great partnership to solve waste issue in Bangkok's canals sustainably and mitigate this big global challenge," Tum Piyo said.

Since the project's launch in June, over 50,000 kilograms of waste has been collected from the canal, excluding large organics such as water hyacinths and tree limbs. The highest daily collection rate was 2,098.12 kilograms in one single day.

The most commonly collected items have been plastic bags, but there have also been large amounts of single-use foam containers, plastic bottles, and glass bottles.

Study find water systems in peril from intensive monoculture

The global spread of vast forest plantations and agricultural monocultures are turning once diverse landscapes into areas of land supporting single plant species, with profound implications for our terrestrial water cycle, according to new research.

A new paper published in *Nature Geoscience*, and written by a global collaboration of interdisciplinary researchers studying ecohydrological systems, calls for policymakers and practitioners to consider these water-vegetation interactions in their land management decisions.

Professor David Hannah, who holds the UNESCO Chair in Water Sciences at the University of Birmingham, is a co-author of the paper. He said: "Scientists and policymakers need to work closely to translate scientific knowledge into action. We need to be designing forests and agricultural systems that embrace and enhance diversity. This approach is essential if we are to preserve the natural resilience of our water-dependent ecosystems and provide better stewardship of the Earth's finite water resources."

The authors of the paper argue that, while land-use cover change can be well intentioned—whether it is done to increase carbon sequestration or meet food, water, and energy demands—it can have unintended consequences that affect the water cycle.

Professor Irena Creed, co-lead author at the University of Saskatchewan, said: "There are hydrological consequences to consider when changing land cover

types. People want to plant trees to help with carbon sequestration and climate change, but sometimes, when you do that and you plant a lot of fast-growing trees that are a uniform species and age, you're lowering the biodiversity and you're also homogenizing the water cycle. That basically means you're narrowing the range and response of the water cycle, and it makes it more susceptible to stressors like climate change."

Plant uniformity in highly managed landscapes that have replaced wetlands, for example, has been linked to increases in the frequency and severity of both floods and droughts, as well as the deterioration of water quality. Elsewhere, the growth of maize monocultures to produce ethanol and biodiesel in the United States are projected to increase areas at risk of groundwater nitrate contamination. And tree plantations grown to meet the demand for wood can reduce or even eliminate streams, leading to soils becoming more acidic or salinated and with increased susceptibility to fire.

In contrast, a more biodiverse system has trees and plant with different architectures, both above and below the ground, leading to a robust, natural system.

Delphis Levia, co-lead author at the University of Delaware, explained: "Think of soil moisture and rooting depth. If there are a variety of different tree species, some send roots down kind of shallow, some intermediate and some deep. That means there's a lot more soil moisture available to some forest species than others. But if you're in a monoculture

situation, as with many staple crops, the rooting depths are more uniform. They don't penetrate the soil to varying degrees like natural vegetation in forests. And so, they can be more susceptible to drought."

The research team argue that further research is needed to analyse fully the relationship between vegetative complexity and water use. This would be done to see how losses in plant diversity affect the water cycle and planetary resilience to global change, and how that can lead to increased susceptibility to disease, fire, and other extreme weather events such as hurricanes.

John Selker, professor at Oregon State University and a co-author on the paper, said that knowing how the change in the water cycle is occurring quantitatively would allow proper management practices to be put into place.

"It is fine to know the qualitative trends, but to put this into management practices, we need some numbers on the resilience as a function of specific metrics of complexity," said Professor Selker.

The paper has its origins in the *Ettersburg Ecohydrology Workshop*, funded by the University of Delaware and the UNIDEL Foundation. 29 experts and students from 11 countries gathered in Weimar, Germany to figure out how to start addressing the world's multifaceted water crisis. At the workshop, the experts worked together to identify the research needs that ecohydrologists must address so they can provide strategies and data to help mitigate some of the world's water crisis.

Maintaining the flow

The water sector is growing increasingly susceptible to cyber attacks, but there's a solution

By Ghian Oberholzer, Regional Vice President of Technical Operations, APJ at Claroty

In June, the Australian government disclosed that a range of political and private-sector organisations had experienced cyber attacks carried out by a “sophisticated state-based cyber-actor.”

These attacks pose an alarming level of cyber risk to Australia's critical infrastructure, the very services on which our society depends. Cyber attacks on businesses are damaging enough, but the impact of a successful attack on critical services such as our water supply could be catastrophic, especially during a global pandemic.



Ghian Oberholzer

Whilst many Australians could tolerate a day without electricity, many couldn't face a day without water.

And our research shows that this is a growing risk. Claroty's Biannual Industrial Control Systems Risk and Vulnerability Report revealed that the Water & Wastewater sector experienced a 122.1% increase in ICS-CERT vulnerabilities during the first half of 2020.

A combination of legacy systems, increasing convergence between operational technology (OT) and information technology (IT) environments, and most recently an increase in remote access has put water utilities at risk of cyber attacks that could disrupt Australia's access to safe water.

A lack of visibility is putting water utilities at risk

A key security issue in the water sector is the lack of asset visibility. Water utilities often consist of hundreds of kilometres of pipelines, pumping stations, water treatment plants, and storage and distribution systems. This large physical footprint, combined with rapidly growing infrastructure to support population and business growth, can result in inconsistent documentation of OT assets, which makes it harder to detect potential threats and vulnerabilities across the network.

Furthermore, pumping stations and other water facilities are often unmanned, meaning employees and authorised third-party vendors rely on remote access to perform maintenance and other tasks. Systems, switches, and controllers may be compromised if the authorised parties' systems are infected with malware.

The rapid increase in remote workers as a result of COVID-19 has created additional security gaps and an expanded attack surface for many organisations. Threat actors have quickly realised that targeting remote workers can provide a viable path into industrial networks in the water sector, among other critical infrastructure.

Claroty research found that the frequency of phishing attacks against critical infrastructure providers increased in the first half of 2020, coinciding with COVID-19 and the increase in

remote working¹. These sophisticated attacks target engineering workstation desks and third-party contract staff in an attempt to execute unauthorised code and commands into OT networks.

Just last year, three cyber-physical attacks hit Israel's water management facilities, targeting the mechanisms responsible for monitoring chlorine levels in the water supply. If the attacks had been successful and water chlorine levels had been compromised, attackers could have caused significant damage to the health of the local population.

While these attacks were geographically distant from Australia, they remind us of the vulnerability of our own water management systems, and the need to increase protection for the nation's critical infrastructure more broadly.

Boosting cyber resilience in the water sector

The Australian government recently illustrated the need for sophisticated cybersecurity practices, policies, and technology to protect our water supply and other critical infrastructure in its 2020 Cybersecurity Strategy. This is a positive step forward in increasing the resiliency of our most important assets.

However, one under-discussed pain point that may be preventing water utility operators from implementing comprehensive cybersecurity solutions is the need to avoid any operational downtime, which is not only costly and inconvenient, but can have detrimental if not deadly consequences for the local populations that the operators serve.

Armed with the appropriate security solutions, operators can boost the visibility and reliability of their OT assets without requiring any downtime or dedicated teams to conduct remote site visits.

The first step in improving network security without impacting availability is to understand exactly what you've got and where. Water utility operators should aim to comprehensively map all of their assets, as well as any connected devices on the network, in order to determine any vulnerable or sensitive areas. This requires a thorough understanding of all physical assets and the communication paths between them.

The next step is to keep a log of all activity across the network, which enables operators to identify anything out of the ordinary. By monitoring and establishing a baseline of normal behaviour on the OT network across an extended period of time, any abnormal activity and potential threats can be easily discovered and dealt with before they have the chance to cause disruption.

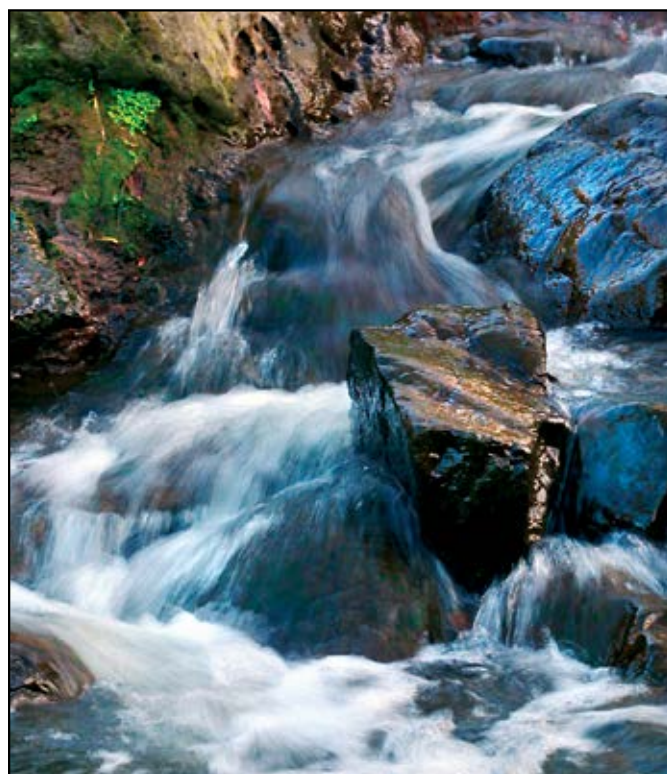
Finally, water utility operators should ensure they have safe remote access procedures in place for any staff and third-party vendors who require it. In the age of COVID-19, it is crucial that operators have the ability to track and audit all remote accesses, in order to provide robust protection against any unauthorised entry.

In recent months, we've all gained a greater appreciation for the availability of vital services. We've learned that while there are few constants in our lives, the need for a safe, reliable supply of water will never waver.

However, the cyber risk to Australia's water supply is now greater than ever before. To ensure we maintain the flow, it is imperative that water utility operators protect their assets with sophisticated cybersecurity tools.

References

1. Biannual Industrial Control Systems Risk and Vulnerability Report, Claroty 2020



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Revolutionary step forward in global sustainable food tech

An international company driven by a leading Australian businesswoman is on the cusp of a global revolutionary change in the food technology and packaging sector.

Zehnder Technologies is set to launch of a sustainable range of Textured Vegetable Protein (TVP) and packaging products to tackle the world's environmental problems.

Led by former executive of activewear giant Lululemon, Alexie O'Brien and Josef Zehnder, a former executive of Australia's Byron Bay Cookie Company and founder of Gluten Free Bakehouse, the company is backed by Mr Zehnder's 30-plus years of experience in food manufacturing innovation and a number of experts in the food technology and business sectors.

The company is already producing and exporting high-quality TVP made from sunflower while it finalises its patented solution for compostable disposable packaging and is currently raising capital for the final stages of branding, legal and R&D components and expects to release the packaging range in mid 2021.

Ms O'Brien said Zehnder products will reshape both the \$1.5 trillion meat market and the \$85 billion fast food packaging sector.

"We are long overdue for a change to outdated meat alternatives such as soy, pea and wheat whose production models haven't improved since the 1970s, and our technology enables this," she said.

"Interestingly, it's not the vegetarian or vegan market looking for new answers. Recent statistics show the majority of consumers looking for a drastic change

are generation-X meat-eaters with serious concerns around health and the environment.

"The production of soy is extremely damaging to the environment, using up large areas of land mass and water, resulting in deforestation and existing on the market as a highly refined product.

"Our TVP products are made from sunflower, are firmer and more nutritious than most already in the market and have little to no difference in taste or texture bite than regular meat foodstuffs.

"This is the first real innovation in the meat substitute market since it began and provides a better outcome for the consumer and the planet."

The company's TVP product has been in the European market for over six months as a white label product with production expected to reach 120 tonnes a month by early 2021.

A FMCG brand, Botany Fields, will launched in December this year and will be distributed across retail, food service and supermarket sectors.





Zehnder's packaging arm, Zehnpak, is also finalising the commercialisation of its patented solution for compostable disposable packaging

The technology aims to disrupt the global takeaway disposable packaging market, including coffee and drinking cups,

cutlery, plates, and fresh food wrapping, which can be made at a lower cost in mass production than current packaging on the market.

"With an estimated 500 billion plus non-recyclable disposable packaging products choking waterways, landfill and oceans, we

have a cost-effective solution to change the way waste is disposed," Ms O'Brien said.

"Our packaging does not utilise chemicals, plastics, trees or coatings and uses less water than recycled paper and the raw materials we use are low cost and available in industrial quantities, with standard base grade product able to hold liquid for 72 hours.

"Best of all it breaks down and starts to decompose within a week leaving no residuals in the environment – it's so safe you can eat it."

The company's TVP arm is expected to commence retail supply at scale by April with a European manufacturing facility already in progress and targeted for completion by June 2021.

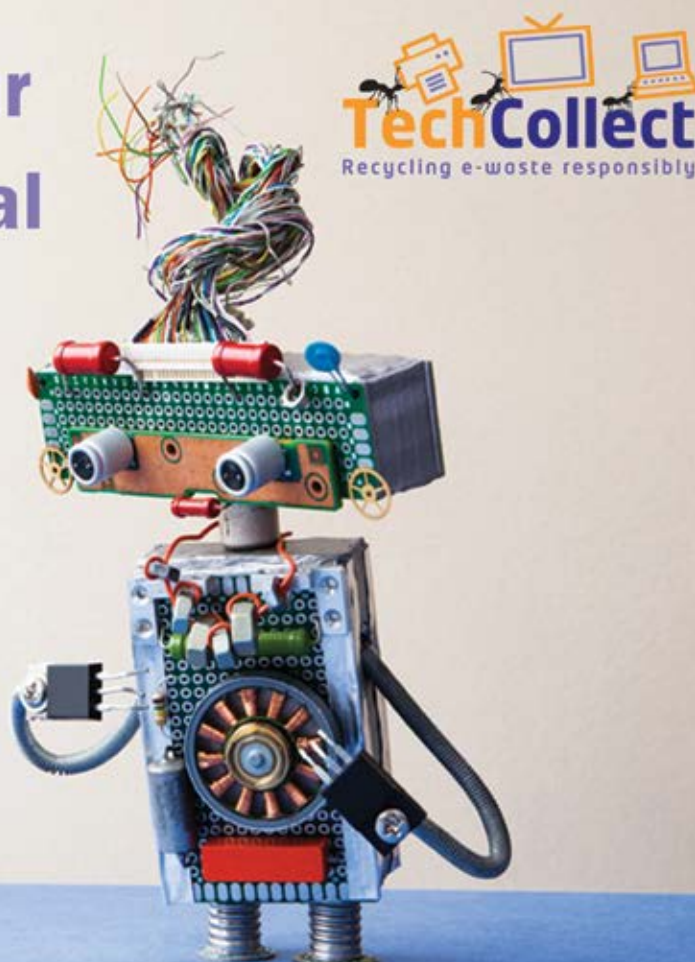
Product development for its compostable packaging will be finalised by April with product sales expected to commence by June and a European manufacturing facility completed by September 2021.

For more information, please visit: www.zehndertech.com

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Biosolids-PFAS nexus

By N.S. Bolan, Global Centre for Environmental Remediation, The University of Newcastle, NSW, Australia and M.B. Kirkham, Department of Agronomy, Kansas State University, Manhattan, KS, USA.

Australia produces around 371,000 tonnes per year of dry biosolids, and Australia is one of the leading countries in the beneficial utilization of biosolids. Beneficial end uses of biosolids account for more than 90% of biosolids production in Australia, and they include agriculture, land rehabilitation and landscaping (Figure 1).

Biosolids provide an important source of carbon and nutrient inputs to soil, thereby contributing to enhancing soil health and crop productivity. For example, a tonne of biosolids could provide around 500-600 kg of carbon and 100-200 kg of nitrogen. Australian soils are very low in carbon,

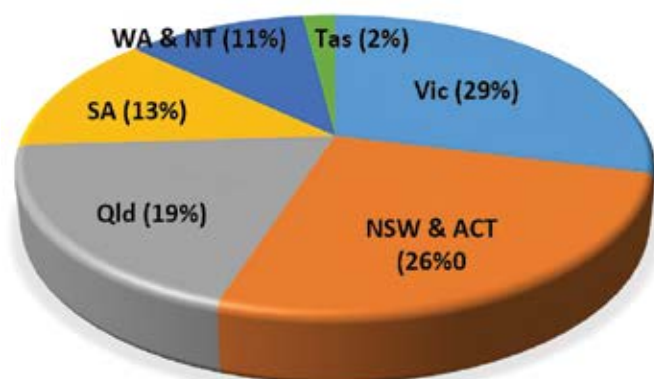
which is important for biological health and soil moisture retention. Thus, biosolids application provides a major source of carbon inputs to Australian soils, thereby helping to mitigate the drought impacts on soil health and crop productivity.

One of the major issues with biosolids application is the level of inorganic and organic contaminants. Historically, the major inorganic contaminants include potential toxic elements (PTE) such as cadmium, arsenic, lead, and mercury. Traditionally, the majority of these inorganic PTE contaminants was derived from industrial wastewater sources.

With the tight regulations on curbing industrial wastewater sources reaching domestic wastewater treatment plants, the level of PTE contamination in biosolids has been drastically reduced.

The major organic contaminants include endocrine disturbing chemicals (EDC), such as antibiotics, and persistent organic contaminants, such as poly- and perfluoroalkyl substances (PFAS). PFAS are one of the emergent contaminants reaching biosolids in wastewater treatment plants. This article provides an overview on PFAS input resulting from biosolid application to agricultural soils.

BIOSOLID PRODUCTION



REUSE OF BIOSOLIDS

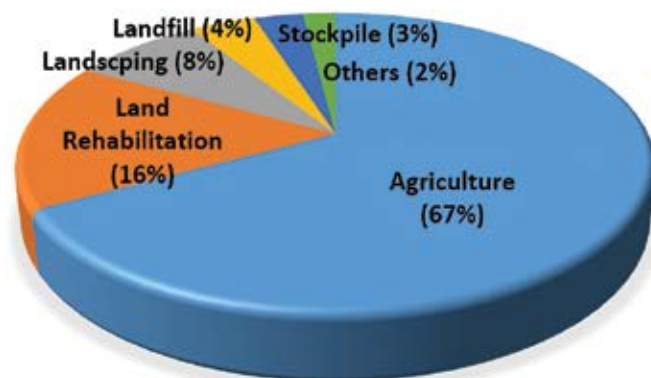


Figure 1. Biosolid production and reuse in Australia

PFAS are a group of manufactured fluorinated organic chemicals that contain one or more C atoms on which the H substituents have been replaced by F atoms. PFAS are a complex family of more than 3,000 manmade fluorinated organic chemicals, and perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorohexane sulfonate (PFHxS) are some of the most well-known PFAS contaminants. PFAS are resistant to heat, water, and oil, and they have been used extensively in a wide range of applications including fire-fighting foam, non-stick cookware, fast-food wrappers, water-repellent fabrics such as carpets and clothing, medical equipment, and plastic and leather manufacture. Aqueous film forming foam used in firefighting, and biowastes, including biosolids, animal and poultry manures, and composts, are major sources of PFAS input to soil.

Wastewater treatment plants (WWTP) are not efficient in the removal of PFAS. PFAS have been detected in influents, effluents and sludge generated worldwide, which suggests that biosolids provide a major link for widespread diffuse contamination of PFAS in the environment. Consequently, PFAS are likely to enter the food chain through plant uptake ultimately posing risk to human and ecological health.

“Wastewater treatment plants (WWTP) are not efficient in the removal of PFAS. PFAS have been detected in influents, effluents and sludge generated worldwide, which suggests that biosolids provide a major link for widespread diffuse contamination of PFAS in the environment.”

The recent report on ‘Assessment of Emergent Contaminants in Biosolids’ carried out by Australia New Zealand Biosolids Partnership (ANZBP) indicated the presence of a number of PFAS congener compounds, including PFOS and PFOA, in biosolids produced in Australia.

For the general population, the major human exposure pathways for PFAS include:

- (i) drinking contaminated water;
- (ii) ingesting contaminated food, such as fish and shellfish;
- (iii) eating food packaged in materials containing PFAS (e.g., popcorn bags);
- (iv) hand-to-mouth transfer from PFAS-containing biowastes and soil; and
- (v) uptake of PFAS by edible crops in soils treated with biowastes.

In the case of biosolids, the last two pathways play a critical role in human exposure to PFAS. However, based on the

average concentrations of PFAS in biosolids produced in Australia, it can be concluded that there is only a minimal immediate risk of human exposure through direct ingestion of soil treated with biosolids (Table 1).

However, there is a potential risk for the uptake of PFAS by edible crops and leaching of PFAS to groundwater sources from soil treated with biosolids, which requires further investigation.

In Australia, assessment of reuse options for PFAS-contaminated materials such as biosolids is based on the principles that reuse of the material must not lead to an unacceptable risk to human health and the environment. Currently, the reuse of PFAS-contaminated materials above the Stockholm Convention PFAS content limit of 50 mg/kg is not considered.

The most important pathways posing a risk to human health and the environment are transport of PFAS to surface water and

Land use	Toxicity Reference value (mg/kg soil)*		Number of years taken to exceed the toxicity reference value in soil**	
	PFOS + PFHxS	PFOA	PFOS + PFHxS	PFOA
Residential with garden/accessible soil	0.01	0.3	33.3	7,000
Residential with minimal access to soil	2.0	20.0	6,666	466,666
Public open space	1.0	10.0	3,333	233,333
Industry/commercial	20.0	50.0	66,666	1,166,666
<p>* https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Land-and-soil/human-health-soil-screening-criteria-190208.pdf</p> <p>** Mean Concentration of PFOS and PFOA in biosolids = 0.021 and 0.003 mg/kg biosolids, respectively; bulk density of soil = 1400 kg/m³; depth of incorporation = 100 mm; Biosolids input = 20,000 kg/ha/yr</p>				

Table 1. Toxicity reference values for PFAS compounds in soil, and the number of years taken to exceed the toxicity reference values through biosolid application

groundwater through leaching from PFAS-contaminated material and bioaccumulation in plants and animals consumed by humans and animals. Therefore, any assessment of risks associated with reuse of PFAS-contaminated material should consider the proximity and sensitivity of surface or groundwater receptors, potential for bioaccumulation, and secondary or tertiary exposure to humans and animals.

There is one more hidden issue with PFAS accumulation through continuous application of biosolids to cropping soils. In the case of PTE in biosolids, there was a concern about the 'time bomb' effect of biosolid application on the mobility and bioavailability of PTE. The time bomb hypothesis considers that the slow mineralization of the organic matter present in biosolids could release PTE in readily soluble forms, which then may become available for plant uptake, thereby reaching the food chain. However, when PTEs are added to soils through continuous applications of biosolids, often a "plateau

response" occurs in plant uptake. At that point, the PTE absorption by plants does not increase in response to biosolid application.

This plateau effect is related to the presence of adsorptive materials in the biosolids, such as organic matter and amorphous iron oxides. Application of biosolids as a soil amendment can result in the transfer of PFAS to soil. These PFAS can then be available for uptake by plants and soil organisms, and there are indications that PFAS can enter the food chain with biosolid application. It is important to examine whether the continuing application of biosolids can lead to either the time bomb or plateau effect in relation to PFAS uptake by plants.

Due to the chemical and thermal stability of PFAS and the complexity of PFAS mixtures, remediation of PFAS in both solid and aqueous media is challenging. For solid media, such as soil and wastes (e.g., biosolids), PFAS can be removed through abiotic or biotic degradation or immobilized using adsorbents. Three relatively

successful abiotic PFAS mineralization treatment technologies include:

- (i) oxidation processes including electrochemical oxidation, photolysis, and photocatalysis;
- (ii) reduction processes involving the use of zero-valent metals/bimetals with clay interlayers and co-solvent assisted vitamin B12 defluorination; and
- (iii) decomposition aiming to break C-C and C-F bonds using, for example, thermal chemical reactions, incineration, sonochemistry, microwave-hydrothermal conditions, and high voltage electric current.

Adsorption of PFAS using anionic adsorbents can also be used to immobilize PFAS in soil and other solid media such as biosolids. Immobilization of PFAS in solid media may reduce their mobility and bioavailability to plant and organisms.

Although few reports exist on biotic degradation under laboratory conditions, their applicability to *in-situ* conditions is challenging.



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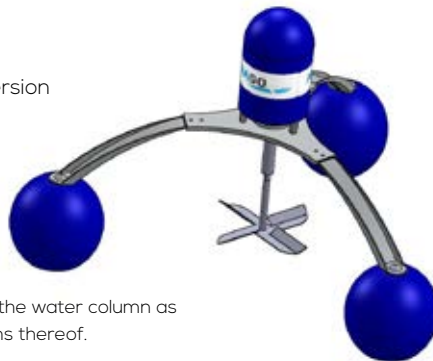
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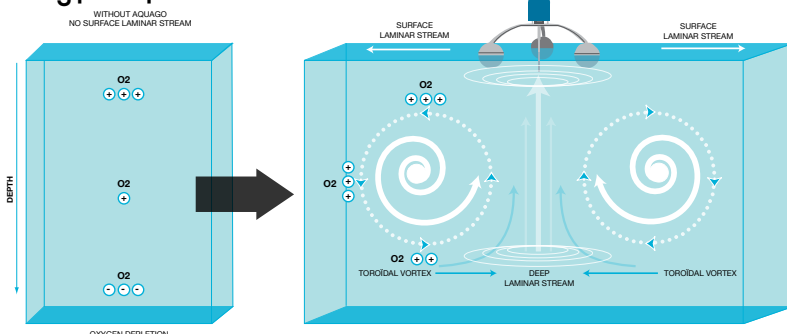
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OPEC Systems commercialises PFAS remediation technology for first European leachate trial

The global commercialisation of OPEC Systems' sustainable *Surface Active Foam Fractionation* (SAFF™) technology to remediate PFAS from water has now commenced, with the first containerised SAFF40™ unit leaving Australia bound for Sweden during November.

The SAFF40™ unit will be installed on a two to four-year full-scale trial to treat between 10,000-20,000 litres of PFAS contaminated leachate water per hour at Telge Himmerfjärdsverket, Sweden, resulting in the permanent removal of significant quantities of PFAS from the environment.

"This is the first full scale trial of its kind in Europe and landfill operators and other sites with PFAS contamination from across the world will be watching the results with interest," said OPEC Systems Managing Director, Peter Murphy.

SAFF40™ represents a pioneering approach to PFAS remediation, where a combination of aeration and vacuum is used to great effect to 'foam out' the PFAS molecules, allowing water to be safely returned to the environment.

"Our objective has always been to create a simple, replicable and low-cost solution that produces miniscule waste with zero environmental harm. SAFF™ leverages the natural physiochemistry of many PFAS molecules to bond to the surface of air bubbles and it is an efficient, sustainable and cost-effective approach in comparison to other technologies," he said.

WHAT IS SAFF™?

SAFF™ is a multi-stage PFAS remediation process which broadly includes:

- pre-treatment – the management of water chemistry to optimise PFAS extraction efficiencies and the removal of cross contaminants and dissolved and suspended solids;
- a multi-stage, foam fractionation procedure to rapidly remove detectable target PFAS contaminants from the influent;
- application of de-watering processes to create a PFAS rich hyper-concentrate;
- use of an absorbent polishing phase to polish any remaining PFAS in the treated water;

- safe return of clean water to the environment following final analysis to confirm contaminants are below the drinking water guidelines.

Following a highly successful trial of SAFF™ technology at a major Australian Defence base, the team at OPEC Systems has commercialised the technology, creating 20- and 40-foot units neatly housed within a container which enable a scalable and modular PFAS solution for a diverse range of sites.

"We've done the science, we've tested, retested and refined; and then we've bought in our A-team to further engineer the technology and find clever ways to condense our systems into a compact space that will allow them to go out into the world and start permanently removing PFAS, one project at a time.

SAFF™ is proving itself as the heavy lifter in the PFAS remediation space, with recent independent testing results from OPEC's Benchtop fractionator systems on leachate waters sourced from various Swedish landfill sites showing excellent removal rates, particularly for ≥C6 chemistry.



carpet and furniture fabrics, clothing, shoes, food packaging, and non-stick cookware. Over time, the PFAS contamination can form an underground plume.

'SAFFY', as the first unit is affectionately known, will arrive in Sweden in early January.

BACKED BY SCIENCE

The OPEC SAFF™ system was developed and refined by OPEC Research and Development Scientists at laboratories in Sydney and Melbourne. It has been independently validated by laboratories in Sweden and the US.

A robust QA/QC process, conducted by NATA-accredited Australian laboratories, was also undertaken. The results from this process were peer reviewed by leading industry experts. The results reconfirmed that the OPEC SAFF rapidly and comprehensively removes a broad array of PFAS compounds (including PFOS, PFOA, and PFHxS) from source water, with no known adverse environmental impacts.

During the testing process, samples were taken from a number of sites with varying concentrations of PFAS contaminants. The testing demonstrated that SAFF™ can successfully treat water with PFAS concentrations ranging from 0.05ug/l to 50,000ug/l.

Importantly, OPEC's Management Systems are certified to a range of international standards, including: AS/NZS 4801:2001 (Occupation Health and Safety Management Systems), ISO9001:2008 (Quality Management Systems) and AS/NZS ISO 14001 (Environmental Management Systems). The OPEC SAFF40™ has also achieved full CE certification.

OPEC is also OFSC accredited by the Federal Safety Commissioner (Accreditation Number 373) and is an accredited environmental consultant and contractor under the Defence Environment and Heritage Panel (DEHP).

ABOUT OPEC SYSTEMS

OPEC Systems is a privately-owned Australian company specialising in site remediation, disaster response, and commission and supply of specialist equipment. The business is centred on provision of specialist services within hazardous and complex contaminated environments.

established in Sydney, Australia in 1992, OPEC Systems currently employs over 90 staff. It operates in all Australian States and Territories with workshop and warehouse capabilities to support major projects.

The company is comprised of six divisions:

PFAS	% REMOVAL
PFHxS	99%
PFOS	100%
PFHpA	99%
PFOA	100%
PFNA	97%

**Telge Återvinning, IVL, LIFE and Upsalla Vatten independent trials. Average percentage removal rates are calculated by subtracting the SAFF treated water from the influent/feedwater concentration, divided by the influent/feedwater concentration.*

"Landfill leachates typically come with a complex mix of co-contaminants which create excessive foaming, and this can challenge traditional GAC and resin remediation technologies. However, with its robust physical separation and concentration process, SAFF™ is proving it is more than up for the task," Mr Murphy added.

"It's not all been smooth sailing, but we've been tenacious and have remained true to our goal of achieving an effective PFAS solution that is underpinned by the principles of green chemistry."

PFAS leachate is an emerging issue of concern for landfill operators around the world. Typically, harmful PFAS contaminants are emitted from landfill items such as





- **Defence:** remediation of sites contaminated with UXO, CWAs and TRW's; supply of CBRN; protection, detection and identification of TIC/TIM; mobile hospitals; monitoring systems.
- **Energy:** bulk fuel infrastructure; decommissioned site management; remediation of hazardous materials.
- **Marine:** oil spill equipment and response vessels, storage and maintenance services, security.
- **Subsea:** commercial diving solutions relating to demolition, civil construction and salvage; underwater UXO, CWA and TRW tasks; vessels and equipment hire.
- **Environment:** environmental remediation and engineering.
- **Education:** OPEC College is an RTO providing RPL and study options within several faculties.

For further information, please visit: www.opecsystems.com



WHAT IS PFAS?

- PFAS is a group of manufactured chemicals used worldwide since the 1950's to make products that resist heat, stains, oil/grease and water.
- Until around 2004, PFAS compounds were present in aqueous film forming foam (AFFF) which is a fire fighting foam used worldwide and at many sites within Australia to extinguish fires.
- PFAS chemicals are also used in non-stick cookware; fabric, furniture and carpet stain protection applications; food packaging and many industrial processes.
- Over decades, PFAS chemicals work their way through soil to reach the groundwater beneath.
- PFAS compounds are generally very stable and do not break down in the environment.
- PFAS chemicals are known as an 'emerging contaminant', and their specific impact on the environment and humans is still being reviewed. PFOS is one of two chemicals listed in Annex B of the Stockholm convention on Persistent Organic Pollutants – the other being DDT¹. Concerns relate to their characteristics of persistence, bio-accumulation and toxicity.
- Within the human body, PFAS substances bind to fat proteins and are retained for a prolonged period. Some studies in humans have suggested that PFAS may affect the development of fetuses and young children leading to possible growth, learning or behaviour problems². Other studies have pointed to possible links to cancer³, immune system disorders⁴, thyroid dysfunction and fertility problems.
- According to NSW Health, people living in PFAS affected regions are advised to: avoid using groundwater or surface water for drinking or cooking; avoid swallowing ground or surface water when swimming/bathing; avoid eating home grown food such as vegetables, fruits, home slaughtered meat and poultry, eggs and milk cultivated from contaminated water; and modifying intake of fish and seafood from contaminated areas.
- In April 2017, Food Standards Australia and New Zealand updated their standard on safe levels of PFOS in drinking water from 0.5 micrograms per litre to 0.07.
- Within Australia, PFAS contaminants have been identified at hundreds of sites around the country where fire training has been undertaken. Locations include defence bases, airports and industrial sites.

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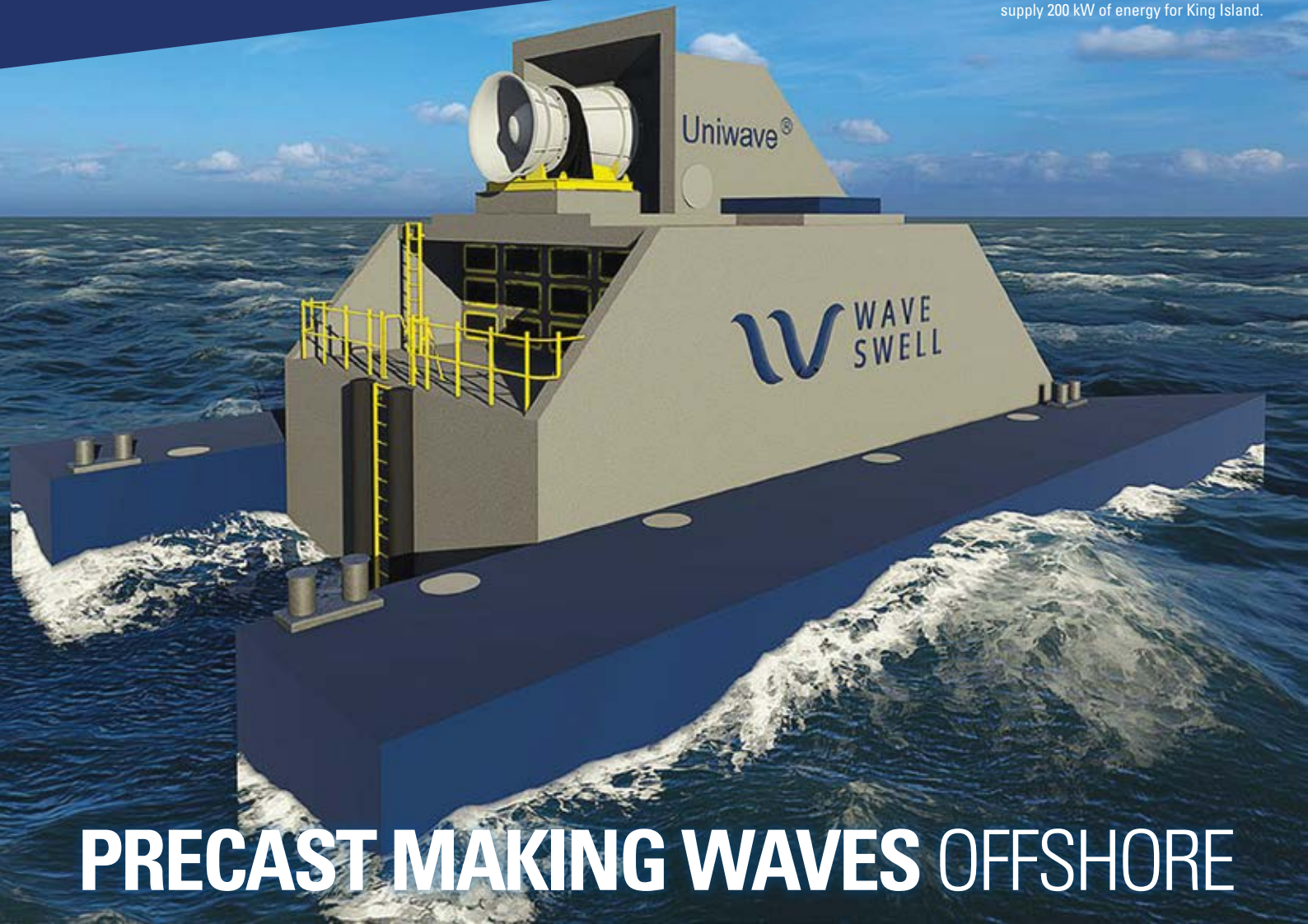
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PRECAST MAKING WAVES OFFSHORE

Client: Wave Swell Energy

Project: UniWave200 Wave Energy Converter

Location: King Island, TAS

Master Precaster: Hudson Civil Products

Project Timeline: Operational Early-2021

Architect: Wave Swell Energy

Engineers: Calibre Group -Structural
Cardno – Geotechnical
Alliance Automation – Electrical
SOTO - Mechanical

The implementation of precast concrete allows complex custom components to be finished with a high level of quality control, whilst maintaining an efficient construction timeline. WSE envisages this unit as a prototype for larger implementations in more demanding locations.

Hudson Civil Products has provided custom precast concrete substructure components and a durable precast superstructure; both suited to WSE's innovative yet demanding vision.



In a bid to provide renewable energy for Tasmania's King Island, National Precast Master Precaster member Hudson Civil Products is working in collaboration with Wave Swell Energy (WSE) to pioneer the construction of an offshore wave energy converter to generate electricity from the power of the ocean.

In a world first, the King Island project is touted as providing a 200 kW supply for the small Tasmanian island.



National Precast Master Precaster member Hudson Civil Products provided custom precast concrete substructure components and a durable precast superstructure for the project.



SERVING THE ALBANY COMMUNITY FOR YEARS TO COME

Project: Water Corporation Bridges

Location: Young's Siding Road,
Albany WA

Master Precaster: MJB Industries

A recently completed set of box culverts and associated civil components have been deployed to the construction of four bridges throughout Young Siding, Albany, WA.

Precast concrete construction enabled a swift timeline despite the range of unique components that was specified, and National Precast Master Precaster member MJB Industries was engaged by

Fulton Hogan to design, manufacture and transport these civil elements to the rural locality over an 8-week timeline. The collection of 24 precast concrete box culverts provided by MJB Industries spans 4500mm and ranges in height and lengths.

MJB Industries has showcased the unique potential of precast concrete by integrating tie-in reinforcement that protrudes from the top of the precast culverts, in preparation in-situ slabs, to be poured after the installation. In response to the client's request for this protruding reinforcement, the MJB team swiftly developed custom formwork from steel sheet and foam block-outs.

MJB's inhouse transport fleet delivered the 24 culverts and ancillary precast elements including Class 4 Pipes and Pipe Headwalls to the Young Siding, Albany site. Precast concrete enabled the client to specify custom details with great accuracy and consistent quality yet maintain an efficient manufacturing and installation timeline.

In all, MJB Industries contributed a deployment of over 200 tonnes of precast concrete components that will serve the community of Young Siding for many generations.

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Reduce your environmental footprint



\$ 1 Trillion debt... What an opportunity

by Warwick Lorenz, Managing Director, Australian Pump Industries

The story is contributed by Warwick Lorenz, Managing Director of Australian Pump Industries, a highly successful Australian innovative manufacturing and distributing company. Lorenz is a veteran of the water industry having been drafted out of an advertising and journalist's career at what was the old Tutt Bryant Group into managing its water pump manufacturing division, Pacific Pump. Born in 1945, he has seen Australia go through tremendous changes. He has lived through the destruction of Australia's industrial manufacturing sector, experienced the challenges of the "recession we had to have" and tasted the temporary delights of the Australian mining boom. He is passionate about the development of the country and deeply concerned about our economic vulnerability – particularly in terms of the long-term sustainability of our manufacturing and agricultural sectors. As with his previous contributions, Warwick welcomes your comments, either positive or negative about this very important subject.

It looks like we Australians are going to have to grow up fast! We've benefited from generations of economic growth, a mining industry that's the envy of the western world and have a huge island continent to play in!

Then along came Corona to teach us a bitter lesson, often compared to the Second World War.

The initial results of the lockdowns created a million unemployed, something unimaginable a year ago. Suddenly we realised life isn't really just about sport (participation or audience) or getting the latest iPhone. Quite the contrary, we are seeing real danger and tangible threats to both our lifestyle and livelihoods and are now coming to terms with it.

THE TRILLION DOLLAR DEFICIT

Papers love to talk about this, but in reality, I believe our Governments has shown more backbone than many of us would have given them credit for. Having the courage and confidence to embark on a program to build employment, means creating new and hopefully long-term opportunities.

Prior to the Corona pandemic, we didn't realise that entertainment, hospitality,

sport and tourism were so fragile.

Now we have to look at what really counts... and it's forcing us to take a good long look in the mirror!

REFLECTING ON AUSTRALIA

Have a close look at this wonderful country and you see vast areas of underpopulated terrain. The landscape is waiting for somebody to do something with it.

Compare it to travelling through the Midwest in the USA or Europe, and you realise the stark reality of the underdevelopment of this island paradise.

At the end of the Second World War, a real challenge, we had one seventh of the entire population in uniform. That's right, can you imagine it? Seven million people in this country and one million of them in the armed forces. It seems hard to imagine it being possible in today's world.

Not only that, but we tripled the productivity of the country in the few short years of the war.

Since then, we've fallen in love with cheap imported goods, many from people who probably aren't really our friends, but whose economies we have helped to build as customers and suppliers.

Remember when we used to make cars, refrigerators, stoves, furniture, even combine harvesters, sugar cane harvesters, agricultural tractors and motor graders? In today's world, it is hard to believe we did all that with a population of 15 million.

So here we are, 26 million people with 65% of us living in four cities where we watch State Governments spend huge amounts of money, billions, on helping us to get from one side of town to the other in the most efficient and least frustrating way.

Meanwhile, our farmers struggle to produce \$60B worth of produce, a pittance compared to the USA with the same land mass.

AUSTRALIA... WE ARE GOING INTO DEBT

So, we come back to the trillion dollar debt...We're going to have a huge deficit.

Most Australians don't realise that the various arms of government in this country collect about \$550B a year in taxes. That's half a trillion. In other words, we will be able to climb our way out of this and become the same "Lucky Country" that we were before Corona.

The big question is, what will we spend the trillion dollars on?

Most working Australians think it's pretty pointless to pay people not to

work when they could be employed and paying taxes to contribute to the country.

Theoretically, nobody 'actually wants' to be unemployed! Why? It's simple:

1. Your income is sharply reduced

2. It's extremely boring

3. It doesn't engender respect

4. Worst of all, you lose confidence

If the government can put the country back to work with the right projects by spending a trillion dollars, then I say ... "Go for it!"

On the other hand, if it's spent on the wrong areas, it could turn out to be a gigantic waste and an unnecessary burden for generation to come.

BEATING CORONA

60,000 years ago, our ancestors were looking for something to kill every day to eat. We've come a long way since then and the technological advances are accelerating as we grow the world population. In 1945, the number of humans on the globe was 3 billion. We're at 7.6 billion now and rapidly heading for 10 billion!

Is that a climate change problem? Possibly.

Is it a problem when it comes to feeding and providing useful work and an acceptable environment for that many people? Definitely.

Yet here we are in the most underpopulated country on earth - and probably the richest per capita - and yet we continue to severely underutilise what we have.

My point is humans have come a long way; and just as we beat Cholera, Typhoid, Smallpox and Tuberculosis, our scientists and medical teams will beat Corona. We should be confident that it will not master the human race!

With that confidence, we should raise our eyes to bigger possibilities. To do anything less would be a wasted opportunity and a national disgrace.

IT'S ALL ABOUT WATER

Every farmer will tell you that the only issue they ever really face is climate. They can deal with too much rain - they know it's temporary and will soak into the subsoil. It's the droughts that are the killers.

Much of Australia has recently been through a six-year drought. And that followed on from the dreaded "*Millennium Drought*", which stretched from 2001 to 2009 and is widely considered to be the worst drought recorded since European settlement.

As well as devastating crops, stock and rural livelihoods in general, the droughts also have a tragic human toll - including



Volunteer firefighters are having to contend with hotter summers and longer and more dangerous fire seasons. Changing the water security in Australia will help to combat this worsening problem.

numerous suicides by farmers who simply lose hope.

Put simply: *on the land, if there's no water, there's no hope.*

We hear about politicians and the smart money investing in water futures or whatever it is they do. To hell with water futures. If we don't do something about water preservation and catchments now, there won't be a water future.

What we really need is a dramatic water plan. Take a good look at the budget papers and you'll see a lot of adventurous and exciting programs but, the grand scheme to bring water to the inland is simply not there.

Governments spend enormous amounts of money and resources on reports into the Murray-Darling, the Great Artesian Basin, the effects of drought etc. It would be great if they spent that money on something useful like water containment and storage.

HOW MANY DAMS DO WE NEED?

Short answer... who knows?

How much money needs to be spent

on it? That also seems unclear, but Tony Abbot and Barnaby Joyce talked up the idea of the "100 dams project" and that proposal was costed at \$30B and would effectively go a long way towards drought proofing the inland.

The available documentation is sketchy, but it's good to know that at least somebody actually had the imagination to think about something on that scale. Our neighbours know the potential of Australia. They must be astonished at our passive approach to allowing our farmers go broke.

Imagine State and Federal Governments watching the drought develop and not doing anything to instigate a water program. Were they just waiting for rain?

Half measures simply don't work, won't work and never will work! It requires a national program. I feel certain that many of the urban folk in that 65% of the population would happily delay one or two of their expressways or tunnels to help farmers boost their agricultural production - and as a consequence, the Nation's wealth and wellbeing - from its current \$60B per annum to more in

vicinity of \$250B per annum. Could we do it? ... HELL YES!

LET'S LOOK AT SOME EXAMPLES

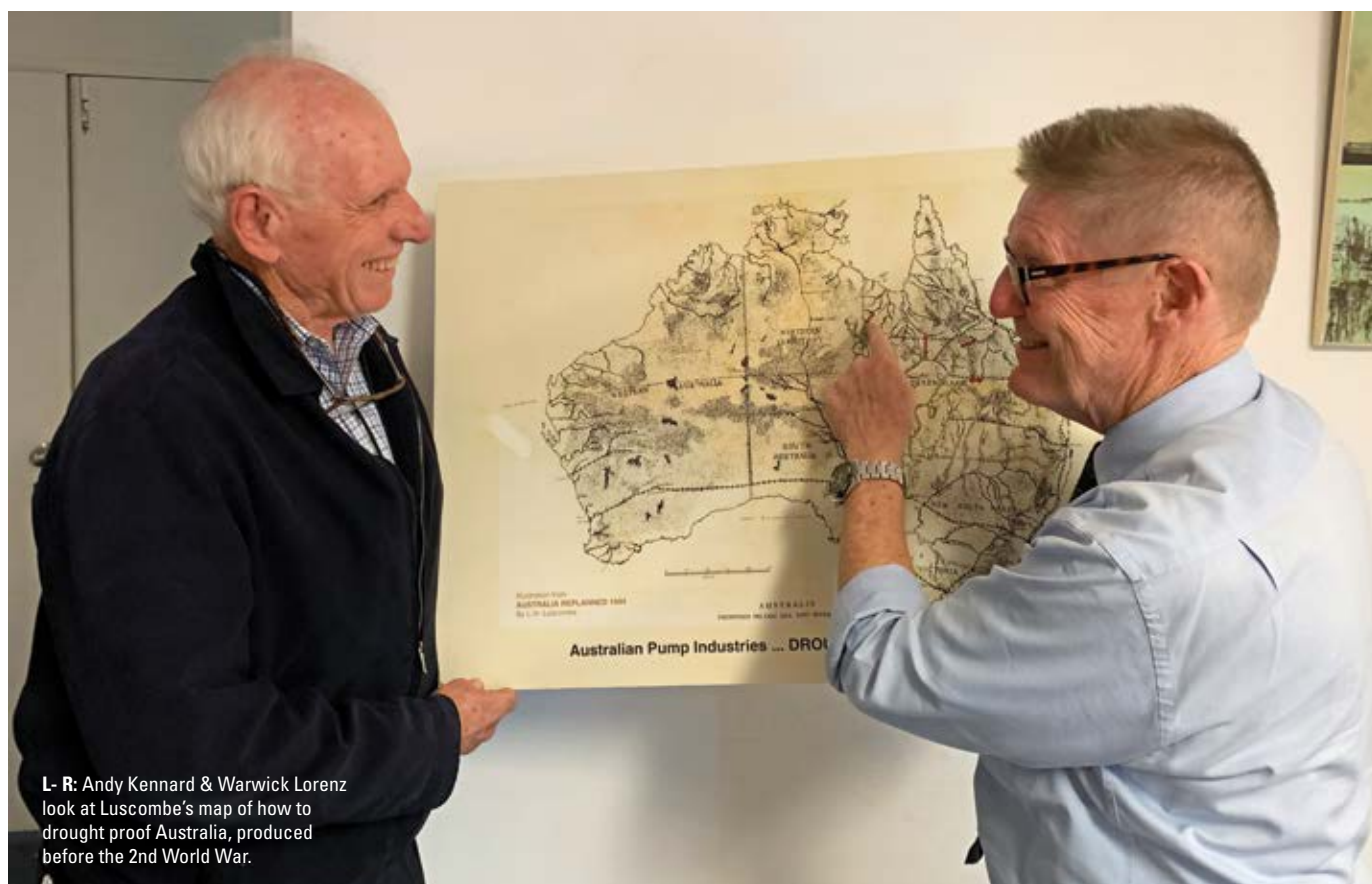
1. The Murrumbidgee Irrigation Area -

The MIA has been in place so long, some people think it was always there. They don't realise that when the Chaffey boys started irrigating out of the Murray at Mildura over 100 years ago, they were showing us what was possible. The plan was to do 100,000 acres (40,000 hectares) and they had a good shot at it but failed because of a major drought. They were the inspiration for the MIA - and what a godsend that has been and continues to be for Australia's food production and economy in general.

2. The Mighty Ord River Dam - It's common knowledge that the huge flow of water has been underutilised since the dam was built. Failure to invest, the lack of confidence to move and Government apathy resulted in huge amounts of water from the dam being released into the ocean every day. Now, at last, the Western



This is what a drought can do the agricultural industry, that that use to depend on "the sheep's back"



L- R: Andy Kennard & Warwick Lorenz look at Luscombe's map of how to drought proof Australia, produced before the 2nd World War.

Australian Government and the Northern Territory are planning to bring water to 100,000 hectares - turning pastureland into high value cropping country. Can you believe it took us 20 years?

Even now, 100,000 hectares is nothing compared to the possibilities that are available to this wonderful country.

BUILDING REGIONAL AUSTRALIA

Instead of governments being intent on merging councils as populations dwindle in what were once thriving towns, we could increase the production of food and fibre. And don't kid yourself that there's no market. The global market for high quality Australian goods and produce is growing as you read this story - despite the current trade challenges.

With the growth of that production, will come opportunities for processing and value adding. It's value adding that counts, not just growing the raw material and shipping it.

Now we're starting to get it. With the return of population to regional Australia, it takes the pressure off the cities, solves the traffic problems and improves the living

standards of millions of Australians. We give ourselves opportunities for a better life, much of it outdoors, to raise our families.

Imagine water security for the inland and the growth of population, the wealth generated and of course, the benefits of dramatically lower priced housing when compared to our major capitals! Flourishing businesses could be abattoirs, vegetable and fruit processing plants, fabric production or whatever our fertile imaginations can create.

Jobs for all! What a vision.

Let's get serious, not everybody has to live within 40 kilometres of a beach!

MANUFACTURING INDUSTRIES COME GOOD

With the influx of population and processing of raw materials, comes opportunities that include production of machinery and servicing of that equipment. Australian innovation and R&D will deliver ideas and products that bring safety and efficiency.

Let's face it, Australia has always been internationally renowned for producing innovative products and solutions. I'm not going to even attempt to list the myriad

of inventions that started in Australia, including much if the agricultural machinery used around the world today.

Our farmers are widely regarded as the some of the best in the world - especially in terms of their ability to transform deserts into arable land to develop and grow a thriving sustainable business when the odds are stacked against them

We are innovative and have a tradition of being inventive. Go talk to a fabrication shop in a country town and just see how these folks can turn their hand to just about anything from building a water tanker to grain silos and even concrete batch plants. Give them a challenge, they'll find a way to respond. We have a talent for innovation. After all, "necessity is the mother invention", and in much of rural Australia, it's often quicker (and usually closer) to simply think of a way to do something and then build the required equipment.

WHAT WILL IT COST TO DROUGHT PROOF THE COUNTRY?

The reality is I don't think anybody has a clue. The \$30B that Tony Abbot talked about in his 100 dams project is probably



The Ord is a mighty dam and resource that has been underutilised for 20 years.

too lean in today's world. What we do know is the money is there. If it means we get in debt for another \$10B or \$15B to do it, why would you stop? We should get started as soon as possible and start reaping the rewards.

Here's a quick recipe that comes out of a book printed in 1945 called, "Australia Replanned".

"What the country needs is to

- 1. Drought proof the country**
- 2. Increase the terms of parliament from 3 years to 5 years**
- 3. Get rid of one layer of government, either State or Local government."**

I believe that that's as true today as it was in 1945.

Andy Kennard, famous as the man who put Kennards Hire on the map across Australia and New Zealand, called into our office a few weeks ago. We talked about how absurd it is that a wonderful country such as ours, can be so blind to its opportunities.

Here's what Andy said:

"When there is plenty of water available for agriculture, there are many beneficiaries from the increase in output.

Firstly, there is the farmers themselves.

Secondly, there are the communities and rural towns who benefit from the wealth created by the farmers who spend in town.

Thirdly there is the general community of Australia who have access to the abundant produce at good prices.

Fourthly, there is the environment – abundant water provides for all forestry, wetlands, for the fish and native animals. We can reduce the natural disasters and environmental damage from extended droughts.

And finally; we improve our independence and reduce our dependence on other countries.

We can and should be the food bowl of Asia and beyond. How many people can we feed – 100m, 200m, more???

From a national security point of view, we will be in a much stronger position when other countries depend on our clean, dependable food supplies. But we must maintain control over the produce growers to ensure our independence.

We have plenty of water... but it doesn't always arrive when we need it.

We need a long-term plan to provide storage around the country to hold this abundance of water to be used as required. When will we have a government (or governments) with the temerity to plan long term? The nation will support whoever does.

And financing it? We have plenty of liquidity in the country. Let's think up

innovative ways for people to invest, fund or 'gamble' to remove this obstacle.

Who can oppose such a proposal? May we be rewarded with the right person to make a stand for the long term."

I was inspired by his comments. I had been thinking about economics and feeding the world, and Andy opened-up my eyes to the environmental gains.

100 million years ago, Australia was forested, so there was a slightly different climate then. We as a race, have been changing the landscape for decades! Somebody described Sydney from the air recently to be a huge slab of concrete! It doesn't need to be this big, real estate doesn't need to be this expensive, we don't need the congestion. Why are people in the city? That's where the jobs are!

You would think somebody would tell the governments this, but it seems that many of the bureaucrats and academics are blinded by their own intelligence and don't see the future.

GROWING FOR THE FUTURE

Surely it's time we realised we need another 30 or 40 million people in this country to develop it and realise our potential. Isn't it time we harvested the potential of the country and at the same

time, help the environment and reverse climate change by planting huge numbers of trees.

Even the French have got an afforestation program in their country. It has already replanted Oak, Apple, Chestnuts and now more than 31% of France reforested.

What are we scared of? Are we frightened of bushfires? We're dealing with that too. Brilliant people in the fire services and industry are coming up with ideas that will control fires in a safer and more effective way.

Surely we learnt in the 60's and 70's that harvesting more timber than you grow is asking for trouble. What's our solution now that we created that problem? We just import it. That doesn't address the issue, it just means somebody else has to harvest it. To make matters worse, can we be truly sure of what timber we're importing. Is it coming from South East Asian or PNG rainforests, or even the Amazon?

Environmentalists weep... but we do have the potential to change all that.

A CALL TO ARMS

If you've got this far into this story and you haven't gone to sleep, you will realise this is up to us. Our leaders will reflect what we think. If we think about football, they'll go to the footy and cheer and eat meat pies so they look like us. If we start yelling at them about developing the country, some of them, the good ones, will start to listen.

Developing the country isn't just encouraging people like Gina Rinehart and Twiggy Forest. That they are giants in their field is obvious. That they have courage and are risk takers is legendary. However, I would love them much more if they were taking that iron ore and buying coal mines and turning it into steel by value adding our raw material.

It looks easy to load ships with iron ore and it's incredible to think \$300B a year in exports is coming out of our resources industry with a workforce of less than 1% of the population. Are the rest of us are a bunch of loafing parasites?

We must call on our governments to triple our agricultural output and start value-adding our raw materials!

Let's think seriously about buying the most modern steel mills in the world and producing our own steel again. We've got the best iron ore, we've got the best coal, why let others value add and make a huge profit out of our resources?

If the answer is not enough people in this country to justify it, or difficulty finding the workforce, let's do something about it. Getting people with skills, ambition and imagination is obviously a priority. We can always use engineers, tradies and intelligent farmers. But wherever they're from, they should first and foremost fill the requirement of being potential nation builders!

To me, all of the above seems so obvious. I believe that it's time that our governments stop focusing almost exclusively on our major capitals, and start seriously investing in rural and regional Australia. Rather than a never-ending array of reports, recommendations and good intentions, we need serious investment and major nation-building projects. Projects that will not only help us to make the most of what we have, but will also secure the future for generations to come.

Let's hear what you think. Comments regarding this article can be sent to: wlorenz@aussiepumps.com.au

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Cement-free concrete beats corrosion and gives fatbergs the flush

Researchers from RMIT University have developed an eco-friendly zero-cement concrete, which all but eliminates corrosion.

Concrete corrosion and fatbergs plague sewage systems around the world, leading to costly and disruptive maintenance.

But now RMIT engineers have developed concrete that can withstand the corrosive acidic environment found in sewage pipes, while greatly reducing residual lime that leaches out, contributing to fatbergs.

Fatbergs are gross globs of congealed mass clogging sewers with fat, grease, oil and non-biodegradable junk like wet wipes

and nappies, some growing to be 200 metres long and weighing tonnes.

These build-ups of fat, oil and grease in sewers and pipelines, as well as general corrosion over time, costs billions in repairs and replacement pipes.

The RMIT researchers, led by Dr Rajeev Roychand, created a concrete that eliminates free lime – a chemical compound that promotes corrosion and fatbergs.

Roychand said the solution is more durable than ordinary Portland cement, making it perfect for use in major infrastructure, such as sewage drainage pipes.

“The world’s concrete sewage pipes have suffered durability issues for too long,” Roychand said.

“Until now, there was a large research gap in developing eco-friendly material to protect sewers from corrosion and fatbergs.

“But we’ve created concrete that’s protective, strong and environmental – the perfect trio.”

By-products of the manufacturing industry are key ingredients of the cement-less concrete – a zero cement composite of nano-silica, fly-ash, slag and hydrated lime. Not only does their concrete use large volumes of industrial by-products, supporting a circular economy, it surpasses sewage pipe strength standards set by ASTM International.

“Though ordinary Portland cement is widely used in the fast-paced construction industry, it poses long term durability issues in some of its applications,” Roychand said.

“We found making concrete out of this composite blend – rather than cement – significantly improved longevity.”

Replacing underground concrete pipes is a tedious task, ripping up the ground is expensive and often has a ripple effect of prolonged traffic delays and neighbourhood nuisances. The Water Services Association of Australia estimates maintaining sewage networks costs \$15 million each year, billions worldwide. The environmental cost is greater – ordinary Portland cement accounts for about 5% of the world’s greenhouse gas emissions.

However, the RMIT study has proven certain by-products can be up to the job, replacing cement and able to withstand the high acidity of sewage pipes.

“Our zero-cement concrete achieves multiple benefits: it’s environmentally friendly, reduces concrete corrosion by 96% and totally eliminates residual lime that is instrumental in the formation of fatbergs,” Roychand said.

“With further development, our zero-cement concrete could be made totally resistant to acid corrosion.”

Roychand and his team are looking to collaborate with manufacturers and government to develop more applications for their zero-cement concrete.

‘Development of zero cement composite for the protection of concrete sewage pipes from corrosion and fatbergs’ is published in Resources, Conservation & Recycling (DOI: 10.1016/j.resconrec.2020.105166)

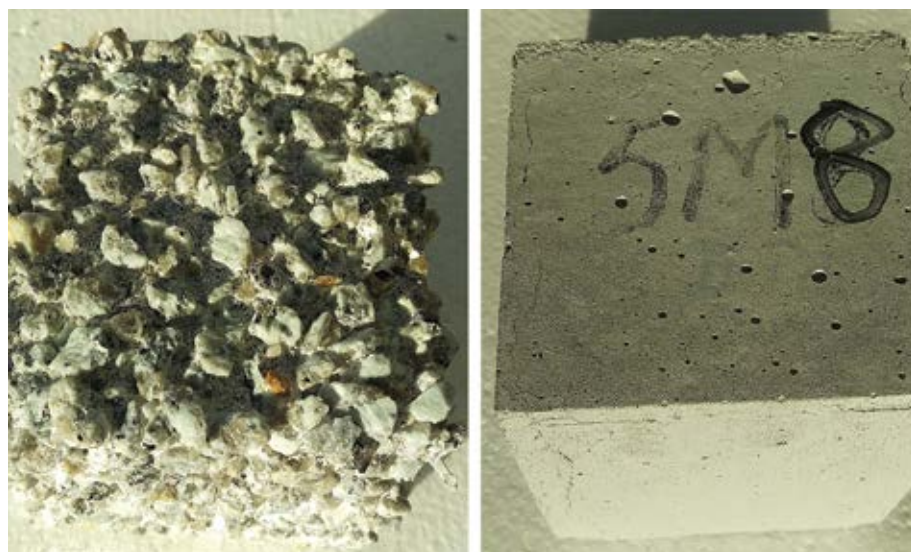


Image comparing highly corroded ordinary Portland cement (left) with cement-free concrete (right).



Image of a fatberg on display in the Melbourne Museum. ©Museums Victoria, Photographer: Rob Zugaro.

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Hydraulink optimises pipe jacking safety for McConnell Dowell's Auckland Watercare record length project

The *Hunua 4 watermain project*, commissioned and managed by Watercare Services Ltd, is a 31km pipeline through South and Central Auckland to help meet growing demand, increase the system's capacity, ensure uninterrupted supply, and provide resilience to natural disasters. Watercare, an Auckland Council-controlled organisation, engaged New Zealand construction leader McConnell Dowell Constructors Ltd to design and construct Section 11, the final section of the pipeline, from Market Road to the Khyber Pass Reservoir. A strong emphasis was placed on safety and minimising disruption to communities along the pipeline route.

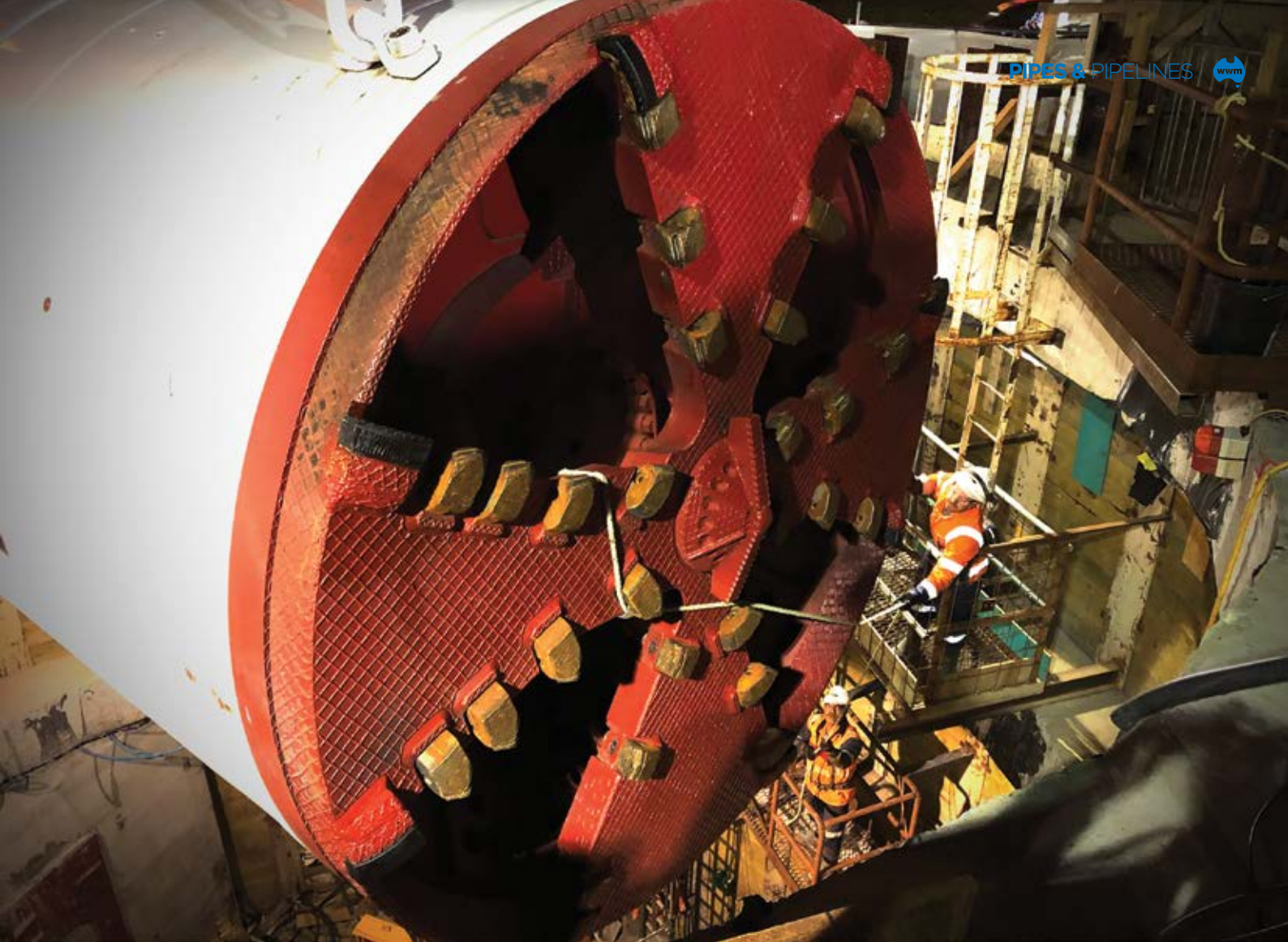
To that end, McConnell Dowell selected the quality hydraulic hose, fittings and 24/7 service backup of Hydraulink to optimise the safety of New Zealand's longest pipe jacking project. Hydraulink has more than 400 service outlets throughout New Zealand, Australia, and Pacific Islands, which bring essential hydraulic hose, fittings and safety-compliant and traceable service expertise to industries requiring prompt, quality 24/7 service either on or off site.

Using mainly micro-tunnelling methods, McConnell Dowell constructed a 3.5km watermain using a tunnel boring machine (TBM) to drive and install 2,500mm ID

jacking pipes between six shafts, before lining the tunnel with a 1,575mm OD steel pipe. The pipe jacks are the longest ever completed in New Zealand. In July 2020 McConnell Dowell celebrated the completion of the second drive of Section 11. McConnell Dowell's TBM broke through at Khyber Pass Rd, setting a record of 1,216 metres for the longest single drive in the southern hemisphere by a TBM greater than 3 metres diameter.

McConnell Dowell utilised a world-class TBM from Germany – a 55-tonne Herrenknecht – to excavate the 3m diameter tunnel required. To minimise community disruption, 80% of the pipeline construction





“I knew that standard parts weren’t going to be enough for this job. We had to have a larger range of sizes, fittings and total stock, including those with very high-pressure ratings.”

was trenchless, and McConnell Dowell selected an alternative pipeline route that moved construction away from residential areas and ecologically sensitive sites.

Hydraulink Sales and Service Technician Juan Viljoen was the main point of contact on the project, and said that working with McConnell Dowell on such an important and challenging project was a pleasure.

“We could tell from the start there were demanding time and budgetary considerations, but the team was all smiles, and were so helpful. It really made our job as a hydraulic equipment and service supplier highly rewarding,” said Mr Viljoen.

“Hydraulic hoses are like the arteries of the system – if they don’t work properly, the whole thing shuts down, and that causes costly downtime, delays and throws the whole project timeline out,” he said.

Mr Viljoen particularly enjoyed this project, coming from an underground mining background of more than 25 years prior to joining the Hydraulink network.

“I knew that standard parts weren’t going to be enough for this job. We had to have a larger range of sizes, fittings and total stock, including those with very high-pressure ratings. And we needed to be there 24/7 for urgent breakdown service. The entire Hydraulink team did an outstanding job, so it’s a great feeling to see that McConnell Dowell is pleased with our service,” he said.

Problem solving expertise in tough conditions

The completed pipe jack was 1,216m, so in order to achieve the distance required for this project, McConnell Dowell utilised a series of ten intermediate pushing stations (interjacks), placed approximately 100m apart, to push the pipe gradually in a series of cycles.

Using a pipe jacking system allowed McConnell Dowell to reduce the amount of surface excavation for trenches. While it involved greater engineering, it was vital to this section of the project, because it ran

under the busy Khyber Pass Road, which averages 30,000 vehicles each day.

At its deepest sections, the tunnel runs close to 30m underground – a similar height to the region’s famous Hunua Falls, part of the Wairoa River that travels through an ancient volcano as it meanders north through Clevedon, before meeting the Hauraki Gulf.

“Difficult geotechnical conditions, ranging from very hard basalt to soft clays created further challenges, reinforced the need for world-class technologies to be employed. Additionally, underground hydraulics and components needed to have a low flame and high flash point to minimise fire hazard risks,” said Mr Viljoen.

With the second drive now complete, McConnell Dowell is progressing to the third and final stage of Hunua 4 Section 11 – a 1,296m drive under Manukau Rd – which is scheduled for completion in late 2021.

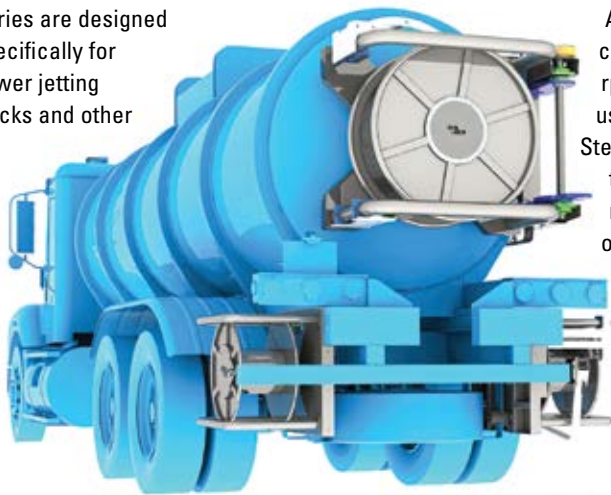
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The Rear Swing Hose Reels can accommodate hose diameters of 3/4" – 1 1/4" in lengths up to 480m with static pressure up to 250 bar.

They come with the option of left or right hand swing. The Rear Low Hose Reels can accommodate hose diameters of 1/2" – 3/4" in lengths up to 185m at static pressures up to 250 bar.

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