

Minister's Approval for Linkage Projects 2021 Round 2 for Funding Commencing in 2022 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)			Total (\$)	Partner Organisation(s)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	2025-26* (Column 8)	2026-27* (Column 9)	(Column 10)	(Column 11)

Australian Capital Territory

The Australian National University

LP210200372	Embedded emissions accounting: frameworks for trade in a net-zero world	57,771.50	133,535.00	75,763.50	0.00	0.00	0.00	267,070.00	CLIMATE CHANGE AUTHORITY, DEPARTMENT OF FOREIGN AFFAIRS & TRADE, CLEAN ENERGY REGULATOR
Aisbett, Dr Emma K	<p>This project aims to inform Government on potential accounting frameworks for greenhouse emissions embedded in tradable products. Public frameworks are urgently needed given the emergence internationally of trade-related climate policies such as carbon border adjustment mechanisms. The project expects to contribute to global knowledge on embedded emissions frameworks by combining economic, engineering, science and policy perspectives. Expected outcomes include improved: capability within Government; understanding among Australian stakeholders; and integration with international approaches. Expected benefits include lower regulatory barriers to global emissions reductions, and fairer access to international markets for Australian producers.</p> <p>National Interest Test Statement</p> <p>The global net-zero transition presents an opportunity for Australia to achieve simultaneous economic and environmental benefits by growing low-emissions export industries. To take full advantage of our natural endowments - such as land, sun and wind - we need to ensure that regulatory barriers such as carbon border adjustment rules do not inhibit Australian clean exports. Government seeks to understand how to help low-emissions industries easily prove their climate credentials, and thus avoid regulatory barriers arising from the climate policies of our trading partners. The proposed project will identify principles and approaches for best-practice public accounting of the emissions embedded in traded products. The project will provide the Australian Government the knowledge required to develop and negotiate fair and efficient frameworks for embedded-emissions accounting. These frameworks will support Australian exports of low-emissions goods and services including agricultural products, refined minerals, energy, and carbon sequestration; hence providing widely distributed benefits for Australians.</p>								
LP210200473	Building Australia's Electric Vehicle Fast Charging Infrastructure	122,019.00	204,038.00	118,864.50	36,845.50	0.00	0.00	481,767.00	SWITCHDIN PTY LIMITED
Ratnam, Dr Elizabeth L	<p>This project aims to enhance the resilience, safety, and efficiency of electricity grids operated with fast-charging Electric Vehicles (EVs) by developing new control and optimisation frameworks. This project expects to develop new robust controllers for EV fast-charging infrastructure operated in coordination with wind and solar generated electricity. Expected project outcomes include enabling fast-charge EV infrastructure to be developed and deployed in Australia by the industry partner SwitchDin. Expected benefits including enabling significant reduction in carbon emissions from the transportation sector, accelerating the energy transition to renewables, and placing Australian industry at the forefront of EV grid integration technology.</p> <p>National Interest Test Statement</p> <p>Australia is on the verge of a rapid take up of electric vehicles (EVs). This provides opportunities for Australian industries to provide fast-charging solutions that enable maximum use of these vehicles. However, these fast-charging stations must be operated in a way that maintains the integrity and resilience of the electricity grid and provides convenience to EV consumers. This project will develop new control and optimisation algorithms that enable the robust, real world operation of smart electrical grids with integrated EV fast-charging capabilities along with a high proportion of renewable and distributed energy resources. The proposed physical pilot demonstration of the 'Droplet' technology with Australian-based company SwitchDin will provide a feasibility test of the technology ahead of an Australian-wide roll-out. Australian industry will benefit from the prospect of enhanced EV charging capabilities and corresponding opportunities for manufacturing and job growth. Australian consumers will enjoy more efficient, reliable use of their EVs on a stable and resilient electricity grid.</p>								

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LP210200654	Conservation genomics of a critically endangered insect	39,053.00	84,606.00	71,106.00	25,553.00	0.00	0.00	220,318.00	ZOOS VICTORIA
Mikheyev, A/Prof Alexander	<p>This project aims to develop tools genotyping large animal genomes, focusing on the case of the Lord Howe Island stick insect, once thought to be extinct and now critically endangered. This project expects to generate molecular tools to monitor the genetic health the insect which has a large, complex and poorly understood genome. Expected outcomes include the development of a preservation and reintroduction strategy for the insect. This project will benefit ongoing conservation efforts, and is timely given the ongoing eradication of rats from Lord Howe Island where this species once lived.</p> <p>National Interest Test Statement</p> <p>The Lord Howe Island stick insect is an iconic Australian animal and its history and public visibility looms large in national conservation decisions. This project will assist ongoing management efforts concentrated at Zoos Victoria by providing vital information about the genetic health of its population, and the status of the sole surviving wild population. It will also facilitate the reintroduction of this insect to its native habitat, which is planned to occur in the next several years. The large complex genome of the stick insect involves tackling unique laboratory and computational challenges, and this project will contribute towards understanding how animals adapt to captivity and how they can be best re-introduced to their native range.</p>								
LP210200697	Managing and mitigating social risks of major infrastructure projects	124,045.00	251,981.50	257,121.50	129,185.00	0.00	0.00	762,333.00	LENDLEASE GROUP SERVICES PTY LIMITED, TRANSURBAN LIMITED, DEPARTMENT OF TRANSPORT AND MAIN ROADS, MAJOR TRANSPORT INFRASTRUCTURE AUTHORITY, AURECON AUSTRALASIA PTY LTD, THE ENGAGEMENT PEOPLE PTY LTD
Bice, Prof Sara J	<p>This project aims to reduce social risks of major infrastructure projects by generating an evidence-based social risk management framework. It brings together leading ANU researchers with top organisations in Australia's infrastructure sector, already working together via the ANU Institute for Infrastructure in Society. The project seeks to improve social risk management in a multi-billion dollar sector, vital to all Australians. The project is significant because it adopts a sector-wide view to systematically define social risk, co-create a social risk management framework and implement it via a new social risk management toolkit. This should lessen harm to communities, reduce delays and costs and benefit national infrastructure delivery.</p> <p>National Interest Test Statement</p> <p>This project addresses the Australian government's strategic infrastructure priorities, including meeting the needs of a fast growing population, boosting regional and urban productivity and delivering jobs growth. It aims to reduce harm and optimise infrastructure benefits to Australian communities by delivering a pioneering, sector-wide social risk management framework. The project complements the National Guidelines for Infrastructure Project Delivery, especially concerns for managing stakeholder interests within the project context, and advances the sector's capacity to manage and mitigate social risks more reliably and consistently. The sector-wide, industry-leading partnerships represented in this project demonstrate the industry's immediate interest in and recognised need for improvement in social risk management. It is a known gap for the sector. The issues this project addresses are critical to Australia's ability to realise the record \$110billion invested in infrastructure in the coming decade and to deliver the \$600 billion in projects that Infrastructure Australia identifies as needed by 2035.</p>								
LP210200818	Socially Responsible Insurance in the Age of Artificial Intelligence	81,945.50	169,352.50	166,075.50	78,668.50	0.00	0.00	496,042.00	INSURANCE AUSTRALIA GROUP LIMITED, GRADIENT INSTITUTE LTD
Lazar, Prof Seth	<p>This project aims to discover the social costs and benefits of using Artificial Intelligence in insurance, and to design practical interventions—responsible design workshops, practical guidance, regulatory proposals, new algorithmic tools—that realise the benefits while mitigating the costs. It expects to generate new knowledge drawing on philosophy, law and sociology, working closely with practitioners at the forefront of deploying AI in insurance. Expected outcomes include novel ethical AI-based approaches to product design, pricing and claims administration. This should benefit insurers and consumers, realising efficiency gains made possible by AI, without unacceptable costs to privacy, fairness, and the unaccountable exercise of power.</p>								

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	National Interest Test Statement								
	Insurance is one of society's key tools for the management of risk. Artificial Intelligence enables people to make cheap, reliable predictions. The adoption of AI by insurers could therefore help society manage risk more efficiently. But if adopted incautiously, AI is very likely to seriously undermine user privacy, realise new kinds of discrimination, and create untenable new power relations. This project will enable Australian insurers and consumers to understand the social costs and benefits of adopting AI in insurance, and design concrete sociotechnical interventions to realise the benefits and mitigate the costs, including responsible design workshops, practical guidance, regulatory proposals and new algorithmic tools. By paving the way for the socially responsible adoption of AI tools and techniques in the insurance industry, the project will ultimately help Australians to better manage risk and uncertainty.								
LP210200931 Gould, Prof Stephen	Towards in-vehicle situation awareness using visual and audio sensors This project aims to characterise driver awareness, activity and interactions with other vehicle occupants using visual and audio cues from internally mounted sensors. Road accidents cost Australia an estimated \$30 billion per year and tragic loss of thousands of lives, yet the vast majority of severe vehicle crashes are linked to driver fatigue or distraction. The expected project outcomes include advanced artificial intelligence to infer and predict dangerous driver and passenger behaviour. This has the potential to significantly benefit society by advancing autonomous driving capabilities and reducing driver-induced accidents and fatalities, ensuring that every driver, passenger and pedestrian arrives home safely at the end of each day.	72,500.00	125,000.00	112,500.00	120,000.00	60,000.00	0.00	490,000.00	SEEING MACHINES LIMITED
	National Interest Test Statement								
	This project will contribute to national traffic safety and the Australian automotive industry by developing advanced and effective computer vision and machine learning technologies. Its ultimate goal is to save lives. New computer vision capabilities, combined with audio cues, developed in this project will be able to detect and predict potential causes of traffic accidents from inside the vehicle, such as distracting driver and passenger behaviour. By linking with the market-leading partner organisation in AI driver safety, the project will embed these novel assisted-driving technologies into simulated vehicles, to evaluate and improve reliability and safety. These technologies can contribute to development and manufacturing within the Australian AI-based automobile industry. The project outcomes can also be used to solve other real-world problems, such as air traffic controller monitoring, mobile payments and off-road vehicles.								
	The Australian National University	497,334.00	968,513.00	801,431.00	390,252.00	60,000.00	0.00	2,717,530.00	
	Australian Capital Territory	497,334.00	968,513.00	801,431.00	390,252.00	60,000.00	0.00	2,717,530.00	

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New South Wales										
Macquarie University										
LP210200796	The power of public spaces to connect communities and places	60,277.00	102,023.00	66,746.00	25,000.00	0.00	0.00	254,046.00	NSW DEPARTMENT OF PLANNING INDUSTRY AND ENVIRONMENT	
Houston, A/Prof Donna M	The project aims to uncover the vital role of public spaces during COVID-19 and in a time of climate change. Public spaces are not just places that are nice to have, they are an essential civic and environmental asset. The project adopts a collaborative framework to build dialogue, bridge academic and industry practice and promote debate about how to sustain public spaces now and in the future. Expected outcomes include new understandings of the diversity of community connections to public space and the importance of Indigenous leadership in public space-making and design. Benefits include an interactive website that will communicate new roles for public space and provide a valuable resource for communities, educators and governments.									
National Interest Test Statement Public spaces are vital for enabling vibrant and sustainable civic life at the heart of communities. They are not just 'nice to have', public spaces provide essential social, environmental and economic benefits. This project adopts an innovative model of government-university-community collaboration to investigate, discuss and co-create new approaches to public space design, management and use. The social benefits will be to better understand how public spaces positively contribute to place-based social connectivity in ways that can mitigate the negative impacts of current challenges such as the COVID-19 pandemic and a changing climate. The project will enhance current understandings of the diverse community connections to public spaces, including by promoting Indigenous leadership in place design, place-making and caring for Country. This will lead to increased cultural and community benefits by making public spaces more inclusive to a broader range of people. The project will benefit industry, educational and public audiences by supporting awareness, advocacy and systems-change via an interactive website.										
LP210200876	Optimising lasers for ablation of structurally complex solid non-metals	105,500.00	215,500.00	225,000.00	115,000.00	0.00	0.00	661,000.00	AUSTRALIAN INSTITUTE OF ROBOTIC ORTHOPAEDICS PTY LTD	
Jackson, Prof Stuart D	This project aims to take the latest developments in fibre laser technology to create a new ablation system for precision cutting and reshaping of structurally complex non-metal materials. Fibre lasers provide high quality beams, high average power, and precise pulse timing. Guided by the composition of the material and its response to incident mid-infrared light, the project will create a tailored laser beam to provide accurate and high-rate ablation. The expected outcomes include minimal damage to the surrounding area and a level of precision not possible with any mechanical alternative. The project will provide long term benefits to the aerospace and healthcare industries and, be a boost to Australia's manufacturing sector.									
National Interest Test Statement Lasers produce better quality cars, on demand material re-shaping and they underpin precision instruments. Maximising their reliability and power allows them to penetrate further into industry creating a direct benefit to society. We will develop, to application-ready status, high average power pulsed mid-infrared lasers. Thermal imaging cameras, dental and skin resurfacing lasers and narcotics detectors all involve the mid-infrared, but the potential to further exploit the mid-infrared is substantial. Mid-infrared laser sources will greatly expand advanced manufacturing, opening opportunities in high-yield pharmaceuticals and long-range defence applications. The core value proposition in this project is a significant improvement in the accuracy and reproducibility of reshaping structurally complex materials containing water. The overarching long-term objective is to overcome all the limitations of mechanical tools currently in use. This work continues a long Australian tradition in world-leading laser development and application that will benefit manufacturing, defence, and healthcare in the future.										
Macquarie University		165,777.00	317,523.00	291,746.00	140,000.00	0.00	0.00	915,046.00		

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Southern Cross University									
LP210200606	New crop on the block: The genetic control of hempseed nutritional quality	93,585.00	186,676.50	171,686.50	78,595.00	0.00	0.00	530,543.00	KAVASIL PTY LTD
Kretzschmar, A/Prof Tobias	Hempseed, which is rich in polyunsaturated oils and high-quality protein, is emerging as a functional food crop across Australia. However, very little is known about the genetic control of oil and protein contents and composition, crucial characteristics for the optimization of hempseed productivity and quality for the Australian industry. A unique genetic resource of 120 diverse hemp accessions, many provided by our industry partner, will be used to define the genetics underpinning nutritional variation and associated genotype-by-environment interactions. This fundamental knowledge will lay the foundation for targeted breeding and best management practice, for the benefit of farmers, the hemp industry and health-conscious consumers.								
	National Interest Test Statement								
	The project will benefit Australia in two ways. Firstly, the project will pave the way for a profitable crop alternative for farmers in the subtropics and northern Australia to improve farm income and increase the financial sustainability of farming businesses in regional and northern Australia. This will arise from the development of nutrient-dense hemp lines from local and imported germplasm as a result of the project knowledge gained. The development of such a high-value industry should also give rise to new processing and packaging facilities in these regions, thus creating jobs along the supply chain for regional Australia. Secondly, the project will provide critical genetic and nutritional information for future breeding of high- value hemp to help meet the national targets of improving the health of the Australian population.								
	Southern Cross University	93,585.00	186,676.50	171,686.50	78,595.00	0.00	0.00	530,543.00	
The University of New South Wales									
LP210200125	Improving the efficiency of CRISPR gene editing in cells	65,386.50	134,520.50	141,073.00	71,939.00	0.00	0.00	412,919.00	CSL LIMITED
Quinlan, A/Prof Kate G	Human red blood cells are well-characterised and the globin gene locus is a model system for the study of gene regulation. Gene editing technologies and delivery tools are evolving rapidly and the globin gene locus is the perfect model for gene editing optimisation. This collaboration between UNSW Sydney and CSL aims to bring together our combined expertise and new technologies to develop an optimal platform for genetic modification in a red blood cell line. Simultaneously, this project aims to generate fundamental insights into mechanisms of human gene regulation. The technological and biological outcomes of this project will be of benefit for future gene editing applications.								
	National Interest Test Statement								
	This project is a collaboration between UNSW Sydney and CSL Limited. UNSW has concentrated expertise in genomics and related technologies, including hosting the Ramaciotti Centre for Genomics and Mark Wainwright Analytical Centre. CSL Limited is one of the world's leading biotechnology companies with expertise that includes cellular and gene therapy. This project aims to explore optimal technologies in order to position Australia to be a leader in future genome editing implementation. The project will generate new knowledge in the biological sciences and technology, specifically by generating an optimal platform for gene editing in red blood cells and by exploring how gene expression within a model locus is regulated. This project will also enhance collaboration between academic and industry research within Australia to build our national research capacity in an important and rapidly moving field.								

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LP210200285 Hajimohammadi, Dr Ailar	Development of Novel Concrete Noise Walls Incorporating Recycled Materials This project will develop high-performance, lightweight, concrete noise walls and acoustic barriers that use recycled tyre and glass products to improve sound absorption, and address environmental problems associated with the mining of river sands, and stockpiling of waste tyre and glass products. Innovation in noise wall technology consists in developing low-carbon concrete mixes (using less cement) with a maximum amount of recycled product, together with reducing wall thickness, while maintaining the necessary engineering properties such as acoustics, strength, and durability. In addition to higher acoustic insulation, the novel low-carbon, lightweight, panels will improve material handling and affordability of noise barriers.	35,000.00	70,000.00	70,000.00	35,000.00	0.00	0.00	210,000.00	TYRE STEWARDSHIP AUSTRALIA LIMITED, FLEXIROC AUSTRALIA PTY LTD, HUMES CONCRETE PRODUCTS
National Interest Test Statement National benefit is 3-fold, health, environment, and industry. 20% of Australians are exposed to unsafe noise levels, that can result in health issues (e.g. cardiovascular complications). Australia's occupational noise exposure levels cost \$2.68 billion annually due to well-being and productivity loss. Acoustic barriers reduce the noise to safe levels but concrete walls reflect noise to its source and are less efficient than more expensive products. Waste glass and tyre products will be used to improve the sound absorption of concrete, while addressing environmental issues associated with stockpiling and landfilling of these wastes. This project supports industry in the development of new products for Australian and International markets. The developed barriers will be up to 30% lighter than traditional concrete and save up to 20% on foundation costs. The technology has applications in acoustic fences in buildings and workplaces, the lining of tunnels and roadside noise walls. In summary, the socioeconomic benefits in delivering cost-effective, sustainable, and efficient solutions to noise are significant.									
LP210200495 Chu, Prof Dewei	Powering Next Generation Wearable Electronics: Moisture Electric Generator This project aims to develop next generation energy harvesting device which can directly generate electricity from the moisture in the air for self-powered, wearable electronics. The goal will be achieved by developing a new class of carbon based nanomaterials and large scale printing technology, through optimizing the materials defects, printing process and electrode configuration. The expected outcomes will be new electronic materials for a wide range of end uses in wearable electronics, significant advances in self-powered, environmentally friendly devices, and commercialisation of the technology to Australian industries.	78,860.00	159,967.50	164,460.00	83,352.50	0.00	0.00	486,640.00	AAM PTY LTD
National Interest Test Statement The wearable technology market is currently valued at US\$37B, and is forecast to hit 1 billion connected wearable devices by 2022. The Australian market is expected to register a compound annual growth rate of 14.5% during the forecast period from 2021-2026. The major limiting factor to the growth of this market is the absence of a reliable and efficient power supply that can be easily worn without compromising on the compactness and ease of use. The project seeks to develop highly efficient, wearable, and environment friendly power supply technology which can directly generate electricity from the moisture in the air. By integrating energy harvesting, energy storage components and Internet of Things sensors, this project will generate significant benefits to Australian economy and community: Development and commercialization of a range of new technologies, including wearable and printable self-powered devices for healthcare monitoring; Designed and manufactured in Australia for the rapidly growing global market; and industry-focused researchers with skills to grow Australia's wearable technology sector.									

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LP210200524 Atakaramians, Dr Shaghik	<p>Polymer fibres: A game changer for THz high-capacity interconnects</p> <p>The transition to a society with consuming enormous amounts of digital data has accentuated the need for high-speed data links. The project aims to create a novel class of polymer terahertz fibres to replace the current lossy wires that are bandwidth limited. This will be achieved through innovative microstructured fibre designs, cost-effective and scalable fibre fabrication, and integration of terahertz fibre in the next generation communication systems. The project outcomes are expected to put Australia at the forefront of the field of polymer terahertz fibre links, which will be a game changer for industries that require reliable and high-speed connections including telecom, automotive, space, datacentres, and image processing.</p> <p>National Interest Test Statement</p> <p>This research will contribute to Australia's national interest by developing technology that will be key to future cost- and energy-efficient high-speed fibre-based data links currently restricted by the limited bandwidth of lossy copper wire. Specifically, the project will generate novel terahertz polymer fibre designs, large-scale production and integration with hardware technologies. This new class of fibres will enable the commercial breakthrough of next generation mobile radio infrastructure at terahertz frequency carriers. The project outcomes are expected to put Australia at the forefront of the field of terahertz polymer fibres and to lead to a spin-off company in Australia for the large-scale production of these fibres. The fibre-based high-speed communication links have the potential to lead into unprecedented advancement of artificial intelligence and cloud-based technologies in Australia, and will be a game changer for telecom industry and other industries, such as automotive, industry4.0-based manufacturing and space, where reliable and high-speed connections are essential.</p>	53,974.50	108,173.00	109,645.00	55,446.50	0.00	0.00	327,239.00	ERICSSON AB
LP210200671 Li, Prof Bingqin	<p>Social isolation and volunteering of older Chinese immigrants in Australia</p> <p>This co-designed and collaborative research addresses an acute challenge since COVID-19: how to make volunteering activities more accessible to CALD immigrants who suffer from serious social isolation. The researchers will work with 5 partner organisations (POs) to study Chinese immigrants (60+) in NSW as an example. It will analyse census and GSS datasets, conduct in-depth interviews and focus groups in the settings of old-age care, service navigation and elderly learning. This research will produce new evidence and test the effect of peer education, and support services and policy advocacy of the POs. This research will benefit CALD older immigrants, enhance service capacity and contribute to greater social cohesion in Australia.</p> <p>National Interest Test Statement</p> <p>Australia faces the challenge of growing social isolation. This is especially acute among older immigrants within the CALD community. Volunteering has been identified as a key mechanism for overcoming social isolation. This co-designed and collaborative research addresses an acute challenge since COVID-19: how to make volunteering more inclusive to older CALD immigrants who suffer from social isolation. This study will analyse the relationship between social isolation and volunteer participation, identify the barriers to participation and develop a suite of policies to facilitate engagement. It will directly benefit the Australian economy by lowering the barriers for older Chinese immigrants (60+) to volunteer. It will contribute to active ageing, improved physical and mental health and enhanced community resilience. It will find new ways to build social capital in the community and enhance social cohesion. The built-in inter-cultural and inter-state knowledge exchange activities mean that the benefits of this research will be nationwide.</p>	50,000.00	101,000.00	100,500.00	49,500.00	0.00	0.00	301,000.00	CASS CARE LIMITED, FEDERATION OF ETHNIC COMMUNITIES COUNCILS OF AUSTRALIA, VOLUNTEERING AUSTRALIA INCORPORATED, THE CENTRE FOR VOLUNTEERING, SYDNEY SENIORS LEARNING SOCIETY

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LP210200689 Schaeffer, Dr Amandine C	Bluebottle dynamics: towards a prediction tool for Surf Life Saving Aust. Many Australians have had a painful bluebottle sting, yet little is known about bluebottles and what brings them to the coast. This project will shed new light on bluebottle dynamics, pathways, and distribution of the beachings. We will use an innovative combination of lab work, ocean surveys, statistical and hydrodynamic modelling to fill knowledge gaps and ultimately provide the framework for prediction. In partnership with Surf Life Saving Australia (SLSA), we will develop the first bluebottle risk prediction tool for our popular beaches. Forewarned is forearmed. Forecasts will help mitigate bluebottle stings, lessen their public health burden, while having broad benefits for coastal communities.	84,115.50	174,246.50	136,570.00	46,439.00	0.00	0.00	441,371.00	SLSA
National Interest Test Statement Surf Life Saving Australia volunteers treat ~60,000 marine stings annually, the majority of which are from bluebottles. True bluebottle sting numbers are believed to be higher, but to date, predicting the risk of bluebottles to beach users has been unattainable. This innovative project will shed new light on the bluebottle dynamics, pathways, and distribution, providing the foundation for a novel bluebottle prediction tool. Daily forecasts will be developed for our most popular beaches. The ability to predict conditions of high stinger risk and to inform lifesavers and beachgoers will have widespread social, environmental and economic benefits. This tool will reduce the burden of sting related injuries for lifesaving services and paramedics. By decreasing sting treatment time and increasing capacity for rescues and drowning prevention we will contribute to enhanced beach safety and therefore lessen the public health burden. Through mitigating bluebottle stings we will help reduce the risk and perceived fears for beach users and boost confidence in coastal tourism, bringing economic and social benefit.									
LP210200826 Dixit, Prof Vinayak V	A Road Out of Motion Sickness in Autonomous Vehicles Autonomous vehicles have found to provide significant improvements in safety and efficiency, as well as the potential to comfortably engage in other activities including work and entertainment. Motion sickness is particularly a significant source of concern in this regard, with factors ranging from demographics, vehicle kinematics to in-vehicle designs affecting the likelihood of discomfort. This study aims to (1) understanding factors inducing motion sickness in AVs (2) Evaluating individuals' preferences between comfort and travel attributes (including in-vehicle tasks) (3) Develop and evaluate mitigation strategies for motion sickness in AVs. Insights from this research will help improve adoption of automated vehicles on the roadways.	59,060.50	114,218.50	113,633.50	58,475.50	0.00	0.00	345,388.00	FORD MOTOR COMPANY
National Interest Test Statement Automated vehicle (AV) technology is developing at a rapid pace, nationally and internationally. Managing motion sickness in AVs is critical for passenger comfort and broader passenger activity. The understanding and models developed in this project, which is a research alliance between UNSW and Ford will inform design of a) vehicles, b) operational domains of driving and c) mitigation strategies to manage motion sickness. This research will also inform AV designs that are comfortable and safe for Australia. Through close industry research collaboration and key manufacturing industry partnership, this project will not only accelerate the development of comfortable AVs for Australia, but create new IP and findings that will have broader applicability. For example, this work is envisioned to seed a testing facility for motion sickness. This project will create a nexus of AV activity, scientific publication and IP which will support AV-related industries broadly in Australia spanning manufacturers, other third-party technology vendors and the travelling public.									

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LP210200831 Selomulya, Prof Cordelia	Engineering improved fat encapsulation for food powders Encapsulation of fats and oils into powders has wide applications in the food industry, with products including creamers, soups, infant formula, and nutraceutical powders. Spray drying of liquid emulsions into powders is an integral part to manufacture high value products by extending their shelf life, nutritional content, and functionality. This project will generate new protocols for the production of high-fat powders, with direct commercial benefits in improved production efficiency and new product development from recovered ingredients. The knowledge will benefit the manufacturing of food powders in Australia, currently valued around \$600M AUD pa, and will potentially expand the variety of product offering for the export market.	30,000.00	60,000.00	60,000.00	30,000.00	0.00	0.00	180,000.00	KONINKLIJKE DOUWE EGBERTS B.V.
National Interest Test Statement The agriculture and food industry is one of Australia's largest export industries, valued at almost \$42 billion in 2019, due to our reputation for 'clean' and 'green' raw materials. However, the value of this export is limited by the short duration of preservation of these products (or short shelf-life) and cost of transportation. This project will develop a new spray-drying process to extend the shelf-life of dairy products by transforming them into powder allowing for long shelf-life storage without affecting nutritional values and sacrificing taste. The outcome of this project will improve Australia's capability to manufacture food powders, making them easier to transport and export. The knowledge gained from this project will benefit the food powder industry, which is estimated at \$600 million per year, potentially expanding the variety of product offering for the export market beyond dairy powders, and enhancing Australia's advanced manufacturing and food industries.									
LP210200868 Gooding, Prof John J	Bioinks that Advance 3D bioprinting of cells to the 4th dimension The aim of this research is to provide a simple method for creating complex 3D cell cultures for in vitro cell based assays using 3D printing. A versatile polymer system as a bioink made from entirely commercially available components, will be advanced that gives a full range of soft tissue mimics and which can be dynamically change on-demand after printing of the 3D cell cultures. The latter will provide in vitro mimics of in vivo events never previously possible with more realistic models of what is found in vivo. Applications are in fundamental cell biology, studying diseases and developing new drugs. The outcomes from this research will be new knowledge on designing cheap extracellular matrix mimics and high throughout 3D cell assays.	77,500.00	161,000.00	172,000.00	88,500.00	0.00	0.00	499,000.00	INVENTIA LIFE SCIENCE PTY. LTD.
National Interest Test Statement Australia is a leading research nation in understand of fundamental cell biology, cancer cell biology and stem cell biology. It is evident that an unmet need is a rapid, high-throughput and controlled method of producing 3D cell cultures which better mimic the in vivo situation than 2D cell cultures on flat surfaces do. Australian owned Inventia Life Sciences and UNSW together have developed the Australian made Rastrum 3D bioprinter to address this need. The proposed research seeks to advance this Australian success story by extending the range of bioinks used in the 3D bioprinter to allow a broader range of biological research to be performed with this Australian bioprinter. Success in this project will generate new Australian owned IP, strengthen Inventia Life Sciences' strategic advantage in this emerging market place and allow the expansion of this Australian company from its current 30 employees.									

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LP210200883 Conibeer, Prof Gavin J	Revival of silicon solar cells for space applications Development of very thin silicon solar cells for space applications. These space cells will include many of the significant improvements in silicon cells of the last 20 years, which have allowed close to the maximum possible efficiencies and the order of magnitude decrease in cost of terrestrial solar cells. Space cells require good radiation resistance to give good end of life performance. This project will use photovoltaic architectures, proven to give high performance for terrestrial cells, to develop ultrathin silicon cells with extreme light trapping and improved radiation tolerance to give high beginning and end of life efficiencies. These cells will be less than 5% of the cost of multijunction cells currently used in space.	78,679.00	148,604.50	139,851.00	69,925.50	0.00	0.00	437,060.00	EXTRATERRESTRIAL POWER PTY LTD, FOM INSTITUTE AMOLF
National Interest Test Statement Expansion of commercial and exploratory activity in space requires much better access to cheap forms of power. This project will allow rapidly growing access to cheap radiation resistant silicon solar cells. It will provide the knowledge for manufacturing silicon solar cells that are very thin, radiation resistant and with high 'end of life' efficiencies. The research contributes to Australia's national interest, the commercial opportunities it will offer to Australasian companies for space power systems in the rapidly growing space sector, which will enable a rapid deployment of space operations and further growth of commercial opportunities for Australia in Earth orbit, on the Moon and beyond. The project will provide high quality training of PhD students and postdocs and will result in many high impact journal publications and high quality conference papers and several patents in innovative manufacturing. These commercial opportunities will generate longer term benefit for Australians in improved space based communication and data handling services as well as several other longer term opportunities.									
LP210200889 Ferrari, A/Prof Belinda C	What fungal features are key to developing environmental resilience? The aim of this project is to identify key mechanisms contributing to environmental resilience within the east Antarctic soil mycobiome. We will use cutting-edge approaches to perform comparative phenotypic and genomic analyses on cold-adapted fungi against temperate species counterparts. Intended outcomes include an enhanced capacity to contribute substantially to the fungal tree of life while gaining new knowledge on fungal adaptations in a model ecosystem at the limits of life. Significant benefits to the Royal Botanical Gardens and Domain Trust is delivery on their mission to quantify and qualify fungal biodiversity, and building of a restore and renew program that will inform future management and restoration of Australian ecosystems.	78,118.00	155,975.50	155,210.00	77,352.50	0.00	0.00	466,656.00	THE ROYAL BOTANIC GARDENS & DOMAIN TRUST
National Interest Test Statement Restoration of disturbed soil ecosystems in Australia have met with mixed success and there is evidence that enhancing soil microbiota will improve outcomes. This project addresses the need for new understanding of the biodiversity of mycobiomes and the adaptability of fungi to environmental change. The tools that we will develop and apply here will be used to understand the role of the mycobiome in Australian soils and how fungal adaptations might be manipulated in degraded ecological sites (e.g. bushfire, mining sites). The outcomes will contribute to the newly established 'restore and renew' program in Australia aimed at the restoration and rehabilitation of aboveground plant communities. The information produced will provide a continuum of environmental conditions to extrapolate our understanding of soil ecosystem responses across presumed healthy and contaminated sites. This understanding will assist in future recommendations to land managers for the conservation and restoration of degraded ecosystems across Australia.									
The University of New South Wales		690,694.00	1,387,706.00	1,362,942.50	665,930.50	0.00	0.00	4,107,273.00	

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The University of Sydney									
LP210200594	The worlds next door: terrestrial exoplanets with the TOLIMAN space mission	147,500.00	295,000.00	295,000.00	147,500.00	0.00	0.00	885,000.00	BREAKTHROUGH INITIATIVES, SABER ASTRONAUTICS AUSTRALIA PTY. LTD., OHB SE
Tuthill, Prof Peter G	<p>This project aims to to explore our nearest neighbour star system, Alpha Centauri, for the first time probing for exoplanets with physical characteristics that resemble those of Earth. The finding of any such world, with the potential to support a biosphere like our own and lying only 4 light-years away, would profoundly alter our view of our place in the universe. The primary outcome of this project will be the design, construction, launch and operation of a novel and innovative space telescope: the TOLIMAN mission. This profoundly benefits the Australian space and university sectors, partnering them with international agencies to deliver marquee science with global impact: the search for our first stepping stone to interstellar space.</p> <p>National Interest Test Statement</p> <p>This project will leverage partnerships with leading global space industries and agencies to build and fly an Australian-led spacecraft. It aims to explore our nearest neighbour star system, Alpha Centauri, for the first time, probing for exoplanets with physical characteristics that resemble those of Earth. The primary outcome of the project will be the design, construction, launch and operation of a novel and innovative space telescope. A mission science centre in Sydney will act as a training hub to develop relevant skills in spaceflight technologies as well as in data processing, image analysis and machine learning. In addition to benefiting Australia's emerging space industries, a priority under our new Space Agency, other high-tech industries will benefit from the new generation of scientists this research will attract to highly skilled STEM-based career paths. This project will provide enormous benefits to our Space industry, as well as build new relationships between universities and industry, delivering science with global impact in the search for our first stepping-stone to interstellar space.</p>								
The University of Sydney		147,500.00	295,000.00	295,000.00	147,500.00	0.00	0.00	885,000.00	
University of Technology Sydney									
LP210200642	Milk protein profiling powered by multiplexed single molecule assay	97,489.50	194,984.00	194,948.00	97,453.50	0.00	0.00	584,875.00	IPROTEOME PTY LTD
Zhou, Dr Jiajia	<p>This project aims to develop a novel device, comprising advanced single molecule imaging, microfluidics and immunoassay technologies, for quantification of milk protein variants. Milk quality is central to dairying and variants of proteins in milk affect its market value. No current milk protein detection technologies are readily applied in milk production quality control. This project aims to produce a device that can be used by milk producers and farms to profile protein variants with high sensitivity in a single test in an hour and screen unwanted protein contamination. The platform also has great potential for detecting other complex and low content analytes. It builds on innovations in nanoparticles and recent industry collaboration.</p> <p>National Interest Test Statement</p> <p>Australian dairying is worth \$13 billion p.a. This project aims to help this industry to improve quality control, reduce quality control costs and increase markets. The new method and device developed in this project will enable the industry to meet growing demand for milk without unwanted protein ingredients. For the first time, Australian dairy farmers and milk product companies will be able to do testing quickly, with high accuracy, on their own premises. The technology will identify A1 proteins, which are considered to affect some people's digestion and to cause allergic reactions. Improved quality assurance for A2 milk and dairy products will benefit Australians who do not tolerate conventional milk products. Technology from this project will also benefit the broader Australian food industry, including confirming product provenance. It has potential in the Australian life sciences and diagnostics industries, including for testing at points of care. The project will strengthen links between a university team and an Australian R&D service provider that has worked for many years with the food industry.</p>								
University of Technology Sydney		97,489.50	194,984.00	194,948.00	97,453.50	0.00	0.00	584,875.00	

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Western Sydney University									
LP210200530	Walking my path: NSW Indigenous LGBTIQ+ peoples' experiences & aspirations	46,500.00	96,000.00	100,000.00	86,000.00	35,500.00	0.00	364,000.00	BLAQ ABORIGINAL CORPORATION
Sullivan, A/Prof Corrinne T	There is little known about the experiences, needs and aspirations of Indigenous gender and/or sexuality diverse peoples in New South Wales. This means that government, corporate and community sectors lack information on how to secure their social, economic and cultural inclusion. In collaboration with local Aboriginal community controlled organisations, the project will create new knowledge about the key events and experiences shaping Indigenous gender/sexuality diverse peoples' immediate needs and longer-term aspirations in NSW. This will inform the development of culturally and gender/sexuality appropriate service provision and promote social cohesion and community (re)connections through engagement with community, economy and culture.								
National Interest Test Statement									
The health and care needs of Indigenous Australian sexual/gender diverse people are currently under-serviced across Australia. This group have one of the highest rates of depression and suicide. This project will work directly with BlaQ Aboriginal Corporation to develop meaningful early interventions and appropriate service provision that can be translated nationally. The project will develop a suite of evidence-based policy briefings to inform government policy, providing a significant body of evidence to inform BlaQ's partners in the Coalition of Aboriginal Peak Organisations. An outreach model will be delivered that builds Indigenous community awareness raising strategies, the knowledge base of key stakeholders, and their support networks of existing and proposed services. We will develop best practice models that will significantly improve the service provision of Indigenous and non-Indigenous service providers. The project will generate more effective and responsive service provision for this group, and improve their access to employment, housing, health and community care.									
LP210200622	Living with Urban Heat: Becoming Climate-Ready in Social Housing	25,113.00	75,043.00	85,189.00	35,259.00	0.00	0.00	220,604.00	ST GEORGE COMMUNITY HOUSING LIMITED, UCA - PARRAMATTA NEPEAN PRESBYTERY, WENTWORTH COMMUNITY HOUSING LIMITED, BRIDGE HOUSING LIMITED, CHURCHES COMMUNITY HOUSING INCORPORATED
Healy, Dr Stephen	This project aims to address liveability in rapidly warming cities by focusing on the role that social practice plays in complementing technical and infrastructural cooling solutions. This project expects to generate new knowledge about equitable heat adaptive practices. It does so by working with culturally diverse social housing residents using an innovative blend of participatory action research and transition design. Expected outcomes of this project include practical, low-cost cooling strategies that can be implemented now, along with increased social input into planning for the hotter urban future. This should provide significant benefits, such as enhanced civic capacity to generate society-wide climate readiness.								
National Interest Test Statement									
It is increasingly evident that global warming is threatening liveability: people die from heat-related health issues every year and mental health is affected when indoor temperatures rise and outdoor heat restricts mobility. This project focuses on western Sydney where hot days (above 32 degrees) and extremely hot days of 35+ degrees have become the new normal during summer. It will work with social housing residents and Community Housing Providers to identify heat adaptive social practices and develop new low-cost strategies to increase wellbeing in the face of rising urban heat. By combining university, housing sector and residents' expertise it will address three National Science and Research Priorities—mitigating heat-related health risks, improving energy efficiency in homes and promoting immediate and long-term community adaptation to environmental change. Research will benefit social housing residents and providers in western Sydney, the housing sector state-wide as well the broader Sydney community and other heat-vulnerable cities in Australia.									
Western Sydney University		71,613.00	171,043.00	185,189.00	121,259.00	35,500.00	0.00	584,604.00	
New South Wales		1,266,658.50	2,552,932.50	2,501,512.00	1,250,738.00	35,500.00	0.00	7,607,341.00	

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(Columns 1 and 2)	(Column 3)							(Column 10)	(Column 11)
Queensland									
Griffith University									
LP210200168	Optimising the occupational wellbeing of Australian healthcare workers	50,518.00	103,151.50	105,824.00	53,190.50	0.00	0.00	312,684.00	UNITINGCARE QUEENSLAND
Wilkinson, Prof Adrian J	This project aims to address the wellbeing of Australian healthcare workers by focusing on the relationship between a manager's leadership style and the utilisation of wellbeing practices. This project expects to generate new knowledge by moving beyond individual factors and work design to explore more deep rooted and systemic causes, located upstream of the work group. Expected outcomes of this project will be to develop preventative strategies to improve healthcare employees' wellbeing, and the associated costs of mental health claims and lost productivity.								
National Interest Test Statement									
This research will identify and improve the links between leadership behaviours and employee wellbeing and will contribute to employees' improved psychological health, resilience, job satisfaction, and work performance. This will help reduce employees' chronic occupational stress which is an increasingly widespread and expensive problem costing the Australian economy \$15 billion per annum, of which \$5 billion is attributed to lost performance (PWC Australia, 2014). The current COVID-19 pandemic has significantly intensified work demands for healthcare workers and starkly highlights the persistent workplace risks faced by healthcare workers for their health and wellbeing with many Australian healthcare workers, reporting levels of anxiety, burnout, and depression. This research will help develop preventative strategies to improve healthcare employees' wellbeing and reduce the associated costs of mental health claims and lost productivity.									
LP210200550	Life in the Shipping Lane; The Cost of Increasing Disturbance to Whales	60,575.00	115,543.50	101,119.00	46,150.50	0.00	0.00	323,388.00	PORT OF BRISBANE PTY LTD, QUANDAMOOKA YOOLOOBURRABEE ABORIGINAL CORPORATION RNTBC, DHI WATER AND ENVIRONMENT PTY LTD, HEALTHY LAND AND WATER LTD, STRADBROKE FLYER PASSENGER FERRY
Bengtson Nash, A/Prof Susan	This project aims to quantify the increasing risk of ship strike to humpback whales in Moreton Bay, and predict the impact of chronic disturbance to nursing calves. The research builds on pilot findings identifying Moreton Bay as a resting area for migrating humpback whales. Using empirical and modelling approaches, this research responds directly to the Federal Government strategy for mitigating ship strike, which explicitly flags Moreton Bay as an 'area of concern'. The project has been developed in collaboration with traditional owners and industry, and is expected deliver optimal mitigation measures for the region. Findings further carry implications for similar functional habitats along Australia's humpback whale migratory corridors.								
National Interest Test Statement									
This project responds to the Federal Government Strategy for Mitigating Vessel strike of Marine Megafauna. It does so by delivering detailed assessment of vessel strike risk in Moreton Bay, flagged by the Strategy as being 'of concern' due to the seasonal presence of large whale numbers at the entry of Australia's fastest growing shipping port. A pilot study between the lead CI and the Port of Brisbane identified Moreton Bay as a resting stop-off for migrating humpback whales. This finding elevates both the risk of species impact, as well as the conservation status of the region, currently subject to a traditional owner-led World Heritage listing bid. The project aims to evaluate disturbance risk and design optimal mitigation measures. Outcomes will provide a basis for evidence-led decision-making on the sustainable growth of marine tourism and commerce in the region. Further, they will guide management of whale-maritime traffic interactions in similar embayments along Australia's coastlines and improve understanding of the functional role of transitory habitats for this highly migratory species.									

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LP210200704 Louys, A/Prof Julien	Deep time extinctions and environments in Australian underwater caves This project aims to investigate the unique submerged Mt Gambier fossil deposits to determine the role environmental change had on large Australian mammal extinctions. By using a combination of technical diving and scientific expertise to study untouched fossil deposits from underwater caves, this project expects to provide greater understanding of past ecosystems and animals, advancements in geochronological techniques, and data critical to prepare Australians for action in protecting our biological heritage. Expected outcomes include insights into cave conservation and protection of underwater cave systems, updated policies on cave management, and promotion of our understanding of Australian geo-heritage through education and displays.	47,430.50	88,089.50	82,979.50	42,320.50	0.00	0.00	260,820.00	CAVE DIVERS' ASSOCIATION OF AUSTRALIA INCORPORATED, SOUTH AUSTRALIAN MUSEUM
National Interest Test Statement This project will provide both environmental and cultural benefits by delivering unique data to further understanding of our biological past; engagement of the cave diving community in developing a broader appreciation of the caves in which they dive; and promotion and development of a management plan for an eco-tourist attraction unique to Australia. The benefits of this project will include increased geo-heritage protection and educational benefits to national, state, and regional Australian public and recreational communities. The data generated will provide a greater understanding of the effects of past environmental changes on Australian biota, benefiting biodiversity conservation efforts by providing the deep time perspective of faunal change and extinction. It will establish world standards for scientific and systematic analysis of flooded fossil deposits, putting Australia at the very forefront of underwater palaeontology.									
LP210200708 Hosseini Bai, Dr Shahla	Developing a novel carbon negative fertiliser Food security is vital to support our growing population. However, our increasing reliance on intensive farming systems necessitates increased fertiliser use, leading to increased water pollution and soil degradation - threatening both the Australian environment and food security. Increasing carbon storage capacity by soil and decreasing fertiliser use are two of the primary pathways for restoring the bio-support capacity of soils and reducing farming footprints. This innovative and first-of-its-kind project aims to develop a cost-effective, carbon negative fertiliser that reduces fertiliser inputs and increases soil carbon storage	58,931.00	116,483.00	115,241.00	57,689.00	0.00	0.00	348,344.00	CARBON POWERED MINERAL TECHNOLOGY & PRODUCTS PTY LTD, C.H.T. AUSTRALIA PTY. LTD., RAINBOW BEE EATER PTY LTD, LITTLE BUNYA ORGANICS
National Interest Test Statement Intensive farming is rapidly increasing in Australia and synthetic fertilisers are becoming increasingly relied upon to support our food production, worth \$2.9 billion/year in exports. While synthetic fertilisers have enabled dramatic improvements in agricultural productivity, they have significantly impacted soil fertility while contributing to the pollution of our marine ecosystems, such as the Great Barrier Reef. With Australia's population expected to reach 35.9 million by 2050, there is an urgent and unmet need to develop new fertilisers capable of supporting increased food production on existing farmland while reducing the need for large amounts of fertilisers to improve soil health and decrease pollution of our water sources and oceans. This project will revolutionize farming systems in Australia by developing a carbon negative fertiliser that can be tailored for use in a range of farming systems. The fertiliser will be cost-effective, will be used to apply for government incentives (e.g. carbon credits), and will decrease off-site impacts of fertiliser leaching and reduce greenhouse gas emission.									
	Griffith University	217,454.50	423,267.50	405,163.50	199,350.50	0.00	0.00	1,245,236.00	

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Queensland University of Technology									
LP210200431	Enhanced natural insecticidal activity against a pest of national priority	74,511.00	139,436.00	129,754.50	64,829.50	0.00	0.00	408,531.00	GREENLIGHT BIOSCIENCES
Bally, Dr Julia L	<p>This project aims to deliver environmentally friendly, non-genetically modified crop protection tools against a catastrophic pest, the fall armyworm. This project expects to generate new knowledge of natural plant protection strategies and their application in targeted crop protection using a combination of unconventional, but cleverly integrated, cutting-edge technologies and approaches. Expected outcomes include comprehensive new technologies to fight against the most damaging global crop pest, improved Australian agritech capacity and strengthened international collaborations. This should provide significant benefits, such as added security for Australia's most important agricultural crops and regions, and global food production.</p> <p>National Interest Test Statement</p> <p>Fall armyworm is a notorious insect pest responsible for severe yield losses in major cultivated crops. The insect is known for its ability to disperse and migrate long distances and expand into new habitats and new host ranges. Although only seen in Australia for the first time in January 2020, its known destructive nature matched with Australia's favourable climatic conditions have already placed it as one of Australia's top 40 plant pests. Failure to control this species will have a serious impact on national food production (which covers 85% of Australia's daily food supply), the \$66.3B Australian agriculture sector, and the wellbeing of the 318,600 people employed by the industry. This project will develop deep new understanding of plant natural defences against this pest through testing of Australian-produced anti-insect compounds, and combine this with transformational plant delivery systems. Overall, this Project will help Australia to remain at the forefront of the plant-biotechnology research with broad global applications, build capacity and networks, and avert future agricultural economic damage.</p>								
LP210200793	Finding Porphyry Copper with zircon trace elements & hyperspectral display	143,822.50	293,605.00	255,091.00	105,308.50	0.00	0.00	797,827.00	BHP GROUP OPERATIONS PTY LTD
Allen, Prof Charlotte M	<p>Copper mine discovery rates lag behind world needs. One way to find copper in the World's Ring of Fire is to measure compositions of zircons which are durable minerals concentrated in stream sands and spreadout long distances below a deposit. 100s of zircon from a cup of sand constitute a sample. Zircon chemical features that indicate possible mines are mostly understood, but nature is complicated. Beyond the 26 channels of chemical data for each grain in the 10,000s of analyses, there are 7 layers of lab imaging data that are not carried along in a convenient way. Geologists need smart computer systems to find useful relationships among the 33 channels and to discover relations within and between samples to find more mineable copper.</p> <p>National Interest Test Statement</p> <p>Environmentally sensitive electrical technologies are expected to push the global demand for copper above projected supply within the next 25 years; discovery of new copper deposits is critical. Australia has significant copper exports but is not a dominant supplier. This project is directed at improving discovery rates of magmatic copper deposits (porphyry-style) which occur in 'Rings of Fire' around the world through geochemical analysis of stream sediment minerals (zircon). This deposit type is mined in North Parkes and Cadia Hill (NSW). From improved understanding of significant copper-bearing porphyries and the geochemical signals that can be detected at the surface through accessory minerals like zircon will come: 1) enhanced reputation of Australian applied research, 2) exploration efficiencies for resource companies, 3) provision of technology and services both here and abroad. This research will involve fundamental knowledge generation about porphyry deposits that will likely inform work on other copper deposit styles such as the world class Olympic Dam in SA and magmatic Copper-Nickel in WA.</p>								

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LP210200918 Kamber, Prof Balz S	<p>Correction of non-linearity in inductively-coupled-plasma mass-spectrometry</p> <p>Chemical analyses by mass spectrometers underpin key Australian economic sectors, particularly minerals and agriculture. The quadrupole inductively-coupled-plasma mass-spectrometer has seen a particular rise in prominence over last 25 years. In this collaboration between mass spectrometrists and the leading instrument designer, we will improve the linearity of its detection system for more precise and accurate data. Better elemental and isotope ratio data from these high-throughput instruments will open up new real-world applications in many areas of Australian interest, such as biosecurity, forensics, groundwater management, and drug design. The research will also inform design of the next generation instruments by the industry partner.</p> <p>National Interest Test Statement</p> <p>Many modern resource and manufacturing processes use chemical and isotopic 'fingerprints' for tracing flows of materials. In Australia, hundreds of quadrupole inductively-coupled-plasma mass spectrometers (Q-ICP-MS) generate such forensic data every day. In this project, Australia's foremost Q-ICP-MS manufacturer and an academic leader in mass spectrometry will develop new methods for producing more accurate data from existing Q-ICP-MS as well as design improved future instruments. The research will support national interest because improved chemical and isotopic measurements will increase discovery rates of new mineral deposits, allow faster identification of biohazards (migration of pests) and help to more accurately assess groundwater resources. The project will underpin National Manufacturing Priority (1) by enabling better knowledge of new economy mineral-element association, a key requirement for dynamic minerals processing. New design knowledge will also strengthen the market position of the industry partner and support job expansion at their research and product development facilities in Australia.</p>	40,067.00	77,304.50	72,065.00	34,827.50	0.00	0.00	224,264.00	AGILENT TECHNOLOGIES AUSTRALIA (M) PTY LTD, AGILENT TECHNOLOGIES AUSTRALIA PTY LTD
LP210200937 Tuten, Dr Bryan T	<p>Photochemical Design of Microstructured Aerospace Materials</p> <p>Commercial aviation and shipping spend over US\$300 billion on fuel and emit almost 3 billion tonnes of carbon dioxide annually at an enormous environmental cost. This project will provide the material chemistry innovation basis for the production of drag reduction surfaces that can be applied to enable a more effective airflow over an aircraft, thus reducing fuel consumption. Critically, the material design approach will not only deliver a high performance coating for the production of drag reduction surfaces, but allow these surfaces to be tailored to specific application profiles including UV resistance and anti-fouling properties. The project will place an Australian company at the forefront of drag reduction technology</p> <p>National Interest Test Statement</p> <p>The reduction of emissions and the associated cost savings by introducing innovative drag reduction systems is a critical task in commercial and defense aviation. However, the translation of nature inspired drag reduction technology to sustainable manufacturing is critically lacking, with no commercially viable method available to manufacture drag reduction surfaces at scale. This project will place an Australian company at the technological forefront of drag reduction technology that can be adapted to a range of environmental conditions by virtue of its molecular design of the developed material from which the riblets are fabricated. The project is a critical contribution to anchoring manufacturing capability onshore with a high value added product that is applicable to aviation globally, enabling MicroTau to access a multi-billion dollar market for advanced drag reduction surface coatings for aircraft</p>	72,598.00	145,196.00	145,196.00	72,598.00	0.00	0.00	435,588.00	MICROTAU PTY. LTD.

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LP210200938	Doped alumina with tailored material properties for battery applications	49,996.50	111,612.50	126,991.50	125,980.00	60,604.50	0.00	475,185.00	LAVA BLUE LTD
Couperthwaite, A/Prof Sara J	<p>This project aims to develop tailored alumina materials for lithium ion battery separators through a novel in-situ approach that will: (1) produce uniform doped alumina for improved safety, (2) target specific surface and bulk material properties to increase the overall performance, and (3) reduce manufacturing costs by integrating the process with new technology developed for the production of high purity alumina. Significant advances are proposed for overcoming current manufacturing limitations of doped alumina. Building research capacity and knowledge in battery material manufacturing will benefit a range of industries across Australia, whilst providing new opportunities for growth in local communities.</p> <p>National Interest Test Statement</p> <p>Australia is positioned to become a world-class hub of battery manufacturing and research. Improving the safety and efficiency of lithium ion batteries through development of new battery materials will contribute to the realisation of this opportunity. The research proposed will deliver advanced materials for key lithium ion battery components. Advancing research capacity in this area will boost the adoption of renewable energy technologies that will: (1) reduce our reliance on fossil fuels, (2) create jobs in a new manufacturing sector, and (3) bring economic opportunities to Australia. This project strongly aligns with Australia's priorities of developing new clean energy sources and storage technologies, where lithium ion batteries have been identified as a key component. Furthermore, the project will build capability in the manufacture and design of next generation battery materials.</p>								
	Queensland University of Technology	380,995.00	767,154.00	729,098.00	403,543.50	60,604.50	0.00	2,341,395.00	
The University of Queensland									
LP210200225	Nanoarchitected anti-corrosion coatings for zinc-plated steel	57,026.00	129,218.50	141,301.00	69,108.50	0.00	0.00	396,654.00	BAOSHAN IRON AND STEEL CO LTD
Amiralian, Dr Nasim	<p>Zinc-plated steel is widely used in buildings, households and vehicles, but the long-term performance is limited due to corrosion resulting from exposure to high humidity or alkaline conditions. Currently, available chromium coatings are toxic, while polymeric coatings lack durability. This project aims to use nanotechnology to develop highly effective, multifunctional anti-corrosive coatings in which long-term protection is achieved by controlling the wettability and self-healing properties. The project is expected to generate new knowledge in coating materials that limit corrosion and address environmental problems. This advanced manufacturing technology should be of high-value benefit to manufacturers and consumers of zinc-plated steel.</p> <p>National Interest Test Statement</p> <p>Australia needs new and non-toxic anti-corrosion coatings for zinc-plated steel. Chromium-based coatings are being phased out due to toxicity concerns, and Australia has an environmental responsibility to find alternative coating materials. This project aims to develop sustainable and more durable nano-coatings with superior anti-corrosion properties to address this issue. This will ensure the longest possible service life of steel in building and manufacturing materials which will benefit Australia's economy, environment, and society. Manufacturing, maintenance and replacement costs of steel would be reduced, as would energy requirement and carbon dioxide emission in making and using steel. The expected outcomes will enhance Australia's international position in steel production and will have a value-add for Australian steel manufacturing. In addition, Australian consumers will have access to more durable steel-based materials, which will benefit diverse industries from construction to vehicle manufacture.</p>								

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LP210200348 Zhang, Prof Ming-Xing	AM of MAX Phase parts for applications in extreme environments This project aims to develop techniques to synthesize MAX Phase compound materials in-situ using laser additive manufacturing. The project expects to increase jet engine fuel efficiency and thrust, and to fabricate longer-lasting parts for supersonic speed applications. The expected outcomes include well-developed additive manufacturing processes to make high performance engineering components with shape complexity for extreme environment applications, and new methods to increase the 3D printability of brittle materials. This should provide significant benefits to aerospace and defense industries through solving their long standing bottleneck material and processing problems. The outcomes also enhance Australia's manufacturing capacity.	59,412.00	121,266.50	124,361.00	62,506.50	0.00	0.00	367,546.00	GRAVITAS TECHNOLOGIES PTY LTD
National Interest Test Statement MAX phase compounds are lightweight materials with both metallic and ceramic characteristics, and have strong potential for engineering applications at special and extreme conditions. However, the current synthesis processes have difficulties to produce high purity materials in large quantities and to manufacture parts with shape complexity. This research takes the advantages of 3D printing to develop novel in-situ synthesis techniques with laser 3D printing to produce high performance MAX phase materials, and to 3D print engineering components with complicated geometrical shapes and superior properties for extreme environment applications. In aerospace industry, use of the 3D printed MAX phase parts can increase fuel efficiency and jet engine thrust. It also provides materials solution to fabricate critical parts for supersonic speed applications in defense sector. Furthermore, the research enhances Australia's high-value manufacturing capacity, and provides Australia with a competitive advantage to make economic benefit through advanced manufacturing in critical Australian investment areas.									
LP210200586 McColl-Kennedy, Prof Janet R	Transforming Primary Healthcare Service Delivery: A Digital-Human Approach This project aims to address the urgent need for a transformational shift in thinking and actions in primary healthcare service delivery. Primary care clinics, the front door of Australia's healthcare, are under considerable strain. By using a four-phase mixed methodology design across four Australian states, this project expects to generate a national evidence-based framework which takes a dual approach combining the use of digital technology with humanness. Expected outcomes include the development of an Australian-first evidence-based digital resource kit, including two new tools, and a new co-designed roadmap to better facilitate this important change journey to enhance patient experience, employee wellbeing and clinic performance.	81,929.00	168,817.50	166,245.50	79,357.00	0.00	0.00	496,349.00	INALA PRIMARY CARE LIMITED, PRESTANTIA HEALTH PTY LTD, AUSTRALIAN ASSOCIATION OF PRACTICE MANAGEMENT LTD, AUSTRALIAN PRIMARY HEALTH CARE NURSES ASSOCIATION LTD
National Interest Test Statement Tasked with addressing a wide spectrum of Australia's healthcare needs, primary care (GP) clinics seek to provide a vital service to the whole nation. But primary care clinics are experiencing considerable tensions, especially in the current turbulent environment from increasing consumer demands, advances in digital technologies, and the lack of resources and skills to enact the much needed transformation. While trained in technical areas of medicine, nursing and allied health, GP clinics have not all kept pace with key digital technologies, nor the necessary skillsets to effectively manage the business side of clinics - customers, employees and performance. This innovative project will provide a national evidence-based resource toolkit including two new tools, a typology, and a new practical roadmap co-designed with industry to equip GP clinics with the necessary skills to make the required transformational shift in both mindset and practice, combining digital technologies with humanness, to enhance patient experience, employee wellbeing, and clinic performance. Thus, future-proofing this critical service.									

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LP210200636 Fedorov, A/Prof Arkady	Surface and Interface Engineering for Superconducting Quantum Circuits The limiting factor for current quantum computers is a process called decoherence. This project aims to identify new strategies to reduce decoherence in quantum computer components using an interdisciplinary approach based on quantum physics, materials science, and engineering. This project involves investigating the effect of atomically sharp interfaces on decoherence and using capping layers to control and/or inhibit oxide growth that reduce the contribution of interfaces to decoherence. Expected outcomes of this project include development of solutions to fabricate long-lived superconducting qubits benefiting superconducting quantum technologies and making a significant step towards realisation of a practical quantum computer.	89,801.50	160,694.00	154,540.50	83,648.00	0.00	0.00	488,684.00	IQM
	National Interest Test Statement Quantum computing is a rapidly emerging technology that is expected to radically transform the way we process information with practical benefits for medicine, chemistry, and material synthesis. Building a quantum computer is a grand challenge and requires solutions to many problems in science and engineering. This project addresses the problem of decoherence, the biggest roadblock to building a practical quantum computer. This project aims to develop new fabrication methods and circuit designs that reduce decoherence. The knowledge and engineering solutions developed here are directly applicable to the fabrication of superconducting quantum computers. The project will enhance capacity to generate international, interdisciplinary research and build collaborations between the leading Australian research labs and industrial leaders in quantum computing outside of Australia. This expanded capacity gives Australia access to cutting-edge technology not yet available in Australia, provides a base for future development, and provides a much-needed push for the national field of superconducting quantum devices.								
LP210200703 Liu, A/Prof Shuang	Integrating community and family aged care for diverse Australians This project aims to identify optimal ways to integrate community and family care to support older Australians from diverse cultural backgrounds to age well at home and in their communities. Using an innovative research design, the project seeks to generate new policy and practice relevant knowledge of care networks and expectations of diverse older Australians, their families and service providers to identify new avenues for enabling family and community collaboration to meet care needs. Expected outcomes include enhancing Australia's capacity to provide accessible, tailored and culturally responsive aged care, with significant benefits for improving care experiences for diverse older Australians, their families and service providers.	67,160.50	133,292.00	124,556.50	58,425.00	0.00	0.00	383,434.00	FEDERATION OF ETHNIC COMMUNITIES COUNCILS OF AUSTRALIA, MULTICULTURAL COMMUNITIES COUNCIL - GOLD COAST LIMITED
	National Interest Test Statement Effectively supporting older Australians to age at home and in their communities relies on integrating community and family care. Yet, under-use of needed community services and over-reliance on families often ill-equipped to provide the needed care remains an ongoing well-being concern among older Australians from culturally and linguistically diverse (CALD) backgrounds. This project aims to generate new practice and policy relevant knowledge to facilitate community and family care collaboration. The research will advance understanding of care networks, experiences, and expectations of older CALD people, family carers, and community service providers. Using this new knowledge, it will engage community leaders and policy makers in identifying optimal ways to integrate community and family care to meet care needs. Significant benefits include building Australia's capacity to provide accessible, tailored and culturally responsive support to enable diverse older Australians to age well and prevent premature entry into residential care facilities, with long-term social and economic benefits for Australia.								

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LP210200723 Chenu, Dr Karine C	Enhancing Genomic Prediction for Changing Environments in Wheat Adverse weather is the primary risk faced by the Australian agriculture industry. This Project aims to develop the next generation of agriculture tools to unlock natural potential in wheat and improve yield stability across seasons and regions. Drawing on crop physiology, genetics and integrated modelling, this Project expects to generate new knowledge and technologies to untangle genetic and environmental interactions that affect productivity, enhance predictive capability, and initiate advanced breeding strategies to develop new crop varieties with superior resilience against changing climates. This should provide significant benefits, such as profit stability for wheat growers, elevated global market position and improved food security.	59,136.50	184,147.50	261,581.50	265,348.00	210,471.00	81,693.50	1,062,378.00	AUSTRALIAN GRAIN TECHNOLOGIES PTY LTD
National Interest Test Statement As the fourth largest exporter of wheat, Australia is a key player in the global market. The Australian industry is valued at \$5B per annum and has a substantial footprint in rural Australia and the national economy. However, wheat productivity is severely impacted by adverse weather. Yield reductions of 4.6% per decade are already being experienced, and these losses are expected to intensify in the future. This project expects to develop innovative trans-disciplinary approaches to enhance breeding efficiency and produce climate-adapted wheat varieties. Successful outcomes will reduce crippling yield variability in the industry and provide income security and a degree of much-needed stability for growers. As wheat is the primary source of protein in low-income nations, outcomes will also contribute to society more broadly through improved global food security. Importantly, new insights and tools from this Project are expected to be transferrable to other high-value crops, such as barley, oats, sorghum, canola and pulses, with further substantial economic, social, research and industry benefits for Australia.									
The University of Queensland		414,465.50	897,436.00	972,586.00	618,393.00	210,471.00	81,693.50	3,195,045.00	
Queensland		1,012,915.00	2,087,857.50	2,106,847.50	1,221,287.00	271,075.50	81,693.50	6,781,676.00	

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South Australia

Flinders University

LP210200165	Reuniting cargoes: Underwater Cultural Heritage of the Maritime Silk Route	111,140.00	178,640.00	135,000.00	133,837.50	66,337.50	0.00	624,955.00	MINISTRY OF MARINE AFFAIRS AND FISHERIES, REPUBLIC OF INDONESIA - KEMENTERIAN KELAUTAN DAN PERIKANAN, SOUTHEAST ASIAN REGIONAL CENTRE FOR ARCHAEOLOGY AND FINE ARTS , GAJAH MADA UNIVERSITY INDONESIA, THE NARA NATIONAL RESEARCH INSTITUTE FOR CULTURAL PROPERTIES, MR MICHAEL LEWIS ABBOTT
Polkinghorne, Dr Martin	Beginning in the mid 1400s the Maritime Silk Route witnessed the largest known expansion of global trade. But the legacy of artefacts retrieved from this time has not been appropriately understood because the objects were mostly salvaged and dispersed without recording the archaeological details of their find-spots. Our multilateral consortium aims to discover the cultural value of the largest Southeast Asian ceramic collections in Indonesia and Australia with archaeological science. By employing and enhancing international conventions, the project will generate new knowledge about this decisive epoch in world history and build capacity to preserve the underwater cultural heritage of our region for future generations.								

National Interest Test Statement

This research aligns with Australia's national interest by contributing to the 'Plan of Action for the Indonesia Australia Comprehensive Strategic Partnership 2020 – 2024' and by addressing antiquities held by Australian public institutions and private individuals. It will deepen Australia's existing bilateral relationships with the Indonesian government and cultural institutions. Researching the most significant collections of Asian ceramics recovered from shipwrecks in Indonesian waters tell the stories of the first direct trade routes between Europe and China. An international team of experts will use the latest methods in archaeological science to discover the find-spots of these objects and develop procedures for Australians and relevant communities in the Asia-Pacific to restore meaning to public and private collections of cultural heritage that have been disconnected from their origins. Importantly, the project will provide Australians with the opportunity to experience and enjoy the shared heritage of our region.

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LP210200536	Confronting everyday harms: preventing abuse of people with disability	61,430.00	166,996.00	171,996.00	66,430.00	0.00	0.00	466,852.00	NDIS QUALITY AND SAFEGUARDS COMMISSION, DEPARTMENT OF HUMAN SERVICES, THE NORTHCOTT SOCIETY, BEDFORD PHOENIX INCORPORATED, MABLE TECHNOLOGIES PTY LTD, VICTORIAN ASSOCIATION FOR THE CARE AND RESETTLEMENT OF OFFENDERS, DISABILITY ADVOCACY NETWORK AUSTRALIA (DANA) LIMITED, JULIA FARR ASSOCIATION INC, NOVITA CHILDREN'S SERVICES, GENU KARINGAL ST LAURENCE
Robinson, Prof Sally A	The findings of the Disability Royal Commission necessitate new approaches to prevent violence, abuse, neglect and exploitation. Framed by recognition theory, this project proposes empirical research with young people with cognitive disability, using a new concept of 'everyday harms' in their paid relationships. The results will inform early responses to poor quality interactions in disability support. The strategic alliances with the government, industry and community partners will develop a practice framework to prevent everyday harms and the escalation to abuse, and to promote safety and wellbeing. The research has policy benefits for capacity-building in the sector to act on the rights and voices of people with disability.								
National Interest Test Statement									
The project will use extensive observations, interviews and analysis to understand and define 'everyday harms' arising from poor support worker interactions with people with cognitive disability, to then devise policy, organisational and practice-based approaches to address them before they escalate to abuse. It addresses a key national interest, the safety and wellbeing of people with disability. New evidence is needed to address the stark problems of abuse and neglect identified in the Disability Royal Commission. Incorporating new understandings of abuse, safety and wellbeing into national policy and practice collaboration will help organisations efficiently and safely improve the quality of disability support, improving effectiveness and value of key mechanisms such as the NDIS. The research will contribute to achieving Australia's Disability Strategy 2022-2032, addressing Outcome Area: Safety, Rights and Justice. It will also support conceptual and practical approaches to enhance safety and wellbeing in the related sectors of aged care and children's services.									
LP210200740	Using facial recognition for bird conservation management	34,006.00	72,566.00	38,560.00	0.00	0.00	0.00	145,132.00	KONRAD LORENZ INSTITUTE FOR COMPARATIVE ETHOLOGY, CLELAND WILDLIFE PARK, UNIVERSITY OF VIENNA, AUSTRIA
Colombelli-Negrel, Dr Diane	Long-term monitoring of reintroduced species is essential to measure conservation success. This project aims to use a novel and non-invasive facial recognition software developed by our research group to measure the recovery of a vulnerable and native bird species following introduction outside of its historic range. This project expects to generate new knowledge in the field of animal monitoring. Expected outcomes of this project include improved ability to track individuals and their persistence to better inform conservation priorities. This should provide significant benefits to researchers, government agencies and industries to improve conservation planning as well as the outcomes of reintroductions and other translocations.								
National Interest Test Statement									
This project aims to use facial recognition for individual bird tracking to better understand the recovery of a vulnerable and native bird species following introduction outside of its historic range. The project merges animal behaviour, population dynamics, conservation, and artificial intelligence to deliver improved conservation planning for Australian's wildlife. Practical outcomes include the development of software that will track individual birds with minimal training and time, and that can be transferred across species and readily adopted by researchers, government agencies and industries to enhance their management plans. The findings of this research will have important implications for informing conservation planning policies, which will benefit various end-users at the departmental, national and international level and will set the world standard for non-invasive monitoring. The research will improve the efficiency and reduce the cost of monitoring programs, producing actionable outcomes for environmental agencies for less effort and with lower impacts on target species.									
Flinders University		206,576.00	418,202.00	345,556.00	200,267.50	66,337.50	0.00	1,236,939.00	

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The University of Adelaide									
LP210200822	Novel isotope techniques to explore the Centralian Superbasin, Australia	65,000.00	130,000.00	137,500.00	72,500.00	0.00	0.00	405,000.00	NORTHERN TERRITORY GEOLOGICAL SURVEY, GEOLOGICAL SURVEY OF WESTERN AUSTRALIA , DEPARTMENT FOR ENERGY AND MINING, AGILENT TECHNOLOGIES, ISOTOPX
Farkas, Dr Juraj	This project will leverage new advances in analytical instrumentation and isotope techniques to generate improved geochronological and stratigraphic framework for the Centralian Superbasin, a vast ancient depositional system covering much of central Australia. The project aims to apply novel laser-based dating of sedimentary rocks, coupled with metal isotope proxy reconstructions of the basin's palaeogeography, hydrological connectivity and past redox conditions, which are all critical parameters to guide and de-risk future exploration of sediment-hosted resources in this frontier basin. Anticipated outcomes will benefit Australia's resources economy, while providing insights into the evolution of Earth's surface environment in deep time.								
	National Interest Test Statement								
	The project has the potential to generate large economic benefits for Australia by developing knowledge and datasets that will transform exploration for energy and mineral resources in the vast and currently under-explored Centralian Superbasin. This basin has demonstrated energy, critical minerals and subsurface gas storage potential, but exploration in this frontier basin system is hampered by general lack of spatially and temporally resolved data and geochronological constraints. This project leverages recent advances in analytical instrumentation to generate new isotope datasets to constrain the basin's long-term evolution and resource framework via novel dating of sedimentary rocks and proxy-based reconstructions. The methods to be employed will be equally applicable to exploring for energy and metal resources in other sedimentary basins in Australia or overseas. In addition, the project outcomes will also contribute to better understanding of past Earth's surface environment and its evolution during a critical interval recording the rise of atmospheric oxygen and the emergence of first animal life.								
	The University of Adelaide	65,000.00	130,000.00	137,500.00	72,500.00	0.00	0.00	405,000.00	
	South Australia	271,576.00	548,202.00	483,056.00	272,767.50	66,337.50	0.00	1,641,939.00	

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Tasmania

University of Tasmania

LP210200539	Working with wind energy and forestry for effective eagle conservation	87,328.50	199,170.00	193,555.50	160,364.00	78,650.00	0.00	719,068.00	FOREST PRACTICES AUTHORITY, THE TRUSTEE FOR THE PENNICOTT WILDERNESS JOURNEYS NATURE CONSERVATION TRUST, EPA TASMANIA, UPC RENEWABLES AUSTRALIA PTY LTD, EPURON PTY LTD, WOOLNORTH RENEWABLES
Johnson, Prof Christopher N	This project aims to reduce the impacts of wind turbines and disturbance from forestry activity on the Tasmanian wedge-tailed eagle. It will do this by understanding the flight behaviour, movements and mortality of eagles, and the behavioural responses of breeding birds to forestry-related disturbance. The project will build new knowledge and institutional partnerships that will be used to minimise impacts on the Tasmanian eagle population, and develop models for use in planning. This will safeguard Australia's largest eagle and improve the sustainability of energy and forest industries. This research will also provide a model for the resolution of similar problems elsewhere in the world.								

National Interest Test Statement

This project will contribute to the national interest in three ways. (1) Environmental: the Tasmanian wedge-tailed eagle is listed as Endangered. As well as being important to the Tasmanian ecosystem, the Tasmanian eagle population is nationally significant because it is one of only two subspecies of the wedge-tailed eagle. The project will help secure the viability of the Tasmanian eagle population. (2) Economic: eagles in Tasmania are threatened by two industries that are important to the current and future economy of Tasmanian and Australia. Renewable energy generation in particular is growing strongly, but its development could be limited by conflicts with eagle conservation. The project will produce knowledge to resolve these problems, and similar problems in other places. (3) Cultural: the wedge-tailed eagle is Australia's largest bird of prey, and is highly valued by the Tasmanian community. The project will increase public understanding and appreciation of it, both in general and through support of a citizen science project.

LP210200955	Reducing environmental footprint by improving phosphorous use efficiency	59,177.00	109,304.00	98,254.00	81,640.50	33,513.50	0.00	381,889.00	ZHEJIANG UNIVERSITY, NANTONG RUIHUA BIOENGINEERING CO LTD, FLUX ADVANCE SCIENTIFIC CO., LTD., SEED FORCE PTY LTD
Shabala, Prof Sergey	While modern agriculture relies heavily on the use of phosphorous fertilizers, most of them are not used by plants and lost in runoff, resulting in a massive environmental damage through contamination of waterways (termed eutrophication). This project takes advantage of an untapped resource - a unique collection of Tibetan wild barley genotypes, to reveal key traits that confer superior phosphorus use efficiency in wild barley and identify appropriate candidate genes and their position on chromosomes for further incorporating these traits into commercial barley cultivars. This will reduce the environmental footprint of modern agricultural practices on terrestrial and aquatic ecosystems without compromising food security.								

National Interest Test Statement

Phosphorous deficiency is considered one of the greatest limitations to agricultural production in Australia. Rock phosphate, the major source of phosphorous fertilizers and one of the cornerstones of modern agriculture, is a non-renewable resource that could be depleted within 50 to 200 years. At the same time, the bulk of phosphorous fertilizers added to the soil end up in the nearby waterways and not used by the plants. This causes major environmental concerns and comes at a massive cost to farmers. This project will contribute to improving plants ability to take up and utilize phosphorous fertilizers thereby reducing the environmental footprint of modern production systems on terrestrial and aquatic ecosystems. It will also greatly reduce the cost of phosphorous fertilizer input into farming systems, reducing the cost of food production to growers. This project will address two National research priorities "Minimizing damage to soil, fresh and potable water, urban catchments and marine systems" and "Enhanced food production".

University of Tasmania	146,505.50	308,474.00	291,809.50	242,004.50	112,163.50	0.00	1,100,957.00
Tasmania	146,505.50	308,474.00	291,809.50	242,004.50	112,163.50	0.00	1,100,957.00

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(Columns 1 and 2) (Column 3)		2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	2025-26* (Column 8)	2026-27* (Column 9)	(Column 10)	(Column 11)
Victoria									
Deakin University									
LP210200707	Novel semio-chemical approach to control the Australian Sheep Blowfly	135,212.00	261,396.50	256,145.00	129,960.50	0.00	0.00	782,714.00	SOURCE CERTAIN INTERNATIONAL PTY LTD
Harvey, A/Prof Michelle L	The Australian Federal Government through the 'Smart Farming' initiative highlights the need for improved multidisciplinary measures in order to remain at the global forefront of the invention and adoption of technology. This multidisciplinary project (entomology, biotechnology, analytical chemistry and genomics) will rapidly inform the management of fly strike on an important Australian resource merino sheep. This will build the key biochemical data in order to develop a novel fly lure technology (at scale) to be used on farm delivering national benefit through improved animal welfare and safety considerations for producers, and will establish the best approach to disseminate this scientific information to stakeholders such as farmers.								
National Interest Test Statement									
This project aims to develop protocols which will significantly improve on-farm practice in respect of flystrike management. Through improved control over fly production, the technology would add significant value to an already world class Australian sheep wool and meat industry. The initiative would assist in maintaining the Australian wool industry's competitive edge internationally and to strengthen Australia's own food security position. The project has potential to make a direct contribution to Australia's economic stability, and to promote Australian scientific research capacity more generally. The technology also offers beneficial new outcomes for Australian farming industries' OH&S and animal welfare practices. The project emphasises a national approach, benefitting rural end users by improving the consistency of the messaging of scientific information across both industry and farm-based stakeholders.									
	Deakin University	135,212.00	261,396.50	256,145.00	129,960.50	0.00	0.00	782,714.00	
La Trobe University									
LP210200706	Fish Jenga: metapopulation management for coastal river fish	95,000.00	168,801.00	151,927.50	78,126.50	0.00	0.00	493,855.00	NSW DEPARTMENT OF PLANNING INDUSTRY AND ENVIRONMENT, DEPARTMENT OF PRIMARY INDUSTRIES - NSW
Crook, A/Prof David A	This project aims to address the escalating threats to coastal freshwater fish from drought, fire, and other disturbances. The project expects to generate new knowledge on contemporary distributions of NSW coastal freshwater fishes, and will develop models of population dynamics to explore the consequences of alternative water management and disturbance scenarios. The expected outcome of the project is to revolutionise management by replacing the current practice of managing river basins separately, with a framework that accounts for among-basin linkages that are essential for the long-term persistence of fish populations. Significant benefits include more efficient use of water resources and improved conservation outcomes for native fish.								
National Interest Test Statement									
Water scarcity is a key limitation to the future development of Australia's national economy and is forecast to intensify under a changing climate. In line with the objectives of the National Water Initiative, this project aims to improve the efficiency of water allocations directed towards achieving environmental benefits. The project will deliver bespoke monitoring and modelling tools and a new management framework to optimise the delivery of environmental flows for native fish in coastal rivers. By improving our capacity to monitor and manage populations at appropriate spatial and temporal scales, the project will address the decline of coastal river fishes (including threatened species) and help Australia meet its international obligations for biodiversity conservation. This outcome will protect high-value commercial, recreational, and traditional fisheries that contribute significantly to community well-being from economic, social, cultural, and mental health perspectives.									

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	La Trobe University	95,000.00	168,801.00	151,927.50	78,126.50	0.00	0.00	493,855.00	
Monash University									
LP210200213	Precision Pollination: Data-driven enhancements to boost crop yield	90,000.00	180,000.00	180,000.00	90,000.00	0.00	0.00	540,000.00	COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION, COSTA BERRY INTERNATIONAL PTY LTD, AUSTRALIAN BLUEBERRY GROWERS ASSOCIATION INC
Dorin, A/Prof Alan	The project aims to transform industrial crop pollination from an intuitive domain to one where decisions are based on sound data and best-practice principles. It proposes to achieve this modernisation of global pollination practice by developing novel technologies to operate a three-stage loop: honeybee pollination monitoring, simulation-based forecasting, and management. This is intended to ensure that the capability of honeybees to provide essential ecosystem services is informed by transferable, standardised data acquisition and management techniques that maintain bee health and maximise pollination. The anticipated outcomes are higher fruit yields and quality, and a beneficial step-change in industry productivity and profitability.								
National Interest Test Statement									
The project tackles industrial fruit production, protected cropping and pollination. As crops move indoors away from extreme weather, greenhouse culture is Australia's fastest growing food producing sector (>60% p.a., value \$1.6B p.a.). For fruit production under cover, pollination is essential, but problematic, since honeybees operate poorly indoors. Outcomes of poor pollination are poor fruit yield and quality – issues that must urgently be addressed for food security and profitability. We address this need and the national research priority for enhanced food production through novel technologies (sensors and real-time data systems). Our partners, the Australian Blueberry Growers Association and Costa Group, include the national body representing 95% of Australia's blueberry industry and Australia's largest supplier of fruit and vegetables to supermarkets. Hence, our project directly and broadly benefits national fruit production and pollination under cover. With these nation-wide stakeholders we will address pollination issues through new technology for bee monitoring, forecasting and management.									
LP210200490	Activating lazy stormwater wetlands through real time monitoring & control	108,822.00	201,885.00	181,288.50	88,225.50	0.00	0.00	580,221.00	MELBOURNE WATER CORPORATION, SOUTH EAST WATER CORPORATION
McCarthy, A/Prof David M	Constructed stormwater wetlands are the last line of defence preventing pollution of urban waterways, but wetlands often fail, with their passive operation unable to adapt to the highly variable climate and hydrology they experience. This project aims to use advances in real-time control technology to turn these lazy wetlands into active wetland systems, optimising their performance. It aims to deliver new-generation technologies to enhance water quality treatment, enhance urban water security and guarantee environmental flows to maintain healthy waterways. Working in partnership with waterway managers and water retailers, this project strives to deliver a nationally and globally relevant technology to change how we manage water in cities.								
National Interest Test Statement									
This project will build the next generation of technologies required to sustainably manage the polluted stormwater generated by our rapidly expanding urban centres. Current wetland technologies are designed to operate passively, making them "lazy" and unable to adapt to the highly dynamic climate and hydrology they experience. Deploying real-time monitoring and control to "activate" constructed stormwater wetlands will not only improve removal of pollutants and pathogens, but also create the means to meet competing objectives for increasingly scarce water resources. This project will provide the knowledge required to transform this technology into the standard practice of waterway managers and water retailers throughout Australia. The water industry is set for a boom in capital investment in water infrastructure, to take advantage of innovative monitoring and control technologies. Our project will help optimise that investment and establish Australia as a world leader in smart water technologies.									

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LP210200616 Dhital, Dr Sushil	High-value functional ingredients from bean processing waste Legumes are considered highly nutritious and sustainable food. Accordingly, there is a steady growth in the consumption of legumes worldwide, including in Australia. Due to lengthy soaking and cooking times, consumers prefer ready-to-eat canned legumes. The current processing technologies are energy and water-intensive and generate considerable waste. This project investigates the application of non-thermal technologies to reduce processing time, water and energy use and enable the recovery of valuable polyphenols and soluble dietary fibres normally lost in the wastewater. This knowledge will lead to sustainable beans processing, delivering improved productivity to Australian manufacturers and quality food to Australian consumers.	69,761.50	146,216.00	155,095.50	78,641.00	0.00	0.00	449,714.00	H.J. HEINZ COMPANY AUSTRALIA LIMITED
National Interest Test Statement The diverse agro-climatic zones across Australia have produced a wide array of high-quality legumes for human consumption. Legumes are considered one of the world's most nutritious and sustainable crops, and their demand is steadily increasing in Australia and worldwide. However, current legume processing technologies are inefficient in terms of resource consumption and waste generation. This project aims to demonstrate the value of novel non-thermal technologies to save water and energy for the legume processing industry and valorise the wasted functional components such as polyphenols and prebiotic soluble dietary fibres. The recovered nutrients have great potential for the nutraceutical and infant food formula industries. Recovering the nutrients from wastewater reduces the burden on the environment, the cost to the manufacturer and could provide additional revenue. The application of novel technologies and valorisation of waste gives the Australian legume processing industry a competitive edge, benefitting the economy and improving sustainability.									
LP210200656 Mueller, Prof Florian '	Advancing Australia's hospitality industry through interactive food This project aims to develop the first framework for the design of interactive food to advance Australia's hospitality industry. The project expects to co-develop with restaurateurs and chefs interactive sounds, smells and tastes technologies that enable them to create novel eating out experiences and evaluate diners' reactions. The expected outcome is an easy-to-use toolkit (comprising a software suite and low-cost sensors) that can be readily incorporated into hospitality operations. This should provide significant benefits, such as enticing people to go out and visit restaurants, supporting some of Australia's 600,000 hospitality jobs while fostering Australia's innovative food culture.	69,347.00	127,242.50	111,071.00	53,175.50	0.00	0.00	360,836.00	WORKSMITH COWORKING PTY LTD
National Interest Test Statement This research will produce the world's first understanding of how to incorporate interactive technology as an additional ingredient into restaurant eating and drinking experiences. It will support Australia's hospitality industry (8% of Australian jobs) to offer experiences people cannot get at home. In doing so, this project will equip restaurateurs and chefs with the ability to use interactive technology as a unique selling point to entice more people to go out, reviving Australia's challenged hospitality industry (worth \$24 billion to the economy) and elevating its standing as a global food and tourist destination. In addition, it will facilitate collaboration between technology developers and the hospitality sector, supporting the digital media and creative sectors. In the longer term, knowledge gains from this work will also support the meaningful evaluation of multisensory interventions such as digital food campaigns, which helps enhance campaign efficacy and assist government organisations and wellbeing advocates to create better interventions that positively affect what and how people eat and drink.									

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LP210200765	A novel physical-digital approach for the assessing a large critical asset	58,321.50	120,670.50	128,125.00	65,776.00	0.00	0.00	372,893.00	MELBOURNE WATER CORPORATION, JACOBS GROUP (AUSTRALIA) PTY LTD
Chiu, Prof Wing K	<p>This project aims to deliver an artificial intelligence-enabled decision-making tool to maintain and manage the floating covers of vast lagoons that treat raw sewage. The cover harvests the biogas released from the anaerobic digestion of sewage for electric power generation that exceeds the plant’s requirement. The approach involves an innovative thermographic technique and exploits transfer learning to adapt neural networks trained on lab-scale and synthetic data to field implementation. The outcome is a machine learning framework to optimise biogas harvesting and renewable energy generation, and to avoid structural failure, that is capable of continuous improvement to take into account improved data and/or modelling capabilities.</p> <p>National Interest Test Statement</p> <p>This project aims to deliver an artificial intelligence-enabled decision-making tool to maintain and manage the floating covers of reactors that treat raw sewage. These covers are designed to create an airtight environment for the anaerobic digestion of sewage by bacteria. This process releases methane-rich biogas that is harvested to generate renewable energy that is more than sufficient for the plant’s requirement, with excess electricity exported to the grid. An unexpected failure of these covers can be very costly, both in terms of replacement costs that exceed \$20m, due to the bespoke design and vast size that exceeds four times the size of the Melbourne Cricket Ground, as well as lost energy production valued at \$8m per year, and a very detrimental environmental impact due to the release of foul-smelling, potent greenhouse gas. The expected benefits will include the creation of machine learning framework designed for continuous learning and improvement that strives to optimise biogas harvesting and renewable energy generation, and to safe-guard the structural integrity of critical assets.</p>								
LP210200844	Community Music Radio: Building the Music-Media Ecosystem	45,142.00	83,221.50	63,997.00	25,917.50	0.00	0.00	218,278.00	COMMUNITY BROADCASTING ASSOCIATION OF AUSTRALIA LIMITED, COMMUNITY BROADCASTING FOUNDATION, AUSTRALIA COUNCIL, APRA AMCOS
Homan, A/Prof Shane	<p>This project aims to investigate the economic and sociocultural impact of community music radio. It seeks to generate new knowledge about the detailed relationships between community music radio stations and the Australian music industry, documenting for the first time national activities and infrastructures. Anticipated outcomes include the identification of policies and strategies to improve the audibility and visibility of Australian music domestically and on global digital platforms; providing a new model for evaluating both economic and sociocultural outputs of creative industries; and building the music-media ecosystem as a vital component of the Australian creative industries.</p> <p>National Interest Test Statement</p> <p>Community music radio delivers a diverse range of music programs to Australians in many regional and urban locations. It also plays a vital role in the Australian music-media ecosystem in promoting artists and local music economies. This project examines the economic and cultural value of community music radio to the Australian creative economy. It will assist both the community music radio sector and music industries in building infrastructure; providing Australian content on digital music platforms; and maintaining community music radio’s ‘incubator’ role for the Australian music industry. The project will produce a nationwide database, case studies and reports to inform industry and policy development as part of Partner Organisations’ creative digital strategies.</p>								

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LP210200903 Yu, Prof Aibing B	Model studies of Australian lump ore applied to blast furnace ironmaking Ore lump use in ironmaking blast furnaces (BFs) requires no preprocessing and has a lower carbon footprint. However, it suffers various technical problems. This project aims to understand and optimize the conditions for such operations. This will be achieved by means of a combined theoretical and experimental program, involving the use of state-of-the-art multiscale computer modelling and simulation techniques. The research outcomes will be tested in the design and control of lump charging operations in practice through collaboration with the industrial partner. This will ultimately increase Australian ore lump usage in BFs, leading to significant financial and environmental benefits to Australia and the entire steel industry worldwide.	120,000.00	255,000.00	272,500.00	137,500.00	0.00	0.00	785,000.00	HAMERSLEY IRON PTY. LIMITED
National Interest Test Statement (1) The outcomes of this project expect to substantially increase Australian ore lump exports by developing an effective platform to guide direct use in ironmaking blast furnaces. (2) The direct lump use help cut the massive cost for constructing, running, and maintaining sinter and pellet plants, leading to unmeasurable financial and environmental benefits to Australia and the entire steel industry worldwide. (3) The project outcomes, such as theories, models, and knowledge, will be valuable intellectual assets for Australia, helping position Australia at the forefront of this field that is of paramount importance to modern industries in this country. (4) The project will train young research scientists and/or qualified engineers to meet the continuous challenges in innovation, cost reduction, and efficiency improvement in Australia's iron ore industries.									
LP210200908 Currie, Prof Peter D	Developing macrophage-based technologies for tissue regeneration Different tissues show distinct regenerative capacities with an organism and across the phylogeny. What underlies this diversity in regenerative ability at cellular and molecular level is far from clear. Building on foundational discoveries in zebrafish, this study seeks to determine if this capacity could, in part, be explained through the properties of a component of the innate immune system, the macrophage, which preliminary data shows generates a transient pro-regenerative muscle stem cell niche in zebrafish. This study will determine if macrophage subtypes acts to coordinate regeneration in other tissues and systems and if a programable pro-regenerative cell can be made in vitro that stimulate regeneration in different settings.	142,600.00	285,750.00	286,300.00	143,150.00	0.00	0.00	857,800.00	ASTRAZENECA, SWEDEN
National Interest Test Statement This project seeks to unlock one of the holy grails of regenerative biology; why some organisms and tissues can regenerate and some cannot? Specifically, the project will uncover the role of the innate immune system in coordinating regenerative capacity across different species. Knowledge and valuable intellectual property generated in cellular production and biotechnology, will underpin a new and growing industry in Australia: synthetic cellular biology. This nascent industry seeks to manufacture and control cellular plasticity, with downstream improvements in both veterinary and human health. An understanding of the factors secreted by these cells, for example, or new production methods to create these cells to deliver products in cell therapy, could one day be used in a wide variety of regenerative and biomedical applications.									
	Monash University	703,994.00	1,399,985.50	1,378,377.00	682,385.50	0.00	0.00	4,164,742.00	

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Swinburne University of Technology									
LP210200345	Tailoring smart film for energy efficient protected cropping	84,319.50	171,530.00	176,547.50	171,510.50	82,173.50	0.00	686,081.00	INNOFOCUS PHOTONICS TECHNOLOGY PTY LTD
Jia, Prof Baohua	Cooling cost represents a major running cost for greenhouse, preventing the wide adoption of highly beneficial protected cropping technology. This project aims at solving this critical issue by developing a world-first tailored smart film that can simultaneously reject solar heat, cool down the greenhouse and maximise the yields of crops. This is made possible by advanced spectral engineering and light management with frontier nanostructures combined with a scalable and low cost manufacturing process. Deliverables of the project include game-changing energy efficient solutions for protected cropping and marketable smart films readily integratable with existing greenhouse for dramatic energy saving and immediate economic and social benefits.								
National Interest Test Statement									
Protected cropping is a highly beneficial horticulture approach, representing the future of urban farming. However, Australian protected cropping industries face significant challenges in remaining internationally competitive, not least being energy costs. Australia's hot dry climates result in high usage of energy by protected cropping companies, largely as a result of having to cool large volumes of air. At the same time, Australia has natural advantages of abundant sunlight. Working with leading manufacturer in the field, this project seeks to develop completely new 'smart films', based on nanotechnology, that meet industry needs to reduce the negative effects of solar heating whilst retaining the positive effects of year-round solar radiation for high plant yields. This project helps Australian industry to become more energy efficient and remain internationally competitive. The success of this project will create new intellectual properties, providing an innovative technology platform for Australian solar, architecture, and agriculture industries, producing significant social and economic benefits.									
LP210200504	Rechargeable lithium carbon dioxide battery - catalyst design to prototype	89,000.00	181,000.00	185,000.00	93,000.00	0.00	0.00	548,000.00	GRAPHENEX PTY LTD
Ma, A/Prof Tianyi	This project aims to develop a new concept of rechargeable lithium carbon dioxide batteries and scaled-up prototypes. Such a battery will be first of its kind to show high power comparable to gasoline and superior rechargeability over existing gas-involved batteries, ensuring realistic use for industrial purposes. Expected outcomes include 2-dimensional catalysts made from earth-abundant elements lowering large-scale production cost, a novel but reliable working principle based on reversible carbon dioxide/oxalate conversion, and prototypes featuring high specific capacity, large energy density and excellent durability. Via industrial pilot trials, commercial benefits will be fast tracked for energy security and carbon dioxide utilisation.								
National Interest Test Statement									
This project has significant benefits for Australia's renewable energy industry, environmental security and economic growth. It will deliver high-power and reliable lithium carbon dioxide batteries and prototypes by using the greenhouse gas as the fuel and earth-abundant elements as the battery materials, to accelerate the development of large-scale and cost-effective carbon dioxide utilisation and clean energy storage. By boosting the laboratory-scale research to industry pilot manufacture, the project will promote R&D of new-generation carbon dioxide conversion catalysts and energy devices, which are highly promising for commercialisation and scaled-up industry-level application, and put Australia at the forefront of carbon dioxide fixation and advanced battery technology. Therefore, it will bring substantial environmental benefit to Australia and the world, as well as reap huge savings for renewable energy industry. The outcomes of this project will create substantial innovations in clean energy, attain a secure and reliable low-emission energy future, open new industries, and generate job opportunities.									
Swinburne University of Technology		173,319.50	352,530.00	361,547.50	264,510.50	82,173.50	0.00	1,234,081.00	

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The University of Melbourne

LP210200216	Advancing the Engineering of Minipile Systems to Frontier Applications	54,265.50	103,906.00	99,281.00	49,640.50	0.00	0.00	307,093.00	THE TRUSTEE FOR ALL FOOTINGS SOLUTIONS TRUST
Disfani, A/Prof Mahdi M	This project aims to develop new knowledge on the performance of battered minipile systems used in a wide range of applications from solar panels to traffic signs. Minipiles provide concrete-free foundation systems, yet their behaviour under more complex loading such as wind, is yet to be fully understood. This project will examine the loading conditions experienced during installation and throughout service life. This will include complex full-scale laboratory tests and advanced computer modelling to verify the performance against expected cyclic loading. New design approaches will be developed for this emerging foundation system, enabling more widespread adoption of this technology in the building and construction industry.								

National Interest Test Statement

This project will create new knowledge to support the development of an innovative and effective concrete-free minipile footing that offers a rapid and easy installation process with minimal disturbance to the surrounding environment. Outcomes will provide benefits to the national building and construction industry by helping to fast-track the delivery of a wide array of structures including solar panels, traffic signals and other types of lightweight structures. This will directly support infrastructure projects funded by the Commonwealth Government's \$200 billion investment over the next decade. The new design guidelines developed by the project will also encourage adoption by the construction sector and enable onshore manufacturing scale-up. The project's robust study will increase the efficiency of designs and build confidence in this emerging system. This will provide a market-leading technology for domestic and international markets, supporting local jobs and growth in Australia's export economy.

LP210200733	Innovations in Demographic Modelling for Government Analysis and Planning	99,415.50	198,831.00	99,415.50	0.00	0.00	0.00	397,662.00	DEPARTMENT OF TREASURY, AUSTRALIAN BUREAU OF STATISTICS
Wilson, Dr Tom G	This project aims to create innovative and cutting-edge demographic models to better meet the needs of practitioners and researchers. Together with the partner organisations, Commonwealth Treasury and the Australian Bureau of Statistics, it will focus on creating more accurate and fit-for-purpose forecasting methods for Australian fertility, mortality, and migration, including a policy scenario model to produce population projections by visa/citizenship category and Australians overseas. Expected outcomes of this project include improved forecasting methods reported in open-access papers, user-friendly forecasting software and tools for the partner organisations, and a stronger relationship between researchers and practitioners.								

National Interest Test Statement

Population forecasts are widely used for planning and policy development. For example, they influence discussion about long-term economic policy options (as shown in the Intergenerational Report), affect superannuation expenditure forecasts, and inform decisions about the number of new schools needed. However, current methods have many limitations. This project will seek to improve the usefulness, detail, and accuracy of population projections and forecasts for Australia at the national, State/Territory, and large region scales. Historically, some population forecasts have proved highly inaccurate. The project will aim to increase the accuracy of fertility, mortality, and mortality forecasts, which are the key inputs to population projections, using the latest computational and statistical methods. It will also focus on creating user-friendly tools and programs for practitioners to try to narrow the gap between research and practice, and encourage greater exchange of knowledge and insights between researchers and practitioners.

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(Columns 1 and 2) (Column 3)									
LP210200774	HyPoCrete: Hydrogen storage using an innovative concrete composite system	80,000.00	157,500.00	162,500.00	85,000.00	0.00	0.00	485,000.00	HAZPROTECT PTY LTD, M MODULAR PTY LTD, BESTECH AUSTRALIA PTY LTD
Ngo, Prof Tuan D	This project aims to develop an innovative polymer concrete composite system for the safe and efficient storage of hydrogen. New knowledge is expected to be generated on the novel use of polymer and concrete materials in hydrogen storage technologies. The expected outcomes include a new class of prefabricated, modular storage system that is highly efficient and low cost. The scalability and resilience of the system will be achieved by using concrete, a material widely used in the construction industry for its mechanical performance, durability and affordability. This should provide significant benefits in fostering the hydrogen economy by providing an efficient and resilient storage system for industrial quantities of hydrogen.								
National Interest Test Statement									
The Australian Government has identified hydrogen as the key pillar to decarbonise the future economy and address climate change. According to the National Hydrogen Strategy, the hydrogen economy will generate \$26 billion in GDP and 17,000 jobs by 2050. This project aims to develop a safe, efficient and low-cost hydrogen storage system, which is essential to accelerate widespread adoption of hydrogen as the primary fuel in a wide range of priority sectors. New knowledge developed in the use of polymer concrete composites for hydrogen storage will place Australia at the forefront of research and development in the emerging hydrogen industry. The development of this new technology is well-aligned with the Australian Science and Research Priorities including Advanced Manufacturing and Energy. This project has significant potential to deliver economic and social impact for the energy and construction sectors. The training opportunities in advanced material and hydrogen storage technologies will develop the skills needed by the new generation of researchers supporting innovation in our emerging hydrogen industry.									
LP210200798	Artificial intelligence algorithms to predict risk of injury in racehorses.	72,141.00	123,622.00	90,547.50	39,066.50	0.00	0.00	325,377.00	ALERTE EQUINE SCIENCE LTD
Bailey, Prof Simon R	This project will address the urgent need for predicting and preventing catastrophic and career limiting limb injuries and cardiac arrhythmias in racehorses due to over (or under) training. Using data from GPS and movement sensors integrated into saddlecloths, artificial intelligence algorithms will convert cumulative data on speed, gait, and stride characteristics during training, along with injury data, into a risk matrix. Recorded heart rate and ECG data will also be analysed using artificial intelligence to detect early evidence of the development of cardiac arrhythmias. The system will improve racehorse welfare, providing a simple interface to warn trainers when risk of injury becomes high, in order to prevent catastrophic breakdown.								
National Interest Test Statement									
The social license to use animals for sport can be compromised when the welfare of those animals is below a standard that is acceptable to society. In Australia, each year there are about 40,000 horses in race training. The economic impact of the Thoroughbred horse racing industry in Australia is substantial, exceeding \$9B per annum. At present, the welfare of those animals is difficult to routinely assess, and the incidence of catastrophic limb injury (necessitating euthanasia) or sudden cardiac failure (which may in some circumstances cause sudden death) are unacceptably high. The biosensor system that will be developed in this project, and the real-time analysis of data from the sensors, will allow trainers, veterinarians and racing authorities to accurately and efficiently monitor individual animals under their care, and will facilitate transparency in the racing industry. The device has the potential to become a monitoring tool that will inform not only the animal carer, but also the regulators of animal welfare, in real-time.									

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Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)			Total (\$)	Partner Organisation(s)
(Columns 1 and 2) (Column 3)		2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	2025-26* (Column 8)	2026-27* (Column 9)	(Column 10)	(Column 11)
LP210200837	Paving the way to greener roads and healthier waterways Waste tyre permeable pavement is emerging as an effective stormwater surge mitigation solution. Yet, its behaviour under traffic loads and varied environmental conditions are not fully understood which undermines industry confidence in this technology. This project aims to advance the engineering of waste tyre permeable pavements by creating new knowledge on their mechanical and hydrological performance. The project will develop design guidelines, identify the governing mechanisms and develop a performance prediction framework based on laboratory and field tests, and advanced numerical modelling. The mechanisms of performance from micro to macro level will be identified, generating knowledge for industry to support widespread uptake.	57,500.00	107,500.00	106,000.00	56,000.00	0.00	0.00	327,000.00	POROUS LANE PTY LTD, YARRA CITY COUNCIL, TYRE STEWARDSHIP AUSTRALIA LIMITED
Disfani, A/Prof Mahdi M									
	National Interest Test Statement Each year approximately 50 million used tyres end up in landfills. From July 2021, Australia must process all its waste onshore, requiring innovative solutions to help achieve a circular economy to reduce the financial burden to the nation and the impact on our environment. This project will provide significant national benefits in helping to solve a major waste problem for Australia by diverting waste from landfills. It will also reduce the impact of urbanisation by helping to filter pollutants and improve the quality of our waterways, especially after storm surges. These innovations will build capacity in Australia's waste and stormwater management industry, help deliver new markets for Australian industries and create opportunities for IP export. The project addresses the National Science and Research Priority in Environmental Change by addressing two challenges: 'resilient urban, rural and regional infrastructure' and 'developing new solutions for responding and adapting to the impacts of environmental change on urban and rural communities and industry.								
LP210200917	AI for Legal Problem Diagnosis in the Diverse Language of Australians The number of Australians with unmet legal needs is estimated to be over four million people per year and growing, and free legal assistance is severely under-resourced. A bottleneck for free legal assistance providers is the determination of what (if any) specific legal needs the individual has, to which end this project proposes to develop AI models to semi-automate the process, with particular focus on fairness across users of all backgrounds, generalisation from small amounts of curated data, and dynamic interaction with the help-seeker. The project will help deliver legal assistance to some of the most vulnerable members of Australian society, and reinforce Australia's position as a world leader in AI for Law.	62,500.00	116,896.00	109,162.50	54,766.50	0.00	0.00	343,325.00	JUSTICE CONNECT
Baldwin, Prof Timothy J									
	National Interest Test Statement Levels of unmet legal need in Australia are high, and free legal assistance services are severely under-resourced. Each year 8.5 million Australians have legal problems and only 4.5 million are able to access assistance. Unresolved legal problems cause financial strain, stress-related illness, physical ill health, relationship breakdown, and having to move home. This project will enhance the provision of free legal assistance by alleviating the bottleneck of manually reading and classifying the legal problem descriptions submitted by potential clients of the service. In doing so, it will enable Justice Connect to provide more efficient, flexible service to vulnerable members of society in need of free legal assistance, contributing to a fairer and more just Australian society. The project's innovations will be made freely available to the broader legal assistance community in Australia and overseas, to maximise societal impact. It will also place Australia at the forefront of the emerging high-impact area of Legal Natural Language Processing, and further showcase Australia's world-leading expertise in AI.								

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LP210200927 Toffoli, A/Prof Alessandro	The future of shipping: achieving autonomous navigation This project aims to develop autonomous decision systems and onshore control stations to support the design and operation of unmanned cargo ships. Blending observations, numerical models, virtual reality and machine learning, the project will develop algorithms for unsupervised navigation and embed these in an advanced ship simulator platform capable of responding to environmental conditions and optimising sea freight transport capabilities. The expected outcomes will enable the integration of automated controls in ships, including remote-control capabilities. This will support Australia's transition towards an autonomous shipping industry, delivering greater reliability, efficiency, productivity and safety.	93,095.00	182,807.50	169,525.00	79,812.50	0.00	0.00	525,240.00	PIVOT MARITIME INTERNATIONAL PTY LTD
National Interest Test Statement Over 90% of world trade is transported by sea and shipping is crucial to our imports and exports. In 2019-20, Australia recorded a trade surplus in excess of \$75 billion with exports growing 18% per year on average over the past five years. Cost-effective and reliable shipping is foundational to the competitiveness of our exports, yet it is lagging. Autonomous ships promise to revolutionise world trade within 20 years, delivering efficiency gains, greater safety, reduced costs and reduced environmental impact. This project leverages advanced research, virtual reality technology and machine learning to drive new developments for automated on-board ship navigational control systems. Artificial Intelligence will automate human control and optimise ship performance. Algorithms will be embedded in Pivot Maritime International's full-scale virtual reality simulation facility in Tasmania to enhance the design and operation of unmanned ships. The project is expected to position Australia at the forefront of autonomous shipping technology to support ongoing competitiveness and growth in Australia's export industries.									
The University of Melbourne		518,917.00	991,062.50	836,431.50	364,286.00	0.00	0.00	2,710,697.00	
Victoria		1,626,442.50	3,173,775.50	2,984,428.50	1,519,269.00	82,173.50	0.00	9,386,089.00	

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Western Australia									
Curtin University									
LP210200888	Universal transcriptome editing technologies	100,433.00	202,238.00	205,496.00	103,691.00	0.00	0.00	611,858.00	LOCANA BIOSCIENCES
Rackham, Prof Oliver	Ribonucleic acid (RNA) is life's most essential molecule – as no living cell or virus can function without it. Although RNA plays many critical roles in cells, from information transfer and regulation of gene expression to scaffolding macromolecular structures and catalysis, the current approaches to manipulate RNA for technological purposes are limited in many respects. This project brings together the scientists who were the first to discover a universal code for recognition of RNA by proteins and one of the world's leading RNA-focused biotechnology companies, Locana Biosciences, with the goal of providing robust and versatile tools to target RNA in diverse organisms.								
National Interest Test Statement									
This project will generate new biotechnological tools to target RNA and manipulate it in any cell or subcellular compartment. This will be of significant national interest through commercialisation of these technologies as well as the resulting engineered cells and chemical products as valuable commodities that will enhance the agricultural, mining, health and defence industries, which are the core strengths of Australia. These developments will make Australia economically stronger and significantly more competitive in the international markets while improving our security and well-being. The global gene editing market is projected to reach \$15.79 billion USD by 2027, according to a recent report by Emergen Research. The innovative technologies that will be generated by this project will position Australia to be internationally leading to generate increased income and employment. Trainees and researchers from this project will be the next generation of multidisciplinary scientists, able to apply powerful new technologies to future challenges facing Australia.									
LP210200907	Cryobiotechnology innovations to help fight the Myrtle rust pandemic	91,383.00	180,701.50	176,573.50	174,510.00	87,255.00	0.00	710,423.00	ROYAL BOTANIC GARDENS AND DOMAIN TRUST, DEPARTMENT OF BIODIVERSITY CONSERVATION AND ATTRACTIONS, AUSTRALIAN NETWORK FOR PLANT CONSERVATION INC, NATIVE PLANTS QUEENSLAND
Mancera, Prof Ricardo L	This project aims to mitigate the impacts of Myrtle rust, a disease affecting >380 Australian taxa in the family Myrtaceae, by developing advanced techniques to conserve susceptible species. The project is expected to generate the biotechnology advances necessary to conserve multiple taxa on the brink of extinction, including species important to our emerging native botanicals industry. Expected outcomes for the project include novel protocols for initiating and maintaining sterile tissue cultures and advanced techniques for cryopreservation of susceptible species, providing insurance against extinction and sources of ex situ material for re-establishing the species in safe sites and for research into disease resistance.								
National Interest Test Statement									
This project addresses the serious impacts of an invasive plant pathogen on Australia’s wild plant diversity and native plant industries. Myrtle rust, a disease caused by the pathogen Austropuccinia psidii, affects more than 380 species in the Myrtaceae family in Australia. It is listed as a Key Threatening Process for its impact on biodiversity under the Commonwealth Biodiversity Conservation Act 1999 and has already driven three species to the brink of extinction. Australia has an obligation to preserve these species under national and international conservation agreements, but the impact of the disease on seed production and new growth limits the effectiveness of conventional conservation techniques. This project aims to develop micropropagation and cryopreservation technologies to enable secure conservation of species requiring urgent and immediate intervention. The technologies developed will provide a source of material for re-establishing the species in safe sites and techniques for conserving and propagating disease-resistant individuals that may potentially be returned to the wild.									
Curtin University		191,816.00	382,939.50	382,069.50	278,201.00	87,255.00	0.00	1,322,281.00	

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(Columns 1 and 2) (Column 3)									
The University of Western Australia									
LP210200140	Alleviating herbicide damage to crops by using fulvate and manganese	83,999.00	173,070.00	181,015.50	91,944.50	0.00	0.00	530,029.00	TROFORTE INNOVATIONS PTY LTD
Rengel, Prof Zed	Glyphosate is a widely used herbicide, but its drift can cause growth depression in sensitive plants such as wheat by reducing uptake of metallic micronutrients, particularly manganese. In pot and field trials, this project aims to assess the alleviating potential of fulvate and manganese on growth and micronutrient uptake by wheat exposed to glyphosate drift. The influence of land management on the effect of these treatments will also be assessed. The underlying mechanisms will be characterised, eg. by determining metal speciation in soil and assessing soil microbial community composition. The outcome of this project will contribute to sustainable agriculture by giving land managers options to reduce glyphosate damage in sensitive crops.								
National Interest Test Statement									
Crop growth in many soils is limited by weed infestation. Therefore, farmers regularly apply herbicides such as glyphosate for controlling weeds. Glyphosate is one of the most widely used herbicides, particularly since the introduction of glyphosate-resistant crops such as canola, allowing its application during crop growth. However, glyphosate drift to neighbouring sensitive crops (such as wheat) can cause growth depression. One of the main reasons for this growth decline is reduced micronutrient uptake, particularly of manganese. The aim of this project is to characterise the potential of applying fulvate and manganese before or after exposure to glyphosate to reduce or eliminate damage in wheat. Additionally, the effect of land management (conventional fertilisation or biological based on biofertilisers) on alleviation of glyphosate damage by fulvate and manganese will be investigated. The outcome will provide new management options to reduce damage of herbicide drift to sensitive crops and contribute to profitable and sustainable crop production.									
LP210200613	Remote sensing techniques to infer fine-scale ocean surface currents	85,614.50	182,085.50	208,299.00	171,900.00	60,072.00	0.00	707,971.00	RPS AUSTRALIA WEST PTY LTD
Rayson, Dr Matthew D	This project aims to develop new technology for measuring ocean surface currents at unprecedented fine resolution using aerial imagery and theory that describes how surface waves are refracted by currents. The project will generate new knowledge on ocean surface current processes and variability across a range of scales, and critically, improve our understanding of surface current uncertainty through application of advanced statistical analysis techniques. The outcomes of this project will deliver Australian capability to leverage the enhanced spatial and temporal resolution of next generation Earth observations to directly benefit search and rescue, offshore industry operations, defence, and pollution response in Australian waters.								
National Interest Test Statement									
The Australian Blue Economy had an estimated worth of over \$80 billion in 2020 and has a projected value exceeding \$100 billion by 2025. Much of this economic activity is underpinned by effective engineering design and safe, yet efficient, operations. This project will develop new technology to measure and characterise surface currents in the ocean which are key inputs to both engineering design and operations across a broad swath of marine industries from offshore oil and gas, marine renewables, and sea search and rescue. Existing techniques to measure surface currents are either prohibitively expensive and/or lack the spatial and temporal resolution required. The technology developed through this project will enable ocean surface current measurements at an unprecedented fine scale using existing low-cost components that can be mounted on platforms ranging from drones to manned aircraft. This new technology, which can be applied by Australian and global marine service providers and industries, and will enhance marine design, operations, and safety at sea.									
The University of Western Australia		169,613.50	355,155.50	389,314.50	263,844.50	60,072.00	0.00	1,238,000.00	
Western Australia		361,429.50	738,095.00	771,384.00	542,045.50	147,327.00	0.00	2,560,281.00	
		5,182,861.00	10,377,849.50	9,940,468.50	5,438,363.50	774,577.00	81,693.50	31,795,813.00	