

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)			Total (\$)	Partner Organisation(s)
		2020-21 (Column 4)	2021-22 (Column 5)	2022-23 (Column 6)	2023-24* (Column 7)	2024-25* (Column 8)	2025-26* (Column 9)	(Column 10)	(Column 11)
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Australian Capital Territory									
The Australian National University									
LP200200472	Making hydrogen storage work for the new hydrogen economy	100,000.00	195,000.00	195,000.00	195,000.00	95,000.00	0.00	780,000.00	GLOBAL POWER GENERATION AUSTRALIA PTY LTD, HYDROGENIA PTY LTD, EVOENERGY, ILLUMINACT PTY LTD
Liu, Prof Yun	This project aims to develop an innovative Liquid Organic Hydrogen Storage technology and prove its energy industry potential. This project expects to expand and validate the performance, safety and scale-up potential of this new technology in an industrial context to promote the development of the hydrogen economy. Expected outcomes include providing practical, efficient, large-scale storage technology for use in intermittent renewable energy storage and hydrogen vehicle refuelling, and addressing legal/regulatory implementation issues. This should provide significant benefits in cultivating the emerging hydrogen energy industry, strengthening industrial competitiveness, enhancing Australia's fuel security and protecting the environment.								
	National Interest Test Statement								
	This project aims to solve critical safety, efficiency and scale-up problems in Australia's capacity to transform its energy infrastructure to meet near-future requirements. Australia is transitioning from carbon-rich fossil fuel energy production to renewable energy and associated energy vectors (such as hydrogen) to guarantee energy security, meet international emissions reduction commitments and to gain comparative export advantage from the decreasing price of renewables. Hydrogen is an important renewable energy vector but it requires large-scale, safe and low cost storage and transport. Providing suitable storage and transport technology would fill a key capability gap, reduce the supply cost of hydrogen fuels, underpin the roll-out of safe, large-scale hydrogen refuelling infrastructure, and accelerate the transition to zero-emission hydrogen for heavy transport and industry. This work creates a foundation to place Australia at the forefront of the development of innovative hydrogen storage, making our energy industry globally more competitive and diversifying our energy export capabilities.								
	The Australian National University	100,000.00	195,000.00	195,000.00	195,000.00	95,000.00	0.00	780,000.00	
	Australian Capital Territory	100,000.00	195,000.00	195,000.00	195,000.00	95,000.00	0.00	780,000.00	

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New South Wales									
Macquarie University									
LP200200688	<b>Restoring diverse native vegetation using drone-based precision seeding</b>	52,907.00	126,729.00	149,877.50	145,096.00	69,040.50	0.00	543,650.00	AIRSEED TECHNOLOGIES PTY LTD, ROYAL BOTANIC GARDENS AND DOMAIN TRUST
Gallagher, Dr Rachael V	This project aims to make drone technology a viable solution for scaling up the restoration of native vegetation on degraded land. By integrating new research in plant ecology, microbiology and environmental economics the project aims to fill key knowledge gaps about the viability and application of drones in restoration. Expected outcomes are world-first research into the delivery of beneficial soil microbes using drones and the first assessment globally of the cost-effectiveness of drone restoration utilizing data from spatial analysis and extensive field trials. This should provide wide-ranging benefits for local land managers restoring remote degraded land and aid in reversing the cumulative effects of habitat loss on biodiversity.								
	<b>National Interest Test Statement</b>								
	The aim of this project is use cutting-edge interdisciplinary research to create new solutions for landholders looking to cost-effectively restore their land using drone technology. Drones have now emerged as a powerful tool for accessing remote and difficult landscapes, including those affected by bushfires. This project will equip drones with soil-encased pods containing seeds and their essential microbes and be the first to trial this innovative method for re-establishing bushland in degraded areas. Economic expertise will be used to assess the cost-effectiveness of drone seeding and community masterclasses held to introduce this exciting new research to landholders and national environmental programs, such as LandCare. This project aims to simultaneously benefit Australia's environment, society, and economy through research which can enhance biodiversity, improve the livelihoods of landholders and underpin new market opportunities in carbon farming and sequestration.								
LP200200951	<b>Scaling Up Satellite Communications for the Internet of Things</b>	65,000.00	132,500.00	135,000.00	67,500.00	0.00	0.00	400,000.00	MYRIOTA PTY LTD
Collings, Prof Iain	The Internet of Things (IoT) is a revolution in sensing and automation that is becoming vital for industries including farming and mining. However, in remote areas, it is especially challenging to connect the large numbers of devices needed. This project will develop novel signal processing and communications approaches to deliver high quality data services to vast numbers of remote IoT devices, distributed over continental scales connected via low earth orbit (LEO) satellite constellations. It will provide the tools for LEO satellite service providers to dimension their networks and assist IoT providers to scale their remote sensor networks and IoT deployments, with ever increasing demand on the limited satellite bandwidth.								
	<b>National Interest Test Statement</b>								
	The Internet-of-Things (IoT) is expected to play a pivotal role in transforming life, business and the global economy. Connecting physical objects and machines to the internet can streamline business processes and has been predicted to provide up to a 20% reduction in costs through remote monitoring, control and predictive maintenance of critical business assets. This project will develop new algorithms and a software package that will have commercial value, enabling the connection of vast numbers of remote IoT devices over large areas to low earth orbit satellites. This project therefore presents a significant benefit for Australia as about 70% of our land mass is a mobile black spot. Adoption of IoT is forecast to contribute tens of billions of dollars per annum to the Australian economy, with benefits to the agriculture, mining, environmental monitoring, and land and ocean transport industries. This project will partner with Myriota to characterise the scalability of its satellite IoT system and optimize the quality of data delivered to end users, with economic, commercial and environmental benefits.								
	Macquarie University	117,907.00	259,229.00	284,877.50	212,596.00	69,040.50	0.00	943,650.00	

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Southern Cross University									
LP200200790	<b>Transforming residues from meat processing into engineered soil amendments</b>	95,338.50	172,214.50	159,915.00	83,039.00	0.00	0.00	510,507.00	DEPARTMENT OF REGIONAL NSW, NORTHERN CO-OPERATIVE MEAT COMPANY LIMITED
Erler, A/Prof Dirk V	The aim of this project is to transform organic residues from meat processing into agricultural soil amendments that actively improve nutrient retention and reduce nitrous oxide (a potent greenhouse gas) emissions. Current disposal and treatment options for meat processing residues are economically and environmentally unsustainable. In this research, a modified hydrothermal carbonisation process will be developed to transform organic residues into novel hydrochars. The influence of these hydrochars on soil nutrient retention and nitrous oxide production will then be assessed using stable isotope tracing, genetic characterisation, and numerical modeling. The project will reduce the economic and environmental costs of organic waste disposal.								
<b>National Interest Test Statement</b>  Red meat processing in Australia is a \$17.3 billion-dollar industry that employs thousands of workers across rural and regional centres. However, the industry is facing significant challenges including growing volumes of organic residues (e.g. paunch, gut contents, treatment sludges) that are an economic and environmental liability. A typical medium sized meat processing facility can generate over 4000 t per annum of these organic residues which costs the sector some \$75 M in annual disposal costs. The current industry standard is to compost organic residues and apply them to land, but compost does not retain soil nutrients and can promote greenhouse gas emissions. This research aims to develop a new technology that can transform the organic residues from red meat processing into engineered hydrochars. These hydrochars will be customised to store soil nutrients, improve plant growth, and actively mitigate greenhouse gas emissions. The outcomes of this project will reduce disposal costs, improve agricultural productivity, and reduce greenhouse gas emissions, all of which will benefit the Australian economy.									
LP200200910	<b>Unravelling how aquatic coastal networks regulate nitrogen removal</b>	120,576.00	242,030.00	231,779.50	110,325.50	0.00	0.00	704,711.00	HEALTHY LAND AND WATER LTD
Eyre, Prof Bradley D	The aim of this project is to determine the nitrogen removal pathways of the coastal zone using a number of innovative field and modelling approaches. Little is known about how the complex coastal landscape controls trade-offs that maximise nitrogen removal but minimise nitrous oxide (a potent greenhouse gas) emissions. The outcomes of this study will significantly advance our understanding of the coastal zone in regional and global nitrogen budgets. This will provide significant benefits such as a new science-based quantitative framework to facilitate best practice management to reduce terrestrial nitrogen loads and associated downstream impacts such as eutrophication, and reduce nitrous oxide emissions and associated global warming.								
<b>National Interest Test Statement</b>  Nitrogen is essential for the functioning of aquatic ecosystems, supporting growth of algae and plants that provide food and habitat for other species. Human activity in coastal regions can cause aquatic nitrogen concentrations to become unhealthy, promoting algal and plant overgrowth which in turn reduces the available oxygen, making it less habitable for species like fish and crustaceans. The aim of this project is to identify the pathways of nitrogen removal from the coastal zone. This will facilitate better management of coastal regions to reduce the concentrations of nitrogen and its impact downstream, and emissions of nitrous oxide (a potent greenhouse gas formed from nitrogen), both of which have economic consequences. It will support preservation of the natural beauty and rich biological diversity of Australia's coast and the economic benefits associated with the multi-billion dollar tourism and fisheries industries.									
Southern Cross University		215,914.50	414,244.50	391,694.50	193,364.50	0.00	0.00	1,215,218.00	

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The University of New South Wales									
LP200200220	Utilising plant-sediment-feedbacks to enhance seagrass restoration	102,735.00	225,597.00	219,264.00	96,402.00	0.00	0.00	643,998.00	DEPARTMENT OF PRIMARY INDUSTRIES - NSW, DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION, THE SINGAPORE CENTRE ON ENVIRONMENTAL LIFE SCIENCES ENGINEERING
Gribben, A/Prof Paul E	This project aims to investigate the role of sediment microbes in promoting the health of threatened seagrass species across Australia. This project expects to create new knowledge for enhancing restoration success for seagrasses by integrating macro and micro-ecology, environmental genomics, plant ecology and ecosystem function (e.g. nutrient and biogeochemistry cycling). Expected outcomes are new knowledge to enhance seagrass restoration utilising sediment microbes that can be integrated into management and policy. This project should provide significant benefits, such as the development of key strategic alliances to enhance management of seagrasses, and the ecosystem services, and economic and social benefits they provide.								
National Interest Test Statement									
Around Australia, an estimated 5 million hectares of seagrass beds in coastal and estuarine waters provide critical environmental (wave and storm buffering, enhancing water quality) and socio-economic services (support recreational and commercial fisheries) with a total estimated value of \$95 Billion y-1. However environmental degradation is resulting in rapid seagrass meadow decline; approx. 110 km2/yr since 1980. The economic appraisals for restoration of 1 ha of seagrass bed revealed a return of \$19,000 ha-1 y-1. This proposal aims to put Australia at the forefront of global restoration efforts for seagrasses by harnessing the power of microbes to enhance restoration efforts which are often ineffective. Our proposal will allow the development of more effective management strategies for seagrasses by the agencies charged with managing Australia’s marine estate. Intended benefits of this proposal are increased environmental and socio-economic sustainability for the communities and commercial enterprises that rely on the services provided by seagrass ecosystems.									
LP200200719	Remembering Sydney’s Post-War Greek Neighbourhoods, 1949-1972	31,515.00	65,431.00	72,974.50	39,058.50	0.00	0.00	208,979.00	STATE LIBRARY OF NSW FOUNDATION, THE GREEK ORTHODOX COMMUNITY OF NEW SOUTH WALES AS THE OPERATOR OF A PBI
Doumanis, A/Prof Nicholas	The project aims to revise our understanding of how migrants integrated into post-war Australia by examining everyday life histories as mediated through individual and social memory. Taking a cluster of Sydney’s post-war Greek neighbourhoods as its case studies, it will document how Greek migrants formed friendships and enmities, exchanged information and rumours, and, more generally, got on with the process of settlement. It will construct a corpus of oral histories and primary materials, archived in the State Library of NSW, that will reveal to researchers, members of the public and community stakeholders how Sydney’s Greeks contributed to the city’s social and cultural remaking, and how they, in turn, were remade socially and culturally.								
National Interest Test Statement									
The partnership involving UNSW, the State Library of NSW and the Greek Orthodox Community of NSW will ensure the creation of a long-term and publicly accessible collection of resources that will reveal how the cultural profile of Australia’s largest city was dramatically altered in the post-war years by immigration. The planned on-line exhibition, community events, scholarly symposia and related publications will facilitate new insights concerning the precise ways in which ethnic groups inhabit and become part of a locale. They will also establish protocols for facilitating the creation of mutually beneficial relationships involving significant public institutions such as the State Library of NSW, the tertiary sector and culturally and linguistically diverse communities.									

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LP200200979	<b>Indoor Photovoltaics Enabled by Wide-Bandgap Perovskite Quantum Dots</b>	74,151.50	149,747.50	153,403.50	77,807.50	0.00	0.00	455,110.00	GREEN ENERGY INSTITUTE
Huang, A/Prof Shujuan	<p>This project aims to develop a high-efficiency indoor photovoltaic (PV) technology to provide reliable low-cost power in the multi-billion dollar "Internet of Things" (IoT) market. There are currently no devices that meet the requirements for maximum operating efficiency under indoor illumination. We propose to solve this problem by fabricating PV cells using colloidal perovskite quantum dots that offer class-leading stability and band gap tunability across the required range, enabled by quantum confinement. The outcome is the development of integrated self-powered IoT devices potentially impacting Advanced Manufacturing growth in Energy, Cyber Security, Food and Agribusiness, as all of these will ultimately rely on networked smart devices.</p> <p><b>National Interest Test Statement</b></p> <p>Billions of wireless networked sensors are to be installed inside buildings in the near future, leading to an Internet of Things (IoT) designed to monitor and control our manufacturing, agricultural and energy systems. A supply of reliable and low-cost autonomous power is urgently needed to enable this smart network, the current use of batteries places significant constraints on IoT operation. To capture the large economic, environmental and security benefits of developing smart networks in Australia, we will build high performing photovoltaic (PV) cells that can harvest indoor illumination to power IoT devices. We will adopt an inter-disciplinary approach to develop nanoscale materials integrated into devices that meet the operation requirements under the indoor spectrum. Here, conventional silicon PV cells perform poorly. The devices are low-cost and made using low-embodied energy processes, suitable for massive deployment of next generation IoT systems. This innovation will directly contribute to Australia's rapid growth in Advanced Manufacturing, Energy, Cyber Security, Food and Agribusiness technologies.</p>								
LP200201026	<b>Plant plasters: Efficient spray micro-coatings for plant delivery</b>	51,155.50	104,525.50	108,951.50	55,581.50	0.00	0.00	320,214.00	JOY HARVEST HOLDING PTY LTD
Spicer, A/Prof Patrick T	<p>This proposal will study and apply recently-discovered methods of strongly attaching beneficial chemicals to plant leaves, stalks, and fruit. The materials have an unusually good ability to stick to crop plants and deliver herbicide or pesticide active ingredients more efficiently than standard additives, without toxicity. Recent findings have shown significant health risks from commercial herbicide additives and their run-off into vulnerable ecosystems like the Great Barrier Reef. This project will explain the unusually effective, but simple, adhesion and delivery performance, incorporate the new additives into commercially-relevant formulations for our industrial partner, and work to deliver the materials at relevant manufacturing scales.</p> <p><b>National Interest Test Statement</b></p> <p>Agriculture is a critical, enabling Australian industry. Maintaining the health of the system, its workers, and consumers is essential to maintaining and expanding the quality of the current state of affairs. This work will speed development of a novel additive for spray herbicides that reduces cost, enhances efficiency, and prevents toxic run-off into the environment. It will also enable our PO's work to develop an understanding of how the additive affects product stability and formation of a critical film for ingredient protection in dry conditions. Knowledge of key variables like additive particle size and length will enable scale-up of the production process, making manufacture viable and allowing entry of this material into the Australian market first. If successful, the work will enable an Australian small business to develop a novel, sustainable product for the Australian market and beyond as well as contributing to lower levels of toxic chemical usage in the environment.</p>								

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LP200201073	<b>A Scenario Planning Tool - Improving the Bikeability of Our Cities</b>	65,820.00	133,851.50	68,031.50	0.00	0.00	0.00	267,703.00	TRANSPORT FOR NSW, WOLLONGONG CITY COUNCIL, WOLLONGONG 2022 LIMITED, PENRITH CITY COUNCIL, NSW OFFICE OF SPORT
Pettit, Prof Christopher J	<p>This project aims to produce a data framework and interactive planning support tool, in collaboration with Australian government agencies, to explore various bicycle infrastructure scenarios and assess their potential impacts. This will be a game changer for the transport sector, as the lack of data-driven approaches focused on active mobility has restricted the development of evidence-based business cases for cycling infrastructure investment, when compared to motorised transport. Benefits from this project to the nation include more informed and optimised investment in cycling, increase in cycling modal share, reduction of emissions and congestion, and improvement of safety and health outcomes from cycling.</p> <p><b>National Interest Test Statement</b></p> <p>Only 1% of Australians cycle to work. Large costs to the Australian economy are associated with this travel pattern: (i) traffic congestion will cost \$37 billion per annum by 2030; (ii) estimates of the cost of impacts on health of air pollution from motor vehicles ranged from \$11 to \$24 billion per annum in 2017; (iii) the burden of physical inactivity on Australian economy was estimated in 2013 as \$805 million. In response, Australian governments (national, state and local) are advocating for increased cycling modal share, particularly through improved infrastructure. However, investment in cycling in Australia has been minimal (1.0% of the investment in motorised transport in 2016). This project will develop an interactive map-based tool that allows planners to design and assess cycling infrastructure and networking proposals, and to support evidence-based business cases for cycling infrastructure investment. In addition to reducing the economic costs of current travel patterns, this will improve the resilience, health and sustainability of our cities and society.</p>								
	<b>The University of New South Wales</b>	325,377.00	679,152.50	622,625.00	268,849.50	0.00	0.00	1,896,004.00	
<b>The University of Newcastle</b>									
LP200200300	<b>Combustion Modelling and Control for Biomass Fuelled Boilers</b>	40,000.00	80,000.00	40,000.00	0.00	0.00	0.00	160,000.00	WILMAR SUGAR PTY LTD
Goodwin, Prof Graham C	<p>This Project aims to improve the operation of bio-fuelled boilers in the sugar industry by using novel approaches to modelling and control of the combustion process. In the sugar industry, sugarcane residue is used as biofuel for boilers. The steam from the boilers is used to crystallise sugar and generate electricity, which is used to power machinery and is also exported to the grid. However, due to poor fuel consistency and poor combustion conditions, critical problems arise that hinder production. Expected outcomes include: improved sugar production, safer operation of boilers, reduced downtime, and better electricity co-generation. This will provide significant benefits to sugar manufacturing and biofuel energy generation in Australia</p> <p><b>National Interest Test Statement</b></p> <p>The Project directly contributes to Australia's national interests by developing knowledge that will improve sugar mill operation and electricity co-generation from biofuels. Sugar is Australia's second largest export crop with a total annual revenue of almost \$2 billion, making Australia the second largest raw sugar exporter in the world. In addition, the sugar industry generates more than 40,000 local jobs, directly and indirectly. Therefore the Project has significant economic benefits to Australia. Wilmar Sugar is the largest renewable energy company in Australia. The sugarcane residue is used as fuel to generate electricity, which is used to power the machinery in the sugar mill, but is also exported to the electricity grid. Wilmar Sugar produces approximately 20% of the total renewable energy generated in Queensland. Therefore the Project has significant environmental benefits to Australia. Furthermore, the project has the potential to be beneficial, not only to Wilmar Sugar and other Australian industries, but will also give Australia a marketable economic advantage.</p>								

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LP200201066 Hodge, Dr Paul B	<b>Juungambala: More-than-human agreement making with/as Gumbaynggirr Country</b>  This project aims to develop & model Indigenous-led land practices, protocols & more-than-human agreements between Gumbaynggirr Custodians, non-Gumbaynggirr people & Country to enhance Australia's capacity to respond to disruptive environmental change through Juungambala, setting things right. This project expects to generate new knowledge in Indigenous-led, Country-led environmental practice by working with inter-species communications (koalas, whales, plants) & innovative songline mapping. Intended outcomes include enhanced stakeholder capacities, intercultural & intergenerational learnings. Benefits include enriched relationships with Country, nurturing of songlines & biodiversity corridors, & development of environmental best practice.	147,887.50	295,924.50	295,115.50	295,115.50	234,999.50	86,962.50	1,356,005.00	GUMBAYNGGIRR JAGUN ABORIGINAL CORPORATION, JALIIGIRR BIODIVERSITY ALLIANCE INC, BELLINGER LANDCARE INC
	<b>National Interest Test Statement</b>  Ongoing disparities between Indigenous and non-Indigenous Australians, reflected in negligible advances in 'closing the gap' indicators, remain stark. Yet, there is growing community-wide recognition that to 'do better' requires new approaches—ways of knowing, doing and being—that take heed of Custodians and Country in ways that make explicit the interrelated social, economic, environmental and cultural factors underpinning these disparities. Industry and stakeholder benefits of heeding this call are starting to emerge but the mechanisms and processes to build and nurture long-term respectful and mutually beneficial understandings and ethical protocols, in the form of agreements between Indigenous and non-Indigenous Australians for environmental change, remain elusive. This project aims to strengthen environmental capacities by producing best practice guidelines and processes to enhance opportunities for social, economic, environmental and cultural benefit built through shared values that will heal Country and communities.								
LP200201079 Yi, A/Prof Jiabao	<b>Removal and degradation of microplastics using halloysite nanocomposite</b>  The project aims to utilize halloysite clay combined with novel highly magnetized nanoparticles for the removal and degradation of microplastics in the contaminated water system. The project expects to fabricate cheap and environmentally-friendly materials using innovative chemical synthesis and surface modification for adsorption and decomposition of microplastics utilizing both high surface area of halloysite nanotubes and catalytic activity of transition metals. This project will facilitate collaboration between multidisciplinary researchers and a vibrant group of industrial participants to advance next-generation composite materials for water treatment and ensure the supply of clean water for healthy living.	58,000.00	116,000.00	118,000.00	60,000.00	0.00	0.00	352,000.00	MINOTAUR EXPLORATION LTD, ANDROMEDA METALS LIMITED
	<b>National Interest Test Statement</b>  The contamination of drinking water and wastewater can cause a significant threat to public health. Around 29 % of the world population does not have access to safe drinking water. The ubiquitous presence of microplastics in water has triggered intensive discussions on possible implications for human health. Recently, WHO recommends drinking water suppliers and regulators prioritize removing emerging pollutants such as pathogens, chemicals and microplastics. However, advanced technologies for efficient removal of MPs remain mostly underdeveloped. Herein we propose to develop a functionalized natural clay-based absorption and degradation technology for the treatment of microplastics and associated contaminants in water. The fabricated nanocomposite is simple to apply, eco-friendly and low cost. The research outcome has the potential to remove not only the microplastics but also other serious pollutants, which will ensure the supply of clean water for the improvement of people's health, reducing the cost of contaminated water related disease, saving money for Australia.								
	<b>The University of Newcastle</b>	245,887.50	491,924.50	453,115.50	355,115.50	234,999.50	86,962.50	1,868,005.00	

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The University of Sydney									
LP200200615	Catalytic production of health food additives from crustacean wastes	54,100.50	112,008.00	119,593.50	61,686.00	0.00	0.00	347,388.00	SUN BIOTECHNOLOGY PTY LTD
Huang, A/Prof Jun	Cost-effective production of new synthetic amino acids as value-added food additives from crustacean wastes is vital for waste recycling and a sustainable economy. This project will develop a unique catalytic system for the selective conversion of waste-derived compounds into tailor-made products. Advanced in situ spectroscopic techniques will be employed to establish the structure-reactivity relationship of working catalysts and thereby manipulate the key factors governing the activity/selectivity. Such cutting-edge knowledge gained is crucial for optimising process efficiency and resource utilisation, which is essential for the success of the biorefining industry and a more environmentally-friendly chemical and food economy in Australia.								
	National Interest Test Statement								
	New nano-catalysts and integrated catalytic system will be developed for the selective conversion of crustacean wastes to high value added food additives as an alternative to reuse wastes and promote the economics of waste treatment. This proposal advances the prospect of developing highly process-efficient and environmentally-friendly approach for the biorefinery via completing multiple reaction steps synergistically in one catalyst system. It will reinforce Australian research leadership in catalysis and biorefinery, addressing not merely the national economic development, but the environmental policy to reduce net waste deposition. The success in the biorefinery will bring new jobs and infrastructure that will offer great economic and social benefit as well as enhance Australian science and technology in sustainable manufacturing.								
LP200200755	Sparkling Imagination Education: Transforming inequality in schools	68,331.00	149,398.00	167,965.50	86,898.50	0.00	0.00	472,593.00	AIME MENTORING, SOCIAL VENTURES AUSTRALIA LIMITED
Harwood, Prof Valerie	This project will produce an Imagination Education Pedagogical Framework for use by teachers in schools. Imagination is recognised as beneficial for diverse groups of young people who experience educational inequality. This collaboration will support access to prominent industry insights on methods for using imagination practices to enhance educational equity. Using co-design with AIME and Social Ventures Australia, it will investigate how these insights can be translated to school contexts to enrich Australian schooling in an environment under intensifying external pressures. The outcomes of this project will support national education agendas for embedding twenty-first century skills of imagination in Australian schooling.								
	National Interest Test Statement								
	This Linkage project responds to the challenge of how schools can provide innovations in imagination education to address the educational inequality that is experienced by some young Australians, including Aboriginal and Torres Strait Islander young people, those from low socio-economic. status (LSES), young former refugees, and those living in regional and remote communities. Since it has been shown that young people can be assisted in their education by sustained experiences with imagination practice, schools are considered key sites for engaging with imagination. The project will make important links with Industry Partner AIME, a leading Australian not-for-profit Indigenous-led mentoring program that has developed novel approaches to youth mentoring that emphasise imagination and with Social Ventures Australia (SVA) a not-for profit organisation focused on supporting novel programs to address inequality to formulate a new Imagination Education approach that can richly and sustainably engage imagination in Australian schools.								



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LP200200806	<b>Polymer nanofibres for advanced paint formulations</b>	78,900.00	157,300.00	157,050.00	78,650.00	0.00	0.00	471,900.00	DULUXGROUP (AUSTRALIA) PTY LTD
Hawkeitt, A/Prof Brian S	Surface coatings seal, strengthen, and decorate the majority of surfaces in the building industry—a \$72 billion market. Despite their importance, advances in paint science have only been incremental and a truly robust and water resistant paint coating has yet to be developed. Dulux Group Australia and the University of Sydney will use polymer nanofibres as additives to radically redesign architectural coatings, with the goal to drastically increase their durability. The partnership will bring a technological breakthrough that will lead to less disruption for the environment, and important economic and technological benefits for Australia.								
	<b>National Interest Test Statement</b>								
	The goal of this project is to create an advanced nanofibre technology to be used in the manufacturing of high-performance waterborne paints on a large scale. This breakthrough will enable the creation of cost effective paint that will have durability, self-healing ability and more efficient use of raw materials than previously imagined. The research will bring economic benefits to Australia through commercialisation opportunities, environmental benefits through the reduced need for replacement of paint coatings and reduced environmental disruption for the extraction of rutile, and cultural benefits in terms of advanced training in advanced nanomaterials research for the early career researchers and students involved. The resulting scientific insights and cutting edge nano-technology are expected to enable follow-on breakthroughs in many industries.								
	<b>The University of Sydney</b>	201,331.50	418,706.00	444,609.00	227,234.50	0.00	0.00	1,291,881.00	
<b>University of Technology Sydney</b>									
LP200200779	<b>Decarbonising built environments with hempcrete and green wall technology</b>	35,106.00	77,212.00	80,212.00	38,106.00	0.00	0.00	230,636.00	AUSTRALIAN HEMP MASONRY PTY LTD
Castel, Prof Arnaud	This project aims to develop an integrated prefabricated building panel solution combining green wall and hempcrete technology to address environmental problems associated with the usage of carbon intensive construction materials, dense urbanisation, climate change and biodiversity. Innovation in hempcrete technology consist in using low carbon options including alkali-activated binders and biomineralization technology, glass waste replacing natural sand. Hempcrete green wall panels will be design to be carbon positive, improve the thermal performance of buildings, provide better acoustic insulation, reduce the risk of mould proliferation, control indoor humidity and air quality and improve indoor thermal comfort.								
	<b>National Interest Test Statement</b>								
	The integrated prefabricated building panel solution, combining green wall and hempcrete technology to be realised through this project, is anticipated to deliver significant environmental benefits critical to Australia delivering on its 2030 emissions reduction targets. The development of carbon positive construction materials and improved resource efficiencies through reduced resource intensity of building products will reduce appetite for fossil fuel-based products, while mitigating environmental problems associated with dense urbanisation. Hemp fibre biomass farming will drive uptake of regenerative farming practices, reducing landfill burden and resulting in delivering higher rates of carbon sequestration and increased carbon banking in infrastructure. The project will also deliver societal benefits associated with improved thermal and acoustic performance and comfort in buildings, and lower occupational energy costs. Improved air quality through elimination of mould will reduce allergies and drive down the significant healthcare costs associated with poor quality housing and workplaces.								

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)			Total (\$)	Partner Organisation(s)
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LP200200915	<b>Field Data based Predictive Maintenance and Enhanced Track Design Procedure</b>	121,744.00	240,261.00	235,104.00	116,587.00	0.00	0.00	713,696.00	SYDNEY TRAINS, SMEC AUSTRALIA PTY. LIMITED, BENTLEY SYSTEMS PTY. LIMITED, BESTECH AUSTRALIA PTY LTD
Indraratna, Prof Buddhima N	<p>Providing improved railroad design and maintenance solutions with accurate and timely assessment of track performance is vital to reduce the disruption of services, excessive maintenance costs and degradation over time. This project aims to develop a predictive maintenance model based on extensive wayside measurements to monitor and predict the nature of track instability. This will also be supplemented by mathematical modelling to corroborate large-scale laboratory observations with past and real-time field monitoring records. This project will deliver tangible strategies and tools to increase track longevity and assist decision-makers in planning and prioritising corrective maintenance to ensure improved safety and passenger comfort.</p> <p><b>National Interest Test Statement</b></p> <p>Specific National Benefits: Considering the agriculture and mining sectors, the lack of capacity to maintain transportation infrastructure to support enhanced passenger mobility and efficient freight movement (i.e. connecting ports with the regional and rural areas) is of grave concern. No State could fulfil the requirements for attaining even a C-rating for the rail sector compared to the expected standards of the developed world (Engineers Australia 2010). By examining large data sets acquired through field and large-scale laboratory studies, this project aims to increase the current level of understanding in critical areas of uncertainty and risk, and to provide improved engineering solutions for design and maintenance of railways. The outcomes will minimise rail infrastructure upgrading costs, while increasing the productivity of our mining and agriculture sectors which heavily depend on fast and efficient rail networks.</p>								
LP200200926	<b>Solid-state lithium batteries using phase-stabilised electrolytes</b>	76,896.50	153,793.00	153,793.00	76,896.50	0.00	0.00	461,379.00	ADVANCED BATTERY TECHNOLOGIES, DLG BATTERY CO. LTD.
Wang, Prof Guoxiu	<p>This project aims to develop advanced lithium batteries using multifunctional phase-stabilised solid-state electrolytes. Solid-state lithium batteries are the ultimate end goal of the battery industry, owing to their unique features including no fire hazard, high energy and power densities, and long service lifespan. By combining nanofabrication and novel electrolyte materials, the project expects to boost the performances of solid-state lithium batteries, establishing them as an advanced energy technology to meet future energy storage and conversion needs. The newly developed battery technology will be widely used for portable electronics, electric vehicles and smart electricity grids that integrate renewable energy sources.</p> <p><b>National Interest Test Statement</b></p> <p>It is well recognised that global warming and climate change are mainly caused by the burning of fossil fuels for energy. This project is expected to deliver new solid-state electrolyte materials and technologies for developing advanced solid-state lithium batteries that can reduce the reliance on fossil fuels. Solid-state lithium batteries will represent a quantum leap in battery technology, with a potential to achieve maximum energy density and operational safety for mobile electronic devices, electric vehicles and electrical energy storage for the fast-growing renewable energy industry. The proposed research will develop cutting-edge technologies in materials science, electrochemistry and nanofabrication. The outcomes of this project will therefore create innovations in clean energy, attain a secure and reliable low-emission energy future, open new industries, and generate job opportunities.</p>								
	<b>University of Technology Sydney</b>	233,746.50	471,266.00	469,109.00	231,589.50	0.00	0.00	1,405,711.00	

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)			Total (\$)	Partner Organisation(s)
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(Columns 1 and 2) (Column 3)									
University of Wollongong									
LP200201035	Efficient Multi-key Homomorphic Encryption and Its Applications	49,500.00	105,949.00	116,449.00	60,000.00	0.00	0.00	331,898.00	VIVO GLOBAL INVESTMENT PTY LTD, WUBEI DESIGN INTERNATIONAL PTY LTD
Susilo, Prof Willy	Multi-key homomorphic encryption (MKHE) is a key technology that functions to allow multiple users to supply their private input for collaboration in the cloud while keeping the user data confidential. Unfortunately, it is very difficult to obtain efficient MKHEs. This project aims to overcome this challenge by enabling novel efficient MKHEs. The expected outcomes of this project are to develop innovative cryptographic technologies which realise efficient MKHEs, together with their cryptographic libraries and practical applications in solving industry problems. This will provide direct economic benefits to Australian industry through the enablement of advanced technologies and low-cost business solutions which are developed in Australia.								
National Interest Test Statement									
The use of the public cloud for data storage has expanded rapidly in Australia, bringing direct benefits to Australian industries by lowering costs and increasing productivity. However, ensuring data security while still allowing data processing remains a challenge, particularly when multiple users' contributions are involved. This project aims to develop novel technology to overcome this challenge and allow the cloud to act as a secure collaboration platform. Such a platform will enable and multiply innovation and economic creativity, opening up a whole new range of opportunities for Australian industry to collaborate in the development of advanced technology products and services while protecting their intellectual property. This in turn will facilitate new synergies and value-add across traditionally siloed industrial sectors. Significant and necessary updates to Australian cybersecurity standards will be identified and research training for a new generation of cyber-security experts delivered through research collaboration between Australian and international participants.									
LP200201096	Functional topological materials for superior thermoelectric applications	65,258.50	132,517.00	135,017.00	67,758.50	0.00	0.00	400,551.00	AZURE MINING TECHNOLOGY PTY LTD, NATURAL TECH IMPORTS PTY LTD, AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION
Wang, Prof Xiaolin	The efficient generation of electricity from waste heat remains a significant technological challenge, hampered by the absence of efficient materials for conversion. This project aims to develop functionalized topological materials with ultra-high thermoelectric and photothermal performance for harvesting heat into electricity. A recent breakthrough in device efficiency will be a game-changer and position Australian academics and industries at the forefront of next generation of renewable power generation and refrigeration products. The outcomes will provide an advantage to end-users and industry, and will open a new market for advanced thermoelectric devices in multidisciplinary fields, communities and emerging industries.								
National Interest Test Statement									
The potential to create electricity from waste heat in Australia has not been tapped significantly due to the lack of suitable waste-heat-to-electricity conversion technology. Thermoelectricity is one of the most promising technologies for waste heat conversion, but the biggest challenge has been to find a reliable, high performing and cost-effective thermoelectric material that can work at a broad range of temperatures. The successful implementation of this project will provide the impetus for manufacturing, mining, renewable energy and many other organisations to adopt strategies for the sustainable adoption of clean energy-conversion technology across the sector. It is clear that the community and end-users stand to benefit greatly from the adoption of highly efficient energy-conversion technology. At a broader level, the project will aid the national interest to meet future economic, social and climate requirements around emissions, worker safety and health while substantially improving the productivity and enabling reduced operational costs.									
University of Wollongong		114,758.50	238,466.00	251,466.00	127,758.50	0.00	0.00	732,449.00	
New South Wales		1,454,922.50	2,972,988.50	2,917,496.50	1,616,508.00	304,040.00	86,962.50	9,352,918.00	

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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## Queensland

### Griffith University

LP200200669	<b>Developing a transformative tourism model for the South Pacific</b>	69,911.00	147,444.50	156,504.00	78,970.50	0.00	0.00	452,830.00	THE NATURE CONSERVANCY, ALTERNATIVE COMMUNITIES TRADE IN VANUATU, AGAPE IN ACTION, MAMANUCA ENVIRONMENT SOCIETY, VATUVARA FOUNDATION, SECRETARIAT OF THE PACIFIC REGIONAL ENVIRONMENT PROGRAM, PACIFIC TOURISM ORGANISATION, TE IPUKAREA SOCIETY, KORERO O TE ORAU
Fleming, Prof Christopher M	In a South Pacific context, this project aims to develop and disseminate a model of tourism that balances economic, social and environmental objectives. In so doing, this project expects to create new knowledge in tourism and sustainable development, while advancing methods of research applicable to diverse stakeholders and settings. Expected outcomes include an enduring community of practice, and a suite of tools, guides and policy briefs for those seeking to promote tourism that enables genuine sustainable development. In addition to improving outcomes for people and places in a region where tourism is a vital industry, this project should support Australia's engagement with the Pacific, while promoting peace and prosperity in the region.								

#### National Interest Test Statement

The Australian Government is committed to a stable and prosperous Pacific region, and enhancing engagement with Pacific Island nations is one of Australia's highest foreign policy priorities. This engagement is focussed on addressing broad-ranging challenges faced by the region, as identified by Pacific leaders and communities themselves. These challenges include responding to climate change and natural disasters, sustaining economic growth, and improving health and education outcomes. This project supports these foreign policy efforts by forming a partnership between Australian-based researchers and nine Pacific-focussed non-government organisations with the objective of developing and disseminating a model of tourism that balances financial returns with broader social and environmental objectives. In so doing, the project will deepen our engagement with the region, improve outcomes for people and places, and promote peace and prosperity in the region.

LP200200758	<b>Portable instrument for quantification and genotyping of Cryptosporidium</b>	64,617.00	133,098.00	121,148.00	52,667.00	0.00	0.00	371,530.00	ADVANCED UNIVERSAL DIAGNOSTIK , SEQWATER, ALS WATER RESOURCES GROUP, GOLD COAST WATER
Shiddiky, Dr Muhammad J. A. S	Cryptosporidium is a parasitic protozoan, causing more than 48,000 deaths in children under 5 and 7.2 million disability-adjusted-life-years globally. A low-cost device that rapidly detects the parasite in drinking and recreational water is needed to enable effective disease management practices. Partnering with Advanced Universal Diagnostik, Seqwater, ALS Water and Gold Coast Water, this project aims to develop a novel device, comprising advanced microfluidics and biosensing technology for parasite quantification, genotyping and viability analysis. Expected outcomes are improved Cryptosporidium management, risk prediction, and rapid mitigation of impending outbreaks. The proposed platform has a great potential for detecting other pathogens.								

#### National Interest Test Statement

Cryptosporidium, an intestinal pathogen, is one of the most common causes of waterborne disease in Australia and around the world. Drinking water contaminated with the parasite can result in diarrhoea and, in extreme cases, death. The project aims to develop a novel, affordable, portable, on-site diagnostic device for the rapid and accurate detection of Cryptosporidium in drinking and recreational water. The proposed innovative monitoring device will ensure that water remains safe for Australian communities and addresses a major public health concern. The world-leading diagnostic technology will generate Australian owned IP and enable water industries to routine monitoring the parasite on-site, allowing early detection and enabling rapid and effective actions to mitigate impending waterborne outbreaks. This project will generate major economic benefits through translation and implementation of the technology with our local and international industry partners. Advanced Universal Diagnostik is a large diagnostic company which will enable commercialisation of our technology on a global scale.

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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LP200200834  Drew, Dr Jacqueline	<b>An early warning system for police workplace health and performance</b>  This project aims to build a comprehensive organisational model of police workplace health and performance. This project answers the call for immediate organisational reform of police workplaces resulting from an Australian national study (2018) and Australian Senate Inquiry (2019). Police experience harm that must be addressed through organisational improvements, leading to more efficient policing. In the first study of its kind, this project will develop a practical early warning system that promotes strategic and front-line leadership capability of Australian police agencies in workplace health and performance. It will allow better identification of risk, resource allocation and tracking of these critical issues in policing.  <b>National Interest Test Statement</b>  Police are essential to our communities but pay a high price for their service. The most serious causes of harm extend beyond traumatic events and stem from organisational stressors that are under the purview of police agencies. Agencies who fail to address mental health impacts of their own organisational systems on police personnel are failing in their duty of care. This project builds and tests the most comprehensive workplace model ever developed, providing an explanatory road map of the organisational factors that underpin workplace health and performance. The project makes significant advances to theoretical and empirical knowledge and develops an "Early Warning System" that promotes police workplace performance reform in Australia and internationally. This project supports police and government to deliver efficient policing services driven by human capital and excellence in performance. Fiscally responsible law enforcement must be driven by healthy and productive police personnel working within healthy organisational systems. This will result in cost-efficient and high-performing police organisations.	28,000.00	53,021.00	65,829.00	40,808.00	0.00	0.00	187,658.00	QUEENSLAND POLICE SERVICE
LP200200976  Powell, Prof Martine B	<b>A framework for adapting child interview protocols in complex cases</b>  This project aims to develop—in collaboration with Aboriginal and other industry co-researchers—a 'how to' framework for effectively adapting standard child abuse interview protocols to accommodate the complexities that create barriers to disclosure. Complex cases necessitate interview adaption, but it requires systematic guidance and an interdisciplinary, practitioner-driven approach to be effective. This innovative framework is expected to have long-term benefits for services that support children's well-being, through improvements in the quality of evidence underpinning decisions. By enhancing interviewer capability, there will also be fewer cases prematurely exiting the justice system before forensic interview or investigation.  <b>National Interest Test Statement</b>  Child abuse presents a serious threat to the wellbeing of children and their communities, whether Aboriginal or non-Aboriginal. To ensure the best outcomes during abuse investigations, interviewers need to use evidence-based interview protocols, but they also need to know how to effectively adapt these protocols in highly complex cases where the standard procedures do not work well. This project builds on extensive prior work by developing (in partnership with industry co-researchers) a global-first framework for adaption. Acknowledging and supporting informed interview adaption will have widespread benefits such as: higher prosecution and conviction rates through improved quality evidence, enhanced victim wellbeing, reduced burnout of interviewers by increasing competency, and raised awareness of the importance of interview adaption among all professional groups. The work will also further enhance Australia's global reputation in producing cutting-edge research and training in investigative interviewing of children with complex needs.	51,652.50	151,244.00	137,010.50	37,419.00	0.00	0.00	377,326.00	TERRITORY FAMILIES
	<b>Griffith University</b>	214,180.50	484,807.50	480,491.50	209,864.50	0.00	0.00	1,389,344.00	

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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<b>James Cook University</b>									
LP200201003	<b>Striking Gold - Determining the genetics of gold skin colour in barramundi</b>	94,187.50	214,932.50	213,318.50	92,573.50	0.00	0.00	615,012.00	MAINSTREAM AQUACULTURE GROUP PTY LTD
Jerry, Prof Dean R	<p>Barramundi is one of Australia's finest eating table fish and the species is gaining global prominence. However, fillet flesh colour of Australian farmed barramundi exhibit greyish tones which lowers consumer acceptance compared to other white flesh fish and imported product. Barramundi with rare golden skin tones do not exhibit this flesh "greyness" and are therefore a valuable niche product to farm if they can be produced in larger numbers. This project will elucidate the genetic basis and mechanism of expression behind the golden barramundi phenotype. In doing so, it will enable barramundi farmers to produce them at commercially relevant scales, providing them with a substantial competitive advantage in both domestic and global markets.</p> <p><b>National Interest Test Statement</b></p> <p>This project addresses an important issue the Australian farmed barramundi industry faces when their product is sold alongside imported fish products - namely "greying" in the fillet flesh. Whilst harmless, this grey tint has negative consumer attributes against often bleached imported product reducing the market opportunity for farmers to sell their produce. The skin coloration of barramundi is naturally silver-black, however, a rare golden colour variant is occasionally observed in hatchery batches. Barramundi with this golden colouration do not exhibit greying in the flesh and thus development and farming of a high-value "niche" golden barramundi strain is commercially attractive for the Australian industry to differentiate and compete against imported fish products. Project outcomes will create a new high-value domestic and import-ready Australian farmed product and help the barramundi industry to compete with inferior imported produce facilitating industry expansion in regional areas, increased employment opportunities and placing Australia at the forefront of genetics when applied to aquaculture.</p>								
	<b>James Cook University</b>	94,187.50	214,932.50	213,318.50	92,573.50	0.00	0.00	615,012.00	
<b>Queensland University of Technology</b>									
LP200200916	<b>Protein biosensors for detecting smoke exposure of grapes</b>	90,920.50	130,965.50	40,045.00	0.00	0.00	0.00	261,931.00	CSIRO, AUSTRALIAN WINE RESEARCH INSTITUTE, MOLECULAR WAREHOUSE PTY LTD
Alexandrov, Prof Kirill	<p>Bush fires and controlled burns that take place in the vicinity of vineyards can lead to grape contamination with tasteless phenolic glucosides. Their hydrolysis during wine making leads to "smoke taint" – an unpleasant medicinal taste that can render wine undrinkable. We will apply a combination of organic synthesis, protein engineering and directed evolution to develop protein-based biosensors of phenolic glucosides. These biosensors will be used to devise a simple portable colorimetric test that can be performed in the vineyard or the winery. The ability to rapidly determine the level of grape contamination with phenolic glucosides would give Australian wine growers and wine makers a powerful tool to mitigate the effects of bushfires.</p>								

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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<b>National Interest Test Statement</b> The wine industry contributes over 45 billion dollars to the Australian economy annually, and is expected to remain an export success even in the current pandemic. However, the value of the Australian wine grape crush is vulnerable to smoke taint, exposure to which adversely affects wine quality. Although this is an international problem, it is particularly critical in Australia due to the wide area effects of the 2019/2020 bushfire disaster, and the prospect of similar events in the future due to climate change. This project aims to provide a world first "point-of-grape" biosensor that can detect smoke taint effects prior to further expensive wine processing, thus increasing the efficiency and value of Australian wine production. Development of such technology is expected to translate into millions of dollars in saving for Australian wine industry.									
LP200200965	<b>High performance bioderived hybrid fillers for rubber composite</b> This project aims to address a significant problem in polymer composite synthesis by production and application of high performance bioderived hybrid silica fillers from renewable biomass feedstock. The project expects to generate new knowledge in the area of advanced manufacturing using interdisciplinary approaches in biorefining, filler and composite production and characterization. Expected outcomes of this project include a more sustainable filler production process for producing novel bioderived silica fillers with properties superior to commercial silica fillers. The successful implementation of this project will lead to the development of a new advanced manufacturing industry, creating jobs in regional Australia.	67,727.50	146,755.00	115,530.50	36,503.00	0.00	0.00	366,516.00	UPALA PTY LTD
Zhang, Dr Zhanying	<b>National Interest Test Statement</b> High quality silica is a critical additive in the manufacturing of many products especially in rubber materials. Globally, high quality silica has a multi-billion dollar market and the demand for silica additives is rising driven largely by tyre manufacturing industry. Silica is currently produced from non-renewable quartz sand using chemical-intensive processing. This project will develop novel, environmentally friendly technologies to extract high-quality silica from rice husks with features superior to the commercial silica additives used in rubber manufacturing. The outcome of this project will be the delivery of a green technology platform to support the development of a new advanced manufacturing industry in Australia. The new manufacturing industry will also improve the sustainability and profitability of the Australian rice industry by producing high-value silica additives from low-value processing residues and create jobs in regional communities.								
	Queensland University of Technology	158,648.00	277,720.50	155,575.50	36,503.00	0.00	0.00	628,447.00	
<b>The University of Queensland</b>									
LP200200046	<b>Visualising Humanitarian Crises: Transforming Images and Aid Policy</b> This project aims to draw on the power of images to transform practices of aid. Prevailing visualisations of humanitarian crises are powerful but problematic. They often focus on violence and depict victims in stereotypical and dehumanising ways. The project develops new evidence-based visual strategies through interdisciplinary collaborations with leading industry partners in Australia and internationally. Expected outcomes include best practice guidelines that better equip humanitarian organisations to help people in need and contribute to enduring political solutions. Resulting benefits are more effective aid policies at a time when humanitarian concerns are increasingly central to global stability and Australia's national interest.	25,000.00	148,269.00	228,608.00	198,914.00	93,575.00	0.00	694,366.00	WORLD PRESS PHOTO FOUNDATION, INTERNATIONAL COMMITTEE OF THE RED CROSS, AUSTRALIAN RED CROSS SOCIETY, MÉDECINS SANS FRONTIÈRES
Bleiker, Prof Roland									

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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	<p><b>National Interest Test Statement</b></p> <p>This project directly contributes to pressing issues of national concern by developing new evidence-based policies that allow journalists, NGOs and government agencies to actively draw on the power of images when enacting Australia’s humanitarian responsibilities. Images are crucial because they influence how policy makers and the public view, debate and respond to suffering and need. Humanitarian crises are becoming more frequent and challenging. They range from bushfires, floods and famines to pandemics, such as COVID-19. In addition to dealing with such issues in its own borders, Australia makes an active and important global contribution, providing over \$4 billion in development assistance in 2019-20 alone. By developing new visual strategies and best practice guidelines, the project not only helps to transform policy-making but also builds interdisciplinary research capacity and industry relationships that place Australia at the forefront of global innovation and leadership in the search for enduring solutions to humanitarian problems.</p>								
LP200200136	<p><b>Production of valuable chemicals from gaseous waste</b></p> <p>This project aims to develop an innovative biotechnology to enable the conversion of carbon dioxide (CO2) available in waste gases into liquid chemicals. This will create strong economic drivers for carbon-intensive industries to implement CO2 capture and utilisation, by significantly increasing the value of otherwise wasted CO2. Using a multi-disciplinary approach, this project will substantially advance the scientific knowledge in this exciting and underexploited area of biological carbon recycling. The outcomes of this project will enable the establishment of a new CO2-based biotechnology sector creating high-value chemical products from waste gases, while also support achieving national target of reduction of greenhouse gas emissions.</p>	90,110.50	193,789.50	167,752.00	64,073.00	0.00	0.00	515,725.00	CENTRAL SEQ DISTRIBUTOR-RETAILER AUTHORITY, NIPPON STEEL CORPORATION
Viridis, Dr Bernardino									
	<p><b>National Interest Test Statement</b></p> <p>While vital for national wealth and prosperity, the industrial sector takes a significant toll on the environment. More than 50% of greenhouse-gas emissions in Australia derive from industrial activities, with the majority consisting of CO2. For carbon-intensive industries, carbon mitigation options are limited due to a lack of suitable technologies providing economic incentives for waste-CO2 capture and conversion into high-value products. This project will deliver an innovative biotechnology that will provide critical support to such industries to enable this critical transition. This transformational research has a strong potential to create a new biotechnology sector producing high-value chemicals from CO2, which will impact many areas important for Australia’s future sustainable economy, including environmental and industrial biotechnology, and that will place Australia at the forefront of sustainable resources research.</p>								
LP200200591	<p><b>Understanding third hand exposure of Australian people to methamphetamine</b></p> <p>In Australia, there is high community concern around inadvertent exposure to methamphetamine residues in contaminated houses. In this proposal, an interdisciplinary research team aim to engage with public health authorities and public housing industry to conduct collaborative research on total exposure to methamphetamine in contaminated indoor environments. The project will assess exposure pathways (via air, dust, surfaces) and link them with methamphetamine levels in samples from occupants (urine, hair). The project is expected to significantly enhance our understanding of how third hand exposure leads to internal exposure in humans. This knowledge provides evidence for policies on residential indoor exposures and remediation strategies.</p>	46,018.00	96,282.00	102,271.50	52,007.50	0.00	0.00	296,579.00	QUEENSLAND HEALTH, QUEENSLAND HEALTH FORENSIC AND SCIENTIFIC SERVICES, MTK GROUP PTY LTD, COMMUNITY HOUSING LIMITED, CHURCHES OF CHRIST HOUSING SERVICES LIMITED
Thai, Dr Phong K									



# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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	<p><b>National Interest Test Statement</b></p> <p>In Australia, the use of crystal methamphetamine (also known as 'ice') has been described as an epidemic by the National Ice Task Force. Smoking ice not only causes disproportionate harm to users but also contaminates the surrounding environment, and this may indirectly cause harm to others. This project is expected to deliver critical information on the risk of third-hand exposure to methamphetamine in Australia. A greater understanding of the relationship between contamination levels in the home and the subsequent exposure risk to occupants is crucial to our Partner Organisations as they devise policies to reduce the social, health and economic burden of remediation of contaminated houses, especially when most of the burden currently falls on lower socio-economic groups.</p>								
LP200200689  Hossain, Dr Md.Shahriar A	<p><b>Low-cost, Lightweight and Liquid Helium-free Superconducting MRI Magnet</b></p> <p>This project aims to develop a liquid-helium-free superconducting technology to address the need for more affordable MRI magnets that currently rely on expensive, limited supplies of liquid helium. This project expects to generate a world-first, much needed MRI systems to be operated in persistent mode without a power supply, to obtain high-resolution images and low-cost operation. The expected outcomes include a novel, lightweight, easy-to-operate magnesium diboride superconducting MRI magnet prototype under persistent mode operation. This should provide significant benefits, including reducing the cost associated with conventional liquid helium-dependent technologies and ensuring Australia at the forefront of MRI development worldwide.</p>	72,885.50	150,764.50	165,281.00	87,402.00	0.00	0.00	476,333.00	HYPER TECH RESEARCH INC
	<p><b>National Interest Test Statement</b></p> <p>MRI is an important diagnostic tool but high capital and operating costs means they are only available in major centres in Australia. This can cause delays in diagnosis and treatment leading to poorer patient outcomes. Current MRI systems require a complex combination of power supply and expensive liquid helium based cooling system, resulting in high operational and maintenance costs and increased system complexity. Australia is affected by a world-wide shortage of liquid helium that has increased demand for alternatives. We aim to develop magnesium diboride superconducting magnets for a low-cost MRI system that doesn't require liquid helium. As there are no superconductor manufacturers in Australia, we are working with Hyper Tech Research, a world leader in this field. This project expects to place Australian researchers and engineers at the forefront of superconductor technology development and applications and create new business opportunities in advanced manufacturing. In the long term the development of inexpensive superconducting magnets will make MRI much more accessible and reduce health care costs.</p>								
LP200200717  Peng, Prof Yongjun	<p><b>Depressing pyrrhotite in copper and gold flotation</b></p> <p>The mining industry is processing low-grade ores associated with high amounts of waste minerals. Extracting metals from low-grade ores is very difficult with technical challenges in rejecting waste minerals. This project aims to understand the surface properties and the behaviour of a major waste mineral which is becoming increasingly problematic during the processing of copper and gold ores. New chemistry and chemical reagents will be developed to efficiently and economically reject the waste mineral by manipulating the reactions that take place on its surface. This project expects to have immediate economic and environmental impacts through increasing metal production, cutting greenhouse gas emissions and applying new green reagents.</p>	87,472.00	168,917.00	188,436.00	106,991.00	0.00	0.00	551,816.00	NEWMONT MINING CORPORATION, VEGA INDUSTRIES (MIDDLE EAST) F.Z.C

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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	<b>National Interest Test Statement</b>  This research will transform the extraction of copper, gold and other metals by efficiently and economically rejecting commercially worthless material, gangue, from low-grade ores in minerals processing plants. The new chemistry and chemical reagents developed from this research expect to increase the growth and production of copper, gold and other metals, reduce operating costs in the metal extraction chain and cut greenhouse gas emissions from smelters. These technologies will also help unlock Australian base metal and precious mineral resources, especially smaller ones, for which high cost processes are not justified under the current expected tonnage of concentrate. The environmentally friendly reagents developed from this research support the sustainable development of mining operations and provide a new opportunity for the Australian agricultural sector. Close engagement with end-users in this research will lead to establishment of transformational chemistry and chemical reagents for their use.								
LP200200762  Hickson, Prof Louise M	<b>Hearing, social connectedness, and well-being of ageing adults in Australia</b>  Hearing ability declines with age and hearing loss has a fundamental impact on an adult's ability to communicate and, in turn, socially connect with others. This benchmark study aims to apply innovative, quantitative and qualitative methods to examine the real-world social connections of adults with hearing loss who use or do not use hearing aids. This project expects to increase understanding of the social impacts of age-related hearing loss and the relationship to hearing rehabilitation. The expected outcomes have the potential to guide research, policy, and practice for ageing Australians. This should provide significant benefits, such as reducing social isolation and enhancing the well-being of millions of Australians.	57,500.00	120,500.00	120,000.00	57,000.00	0.00	0.00	355,000.00	SONOVA AG
	<b>National Interest Test Statement</b>  Australia has an ageing population and one in six adults experience hearing loss. Hearing loss increases the risk of social isolation and loneliness, and this, in turn, is associated with depression/anxiety, lower well-being, cognitive decline, and reduced workforce participation. The associated financial costs of hearing loss are estimated to be \$41.2 billion in Australia. Targeting the largely neglected area of social disconnection in hearing loss and how hearing aids might improve social connections has great potential for reducing the economic burden of hearing loss through improved health and well-being. This also has potential to help relieve GPs, emergency services, and hospitals from the burden of inappropriate service use by individuals experiencing social isolation. The outcomes will meet the Australian Government's National Science and Research Priority of improving physical and mental well-being for ageing Australian adults. This project will also lead to better targeting of health care models and services that will improve overall outcomes and the management of age-related hearing loss.								
LP200200805  Abramson, Prof David A	<b>Tuning parallel applications on software-defined supercomputers</b>  Supercomputers are used by many Australian industries and laboratories to make better products and perform critical predictions, and it is essential that codes operate efficiently. This project aims to assist programmers in identifying performance bottlenecks in their code quickly and easily. The project expects to supersede the current methods, which are often complex and time-consuming, by developing innovative software tools and techniques. The expected outcomes include novel software, verified by industry partners in real world case studies, ranging from life sciences to hypersonic transport. This should provide significant benefits, including the capacity for Australian industries to access world-class supercomputing technology.	62,500.00	128,500.00	135,000.00	69,000.00	0.00	0.00	395,000.00	XENON SYSTEMS PTY LTD

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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	National Interest Test Statement								
	Supercomputers solve complex problems, but the hardware is costly. Software-defined supercomputers offer a high performance computing (HPC) alternative to a wider range of users, but uptake is currently limited by performance issues. By developing the necessary tools to streamline how these issues are resolved, this project aims to make supercomputing more widely available to Australian researchers, industry, and policymakers. The range of applications is vast, making this project a significant value-for-money prospect, but, more specifically, the expected benefits in the shorter term include: a) unique, world-leading intellectual property for XENON Systems, an Australian-owned and operated company offering tailored HPC solutions to Australian industry and customers in the Asia-Pacific region; b) improved uptake of the ARC LIEF-funded HPC facility FlashLite, benefitting Australian research; and c) immediate improvements for multi-scale modelling and data analysis in bioengineering research (in partnership with University of California San Diego) and hypersonic systems (at UQ).								
LP200200822	<b>Novel Propagation and Conservation Technologies for Australian Macadamia</b>	51,593.00	102,804.50	102,423.00	51,211.50	0.00	0.00	308,032.00	THE ROYAL BOTANIC GARDEN SYDNEY, DEPARTMENT OF AGRICULTURE AND FISHERIES, MACQ PTY LTD, AURORA MACADAMIAS PTY LTD, MACS NETWORK OPERATIONS PTY LTD, BUSH HOLDINGS PTY LTD, AUSTRALIAN MACADAMIA SOCIETY LIMITED, MACADAMIA CONSERVATION TRUST
Mitter, Prof Neena	Australia's \$850M macadamia industry is a booming contributor to regional growth with a strong domestic market niche. However the industry is threatened by a severe plant supply bottleneck. Also wild germplasm for breeding is threatened with extinction. This project aims to innovate world-first tissue culture technologies for macadamia propagation and secure cryo-storage of germplasm, aided by cutting edge genomics. Expected outcomes of these new, cross-disciplinary techniques are on-demand supply of superior trees to growers and the protection of invaluable germplasm. This should provide significant benefits for industry growth, food security and conservation de-risked from global change.								
	National Interest Test Statement								
	Macadamia is Australia's most profitable native crop worth >\$850M. Global demand for the nut is growing at 7%/year. This project expects to break down barriers to industry expansion, and address the most pressing industry need of more trees in the ground. This is key to faster positive cash-flow for Australia's 800+ macadamia growers, and whole value-chain growth. This project should create economic gains to farmers of over \$28k/hectare, plus cost-savings from reduced resource requirements, options for mechanisation/smart technologies and less disease/tree loss. New growing regions and production technologies should create regional jobs and business opportunities. Tree-free propagation would eliminate the need for land, water and chemicals and minimise the industry's environmental footprint. Seednut fields could be reallocated for food trees or reforestation. Cryopreservation of threatened macadamia species would ensure long-term protection against climate change, natural disasters and human impact and safeguard important genetic diversity for a globally competitive, resilient Australian macadamia industry.								
LP200200903	<b>Wind Tunnel Testing of a Hypersonic Plasma Engine</b>	143,151.50	224,763.00	183,952.50	196,485.50	139,773.50	45,629.00	933,755.00	LOCKHEED MARTIN AUSTRALIA PTY LIMITED, LOCKHEED MARTIN (US), DEFENCE SCIENCE AND TECHNOLOGY GROUP
Paull, Prof Allan	This project intends to evaluate an electric engine that is capable of speeds in excess of 10000 km/hr, for access to space and responsive surveillance in our region. The expertise of Lockheed Martin, Lockheed Martin Australia, the University of Qld and DST Group are to be combined to complete experimental and theoretical evaluations of an air-breathing plasma engine that is capable of out-performing rockets and scramjets. US Air Force Research Laboratory results will also be compared and shared. This project provides opportunities for young Australian researchers to be participate and lead an exciting new field of propulsion. It is anticipated that the program will be the foundations to future flight demonstrations from Woomera, Australia.								

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	<b>National Interest Test Statement</b> The image of a plasma engine is the brightly glowing exhaust of a plane in a science fiction movie, but this image will soon no longer be science fiction. By bringing to bear Australia's world-leading hypersonics expertise in collaboration with Lockheed Martin and Lockheed Martin Australia, we can create a new kind of plasma engine. It has the potential to change the face of hypersonic flight and space access. It will be a new direction that broadens Australia's hypersonic community which is responsive to the Force Structure Review requirements. It is a gateway to technologies that provide the speed and coverage advantages of satellites with the cost effectiveness of aircraft. Thus, provides the Australian Defence Force and environmental scientists with capabilities for wider surveillance in diverse locations such as Antarctica and the southern oceans and therefore greater leverage in international negotiations. The project brings substantial funding with exciting opportunities for 10 early career graduates in a 5 year program that has a path to commercialisation with \$1B in potential investments.								
LP200200927	<b>Digging deeper to improve yield stability</b> This project aims to provide innovative breeding solutions that harness the 'hidden' part of the plant, roots, to support the development of more productive crops in the face of climate variability. The project expects to generate new insights into the biology and genetics of root development in barley, a model cereal crop, by applying cutting-edge genome editing, phenotyping and genomics technologies. Anticipated outcomes include novel methodologies to accelerate breeding for diverse production environments, with direct applications in barley, and other major cereals including wheat and oats. This should provide significant economic and social benefits to the Australian grains industry through yield stability amidst climate variability.	97,497.50	200,535.00	200,098.00	192,121.00	95,060.50	0.00	785,312.00	INTERGRAIN PTY LTD
Hickey, A/Prof Lee T	<b>National Interest Test Statement</b> The Australian barley industry – valued at \$3 billion per annum – is renowned globally and prized by domestic markets for producing grain with high malt and feed qualities. Australia is a major player in the global barley export market, contributing 30-40% of the malting barley trade and 20% of feed barley. However, barley production in Australia is highly variable and dependant on seasonal rainfall, with some Australian varieties failing to meet stringent product specifications. While barley has many characteristics that are well-adapted to 'harsh' Australian conditions, this project will deliver new, genetically-enhanced cultivars via selection of the grain's most optimal traits. New breeding approaches developed in this project are expected to improve barley productivity over the next 5 to 10 years and could provide a yield increase of up to 8% in some environments, leading to a more stable supply of high-quality grain for domestic and export markets. Importantly, new insights realised in this project are expected to be transferrable to other high-value crops such as wheat and oats.								
LP200201078	<b>Development of a market relevant DNA nano-vaccine platform</b> DNA vaccine technology can potentially provide a rapid response to existing or new pathogens, but its market success has been limited. By addressing key scientific and technical challenges, this project aims to develop a new and cost-effective DNA nanovaccine platform using a multiscale engineering approach. It is anticipated that novel nanoparticles for DNA delivery and an end-user-driven DNA vaccine technology with enhanced immunogenicity, stability and safety will be generated. Expected outcomes include new knowledge in nanomaterial science and a market ready technology platform, improving Australia's capabilities in nanobiotechnology and vaccine development, as well as delivering a new value-added product for the Industry Partner.	65,468.00	127,936.00	126,436.00	63,968.00	0.00	0.00	383,808.00	N4 PHARMA
Yu, Prof Chengzhong									

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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<b>National Interest Test Statement</b>										
This project aims to develop a cost-effective nanoplatform for DNA vaccine delivery with enhanced immunogenicity and stability. The new technology developed in this project will not only possess high delivery efficiency and potent effectiveness, but also have the potential to avoid cold chain management, thus greatly reducing costs in manufacturing, transportation and storage of DNA vaccines. The short-term benefit of this project will be the generation of new intellectual property by developing a versatile nanoplatform for veterinary DNA vaccines that can be rapidly adapted to treat emerging pathogens. In the mid-term, this project is expected to attract substantial commercial interest, as there is a huge market opportunity for an improved DNA vaccine delivery platform with the global DNA vaccine market forecasted to reach revenue of US \$9.43 billion by 2025. In the long-term, this new technology will benefit Australian agriculture by providing cheap animal vaccines which will increase the international competitiveness of our livestock industries by reducing production costs and improving food quality.										
The University of Queensland		799,196.00	1,663,060.50	1,720,258.00	1,139,173.50	328,409.00	45,629.00	5,695,726.00		
Queensland		1,266,212.00	2,640,521.00	2,569,643.50	1,478,114.50	328,409.00	45,629.00	8,328,529.00		

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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## South Australia

### Flinders University

LP200200326	<b>Post-parental housing transitions among adults with intellectual disability</b>	52,017.00	102,366.50	107,513.50	57,164.00	0.00	0.00	319,061.00	NATIONAL DISABILITY SERVICES LIMITED, BEDFORD PHOENIX INCORPORATED, SA HEALTH, GENU ABILITY
Walker, A/Prof Ruth B	This project aims to address the urgent issue of growing numbers of older people with intellectual disability (ID) outliving their parent carers who have not put future care plans in place. This project expects to generate a national evidence-based framework for ensuring successful post-parental housing and care transitions. By using a three-phase mixed methodology design in three Australian cities, expected outcomes of the project include the development of an Australian-first evidence-based resource kit which should provide significant benefits for older people with ID, their family carers and the disability sector, in terms of planning for post-parental housing and care transitions.								

#### National Interest Test Statement

A growing section of the Australian community are older people with intellectual disability (ID), many of whom are outliving their parents who have typically been their lifelong primary carers. Many older parents, however, have not put plans in place for ongoing care of their son or daughter with ID and are in urgent need of support to help them plan for the future. This project will assist people with ID and their family carers to plan for future housing and living arrangements, hence reducing the likelihood of an uncertain future. It will also be important in helping them navigate housing decisions in what has become a very dynamic and complex market under the National Disability Insurance Scheme (NDIS). It will benefit government and the disability and ageing sectors by addressing a current lack of evidence-based policy on which to base services to assist in planning for post-parental housing transitions. An important outcome will be the development of a resource kit co-designed by people with ID and their family members aimed at ensuring greater choice and control.

LP200200803	<b>Rockshelters and Rock Art in the River Murray Gorge: New Data and Syntheses</b>	40,837.00	81,056.50	83,182.00	81,816.00	38,853.50	0.00	325,745.00	THE RIVER MURRAY AND MALLEE ABORIGINAL CORPORATION RNTBC
Roberts, A/Prof Amy L	This project, undertaken in partnership with the River Murray and Mallee Aboriginal Corporation, aims to explore Aboriginal rock art and rockshelter occupation deposits in the Upper Murray River Gorge, South Australia. The project will conduct the first archaeological excavations of stratified rockshelter sites in this region in more than 50 years and record a threatened and rapidly diminishing corpus of rock art. The cultural importance of the located sites will be considered in conjunction with their archaeological significance to produce meaningful narratives. New understandings about Holocene societal and environmental changes will be generated. Traditional owners will benefit from a range of socio-economic capacity-building measures.								

#### National Interest Test Statement

The Murray-Darling Basin is the largest and most complex river drainage system in Australia. The Murray River forms the longest river in this system, yet despite its importance our knowledge of its deep Aboriginal cultural history is poorly defined, particularly in relation to Aboriginal rock art and rockshelter deposits. This project, conducted in partnership with the River Murray and Mallee Aboriginal Corporation, will transform our understanding of the archaeology of the Murray River, which will be shared with local communities and the general public to improve cross-cultural understanding. This project will have important cultural heritage management benefits by providing a comprehensive inventory and condition assessment of Aboriginal sites in the Upper River Murray Gorge. The results of these investigations will also improve our palaeo-environmental understanding of the region via the employment of earth sciences methods. This research will have an economic benefit through built-in employment and skills development for traditional owners in a region that experiences high socio-economic disadvantage.

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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LP200200848  Natalier, A/Prof Kristin	<b>A home-centred approach to support children and young people in state care</b>  This project aims to determine how conceptions of home can enhance an understanding of and responsiveness to young people's needs in state care. It expects to generate novel data on home for young people in state care and for the first time develop a home-centred approach to supporting young people across multiple care contexts. Expected outcomes include developing and evaluating home-centred care principles, practice guidelines and an online training module. These should provide benefits including better experiences and placement stability for young people, effective training for carers and evidence-informed strategies guiding the work of service providers and governments, with the potential to improve young people's life chances.	36,975.00	72,983.00	79,168.50	69,124.50	25,964.00	0.00	284,215.00	DEPARTMENT FOR CHILD PROTECTION, ANGLICARE SA LTD., LIFE WITHOUT BARRIERS
<b>National Interest Test Statement</b>  There are currently around 45,000 Australian young people living in state (out-of-home) care. Many experience trauma, loss, placement instability and a feeling that they do not belong. These experiences have far-reaching impacts, eroding young people's life chances, connections with family and community and their capacity to imagine and enact brighter futures. By integrating the concept of home into more responsive state care principles, practice frameworks and carer training, this research will offer the following benefits: 1) improved placement stability and a sense of belonging, thus mitigating the poor outcomes linked to abuse and neglect in families of origin and placement upheavals in state care; 2) develop resources that may strengthen carers' capacity to support young people with complex needs; 3) assist government and service providers to develop and procure appropriate supports for carers and young people; and 4) reduce the long-term social and economic costs associated with care leavers' heavy social and health services use.									
	<b>Flinders University</b>	129,829.00	256,406.00	269,864.00	208,104.50	64,817.50	0.00	929,021.00	
<b>The University of Adelaide</b>									
LP200200073  Hill, Prof Lisa H	<b>Understanding and Addressing Informal Voting in Victoria</b>  Victoria's informal vote rate is high and rising. In order to combat the problem of hundreds of thousands of 'lost votes' at Victorian state and local government elections we must first understand it. This collaboration with the Victorian Electoral Commission addresses the problem at both state and local levels over 3 election periods using 4 distinct studies. We combine experimental data, aggregate-level data and individual-level data to provide a thorough and multi-dimensional picture of informal voting. We will then propose remedies to be trialled and assessed. Taken together, our studies will represent the first multi-dimensional analysis of informality to be conducted in any Western democracy.	25,000.00	50,000.00	50,000.00	50,000.00	25,000.00	0.00	200,000.00	VICTORIAN ELECTORAL COMMISSION
<b>National Interest Test Statement</b>  This collaboration with the Victorian Electoral Commission will advance knowledge of the patterns and sources of informal voting at both state and local elections in Victoria. We will produce the first large scale, multi-dimensional study of informal voting ever conducted in an advanced democracy. We will also develop test solutions for arresting the problem and thereby assist the VEC in meeting its goal to reduce the high informal voting rate. Although our study is focused on Victoria, findings will have resonance for all Australian jurisdictions, including the Commonwealth, as well as other compulsory voting regimes the world over. This will enhance our reputation as one of the most successful and innovative voting systems in the world.									

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LP200200134	<b>Running Hot: Increasing the Availability of World-Class Precision Timing</b>	80,000.00	150,000.00	70,000.00	0.00	0.00	0.00	300,000.00	CRYOCLOCK PTY. LTD.
Baynes, Dr Fred N	<p>Precision clocks are a key enabler for many important technologies including navigation, radar, distributed computing and communications. Unfortunately, the very best clocks are currently bulky and very expensive. This project will take Australia's multi-award winning sapphire clock technology and transform it so that its unmatched performance is available from a unit with an order of magnitude smaller size, power consumption and cost. This transformation will be driven on the back of a patented revolutionary step that allows operation of the sapphire clock at higher cryogenic temperatures. The new clock will have a wider range of applications delivering more computational power, higher bandwidth transmissions and better radar.</p> <p><b>National Interest Test Statement</b></p> <p>The sapphire clock was awarded the 2018 Eureka Prize for Outstanding Science in Safeguarding Australia because of its importance in upgrading the performance of a key defence surveillance asset, Jindalee Over-The-Horizon Radar Network (JORN). The upgrade in radar capability accrues because of the world-beating performance of the sapphire clock. One expects similar benefits would come to many other important technologies, such as computing, navigation and communications, if they were to also have access to the superb sapphire clock. However, as with all precision timing technologies, the sapphire clock is bulky and expensive, prohibiting its use in many important needs. This project will transform the sapphire clock so that its superb signals will be available in a package that is 10 times smaller and less power hungry, while also being significantly cheaper. This promises a much wider deployment of this key technology with subsequent benefits to those critical technologies that depend on excellent timing. This will give Australia's industry and defence a key edge over its competitors/adversaries.</p>								
LP200200216	<b>Accelerating Consolidation and Closure of Mine Tailings Storage Facilities</b>	75,710.50	136,148.00	112,422.00	51,984.50	0.00	0.00	376,265.00	HANSON CONSTRUCTION MATERIALS PTY LTD
Jaksa, Prof Mark B	<p>All mining operations involve the production of waste. Many regard such waste (tailings) and their environmentally acceptable storage as constituting the largest waste problem on Earth because of the enormous damage and loss-of-life that have resulted from failures of tailings storage facilities. This project focuses on a dewatering technology, electro-osmosis (EO), which has yet to be fully operationalised, for improving the strength, stability and settlement characteristics of the tailings. Sophisticated testing will be undertaken at three scales (lab, meso and, most importantly, field), as well as the development of generic numerical models, to create practical guidelines to facilitate the implementation of EO in mines around the world.</p> <p><b>National Interest Test Statement</b></p> <p>In the last 5 years, more than 15 tailings storage facilities (TSFs) failures have occurred worldwide, two of which were catastrophic; i.e. the Fundão [50% owned by BHP] and Brumadinho TSFs. Together, these two failures have claimed at least 291 lives, destroyed two cities, and to date, for the Fundão failure alone, has involved US\$1.75 billion in compensation and remediation measures. By reducing the water content of the tailings through electro-osmosis (EO), the proposed research will reduce the likelihood of similar such failures. In addition, the following major benefits will be derived: (1) water usage will be significantly reduced (10,000 ML p.a. estimated in Australia from the production of construction and silica sand alone); (2) the operational life of TSFs will be extended; (3) the environmental footprint and sustainability of TSFs will be reduced; (4) guidelines will be developed to operationalise EO in mines globally; (5) a new and unique market opportunity will be created for the partner organisation, and Australia in general; and (6) a new, bespoke numerical model will be developed.</p>								



# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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LP200200813	<b>A soil ecological approach to increasing Australian crop productivity</b>	25,547.50	131,800.00	215,430.50	189,417.00	80,239.00	0.00	642,434.00	NEW EDGE MICROBIALS PTY. LTD., SOUTH AUSTRALIAN GRAIN INDUSTRY TRUST FUND
Denton, A/Prof Matthew D	The objective of this project is to use emerging genomics technologies to identify and characterize soil bacteria that allow the replacement of current agricultural fertilisers, which have significant environmental and economic disadvantages, with sustainable biological fertilisers. Soil bacteria can greatly enhance phosphate solubilization and hence availability for plant growth. Beneficial microbes will be identified from our existing soil collection and their performance and persistence optimised. Concurrently, our industry partners will develop suitable microbial formulations for application. The outcomes of the project will be the use of biological fertilisers to enhance crop productivity in an environmentally sustainable manner.								
	<b>National Interest Test Statement</b>								
	Agricultural production and export is a key industry for Australia. This project will assist development of evidence-based microbial inoculants for Australian agriculture that act as biological fertilisers, increasing productivity for farmers while reducing the costs of conventional fertiliser use. Home-grown microbial fertilisers will reduce negative off-site impacts of poor fertiliser use, promote healthier water-soil ecosystems, and boost sustainability. By identifying and developing beneficial microbes adapted to Australian conditions, the project can also assist in sustaining improved agricultural productivity in the face of issues such climate variability. By developing the evidence-base for microbial inoculants, the project will help develop new export industries and markets for Australian know-how. The training component of this project will also provide skilled workers for this growing sector.								
LP200200881	<b>Collaborative Sensing and Learning for Maritime Situational Awareness</b>	126,881.00	250,801.00	194,901.50	70,981.50	0.00	0.00	643,565.00	SAFRAN ELECTRONICS & DEFENSE AUSTRALASIA PTY LTD
Wagner, Dr Markus	We aim to demonstrate coordinated autonomous sensing of naval assets in dynamic maritime environments, reducing the operational load required to deliver a high quality maritime situational awareness. A realistic simulation based approach will help us develop novel artificial intelligence technology including: self-adaptive strategies for dynamic asset allocation, embedded smart sensing capabilities for naval observation systems and novel approaches to continuous collaborative learning from multi-spectral media. In addition to the emerging partnership between participants, the project will advance sovereign capability to develop maritime intelligence gathering technology for the Royal Australian Navy to underpin stability in our region.								
	<b>National Interest Test Statement</b>								
	Monitoring and protecting Australia's maritime environment is widely recognised as a national security imperative, vital to the prosperity of the nation. The vast majority of Australia's imports and exports travel by sea transiting strategic chokepoints in the South China Sea, Strait of Malacca, and the Indonesian Archipelago. Further, Australians and visitors enjoy the extensive pristine coastline and natural marine wonders. It is critical for the economic development and prosperity of the nation to protect, defend, police, and prevent illegal resource exploitation and pollution in our waters and to vigorously support open sea lines of communication in the Indo-Pacific on which the nation depends so greatly. This project will provide game changing artificial intelligence technology to deliver next generation maritime situation awareness solutions. The research will be of high value to the Royal Australian Navy and Maritime Border Command to help optimally manage, coordinate and organise sensing resources to achieve higher quality situation awareness, thereby contributing to stability in our region.								

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program  (Columns 1 and 2)	Approved Research Program  (Column 3)	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)			Total (\$)	Partner Organisation(s)
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LP200200957  Searle, Dr Iain R	<b>Development of drought tolerant, high protein legume for arid Australia.</b>  The aim of this research is to demonstrate the molecular basis of a non-proteinogenic amino acid toxin accumulation by using genomics and genome editing to produce a non-transgenic, protein rich legume. The significance of the outcomes will be a fundamental understanding of how non-proteinogenic amino acids are metabolised in plants and an inexpensive, high-protein feed for the pork and chicken industries thereby reducing production costs and increasing profitability. The outcomes from the research are fundamental knowledge of non-proteinogenic amino acid metabolism and turnkey approach to identify, engineer, test and produce value added crops. The benefits of the research are a multi-purpose crop for Australian crop and animal producers.  <b>National Interest Test Statement</b>  Our research outputs will deliver significant economic returns to Australian farmers by increasing the commodity value of common vetch seed and open new international export markets thereby positively contributing to Australia's balance of payments. Subsequent use of our non-toxin common vetch as an inexpensive, high-protein source in the pig and broiler chicken industries will reduce pork and chicken meat production costs and increase meat producers profitability. Broad adoption of our nitrogen fixing common vetch by farmers will reduce the need for application of expensive nitrogen fertilizers that require large amounts of greenhouse gas producing fuels to produce, and also reduce excess fertilizers application to crop fields and the subsequent run-off of nutrients into natural waterways that causes eutrophication.	34,172.50	68,367.50	80,972.00	103,488.50	56,711.50	0.00	343,712.00	SARDI, SOUTH AUSTRALIAN GRAIN INDUSTRY TRUST FUND
LP200200974  Burton, Prof Rachel A	<b>Agave; a new Australian crop with a resilient spirit</b>  This project aims to set the foundations to establish Agave as a sustainable, versatile and climate-proof Australian crop, supporting production of a new high value spirit for domestic and global markets. Outcomes will include novel cultivation and sensor technology for agave harvest at the "sweet spot" and advanced spirit assessment technologies allied with consumer sensory testing. Product character and consistency will be optimised by holistic integration and control of the production chain, encompassing plant growth, input materials, and fermentation and distillation steps for a complete plant to bottle pipeline.  <b>National Interest Test Statement</b>  Agave is a drought-proof succulent that thrives in semi-arid conditions making it an ideal new crop able to grow in marginal areas of Australia and with a changing climate. It produces large stores of sugar making it ideal for alcohol production, but also potentially for biofuel or hydrogen generation, as a stock feed or a source of beneficial human nutrients. The establishment of agave as an Australian crop will allow production and release of a unique new agave spirit into the domestic liquor market worth over \$12.5bn a year with our reputation for clean green production making the spirit attractive in the global US\$340bn market. Technology developed in this project to non-destructively scan plants to pick the best harvest time could have broader application to fruits and vegetables, detecting freshness or how ripe they are, whilst the search to maximise fermentation efficiency could lead to isolation of novel yeasts, benefiting other beverage producers.	120,665.00	248,744.00	259,485.00	131,406.00	0.00	0.00	760,300.00	TOP SHELF INTERNATIONAL HOLDINGS PTY LTD, FRAUNHOFER INSTITUTE, THE TRUSTEE FOR PROSPECT AGRICULTURE TRUST
LP200201000  Connell, Prof Sean D	<b>Addressing social and ecological constraints to expand marine restoration</b>  This project aims to improve social and ecological outcomes of marine habitat restoration by increasing community and industry engagement in restoration practices with high socio-economic benefits. By understanding and overcoming social and ecological barriers to successful restoration efforts, this project will generate new knowledge on how communities – both human and marine – can work together to rapidly restore robust, productive reef habitats. Expected outcomes of this project include a new ecological, multi-species approach that boosts restoration resilience; and a collaborative framework for developing government policy that builds industry and community support for cooperative management of coastal ecosystem restoration.	59,153.00	118,076.00	118,758.00	59,835.00	0.00	0.00	355,822.00	DEPARTMENT FOR ENVIRONMENT AND WATER, AUSTRALIAN OCEAN LABORATORY LIMITED, YUMBAH AQUACULTURE LTD, G.M BOWLEY & S.C BOWLEY

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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<b>National Interest Test Statement</b>									
Healthy coastal ecosystems deliver invaluable social and cultural benefits to Australian society. However, restorations of degraded ecosystems often fail due to conflict between relevant government, industrial and community groups. This research seeks to improve stakeholder engagement with marine restorations of high social, cultural, and economic value, while also exploring ecological strategies that maximise productivity and success. Socially, we seek to redefine the role of stakeholders in marine restoration by developing a framework for incorporating socio-economic well-being into restoration planning, and fostering greater community stewardship in conservation. Ecologically, we will explore a multi-species strategy to accelerate the rate of habitat recovery and the productivity of commercially relevant species, such as abalone, oysters and fish. Our results will enhance the success of marine restoration efforts in Australia, bolstering our economically important fishing and tourism industries, supporting marine ecosystem restoration, and improving quality of life in coastal communities.									
	<b>The University of Adelaide</b>	547,129.50	1,153,936.50	1,101,969.00	657,112.50	161,950.50	0.00	3,622,098.00	
<b>University of South Australia</b>									
LP200200681	<b>Towards 'zero hunger': improving food relief services in Australia</b>	50,000.00	100,000.00	107,500.00	57,500.00	0.00	0.00	315,000.00	THE FOOD CENTRE INC, FOODBANK OF SOUTH AUSTRALIA INCORPORATED, ANGLICARE SA LTD., DEPARTMENT OF HUMAN SERVICES
Bogomolova, Prof Svetlana	This project aims to improve the effectiveness of the food relief sector in meeting the needs of >5m Australians experiencing food insecurity annually. Following an innovative co-design process with sector stakeholders and their clients, this project investigates food relief service models that satisfy emergency needs as well as address root causes of food insecurity. Expected outcomes include tested best-practice guidelines and auditing tools for improving, monitoring and evaluating food relief services. These will not only assist >2,500 volunteer-run organisations to deliver more nutritious foods to more people, through a more dignified, fairer and diversified service, but map a pathway for clients out of food insecurity.								
<b>National Interest Test Statement</b>									
Food insecurity is a major challenge in Australia. More than 1 in 5 Australians have experienced food insecurity in the last 12 months, an increase of 22% from the previous year. Hunger has been proven to lead to significant negative social, health, psychological and economic consequences, which is reflected in stated priorities of the United Nations (Sustainable Development Goal 2 "Zero Hunger") and the Australian Government (Science and Research Priority 1 Food). The food relief sector in Australia already reports being unable to meet demand, and the economic and social impacts of COVID-19 are expected to increase that demand significantly. By developing systemic, evidence-informed improvements to the sector's offering, the project will benefit: (a) over 2,500 food relief charities that could meet the demand more effectively; (b) the government and private donors by using, their resources more effectively; and, importantly, (c) over 5m Australians who will get access to better quality food and services supporting them towards exiting food insecurity for good.									
	<b>University of South Australia</b>	50,000.00	100,000.00	107,500.00	57,500.00	0.00	0.00	315,000.00	
	<b>South Australia</b>	726,958.50	1,510,342.50	1,479,333.00	922,717.00	226,768.00	0.00	4,866,119.00	

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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## Tasmania

### University of Tasmania

LP200200394	<b>Portable and field-deployable analytical platforms for water monitoring</b>	62,857.50	123,715.00	114,617.00	99,973.00	46,213.50	0.00	447,376.00	T.E. LABORATORIES LTD., NORTHERN TASMANIAN NATURAL RESOURCE MANAGEMENT ASSOCIATION INC., TASMANIAN FRUIT & VEGETABLE EXPORT FACILITATION GROUP
Paull, Prof Brett	This project sets out to tackle one of the costliest and most challenging environmental problems, namely, nutrient pollution in water systems. At present, nutrient pollutant monitoring is predominantly carried out using an antiquated manual approach with numerous shortcomings, inadequate to achieve truly effective water quality management. The in-situ analyser developed and deployed within this project will provide continuous real-time observations and will allow users to remotely monitor water quality; alerting them to pollutant levels, enabling immediate action to be taken to prevent environmental damage. The system is low-cost, facilitating mass adoption, yet delivers an analytical performance comparable to leading laboratory analysers.								

#### National Interest Test Statement

This research is supporting the development of analytical platform technology to enable end-users make more informed and data supported economic and environmental decisions on water and nutrient management. The developed and enhanced portable technology will add to the 'smart and intelligent' analytical toolkit available to agribusiness organisations and practices, and simultaneously promote environmental protection and impact awareness. The project will generate new advanced detection and remote monitoring intellectual property, together with advancing areas of applied strategic knowledge. The commercial development and availability of the new platforms within Australia will also deliver employment via sales, training and support opportunities, and add to the growing Australian advanced manufacturing and analytical technology sectors.

<b>University of Tasmania</b>	62,857.50	123,715.00	114,617.00	99,973.00	46,213.50	0.00	447,376.00
<b>Tasmania</b>	62,857.50	123,715.00	114,617.00	99,973.00	46,213.50	0.00	447,376.00

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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Victoria									
Deakin University									
LP200200239	Entangled Knowledges in the Robert Neill Collection	47,500.00	84,000.00	61,500.00	25,000.00	0.00	0.00	218,000.00	ALBANY HERITAGE REFERENCE GROUP ABORIGINAL CORPORATION, NATIONAL MUSEUM OF SCOTLAND, WESTERN AUSTRALIAN MUSEUM, NATIONAL MUSEUM OF AUSTRALIA, NATURAL HISTORY MUSEUM LONDON
Shellam, A/Prof Tiffany S	This project aims to reverse the trajectories of Menang Nyungar knowledge imbedded in a historical fish collection, returning language, stories, and fishing practices to the Menang community. By working in a cross-sector, collaborative and Indigenous-governed team our research will enrich and re-frame the understanding of this collection in the Museum, unearth Indigenous taxonomic practices, produce new histories of biocultural collections, and develop the 'kaardtijin model' for participatory cross-cultural and cross-sector collaborations. Workshops on country will produce content for a digital reassembling of the collection to be used by museum partners, ensuring wide cross-sector and community engagement with project outcomes.								
	National Interest Test Statement	The project will make a profound contribution to Australia's national interest by producing outcomes to foster better understandings of shared histories and the characteristics of Western scientific and Indigenous knowledge systems. Its collaborative methodology will produce a model for future projects, leading the way for museums, universities and communities to form strategic and ethical alliances. This is particularly timely given the need to understand historical Aboriginal environmental knowledge and practices. The project has the potential to enrich the practices of collecting institutions in the return of Indigenous knowledge to biocultural collections, addressing growing national and international concerns around the need for museums to decolonise their practices. The project impacts will be realised with a widely accessible digital platform, a civic heritage interpretation in Albany timed to feed into the Bicentenary of Albany’s colonial settlement in 2026, and the unearthing of new histories to enable and encourage pathways for meaningful reconciliation and healing for Aboriginal communities.							
	Deakin University	47,500.00	84,000.00	61,500.00	25,000.00	0.00	0.00	218,000.00	
La Trobe University									
LP200200264	Using pollinators to optimise plant conservation translocation	42,174.00	108,114.50	146,599.50	143,088.00	62,429.00	0.00	502,405.00	ROYAL BOTANIC GARDENS VICTORIA
Phillips, Dr Ryan D	This project aims to address the low success rate of conservation translocations of threatened orchids. While pollinators are critical for plant reproduction, they are very rarely considered when establishing new populations of endangered species. Our innovative approach to conservation translocation involves using pollinators in site selection, developing strategies to mitigate risks of hybridisation, and optimising plant reproduction through planting design. The key outcome will be best-practice protocols to fast-track the establishment of self-sustaining populations. Due to their novelty, the approaches we develop will benefit plant translocations worldwide, and lead to enhanced conservation outcomes at reduced financial cost.								
	National Interest Test Statement	Orchids are renowned for their intricate flowers and often bizarre pollination strategies. In Australia, the spider orchids (Caladenia) are among are most iconic wildflowers. Yet, they are also one of our most threatened plant groups. Consequently, effective large-scale conservation translocation programs are urgently needed to prevent extinction. This study will: 1. Investigate how knowledge of pollination systems can be used to fast-track the establishment of new self-sustaining populations. 2. Establish protocols for testing if pollinator availability limits suitability of candidate introduction sites. 3. Design planting strategies for mitigating the risks of hybridisation and enhancing plant reproduction in newly established populations. The development of new protocols and methods would be internationally ground-breaking, and provide new guidelines for the successful translocation of plants in general, leading to more effective use of conservation funding. By enqaqing citizen scientists, the project will also enable strong science-community enqaqement.							

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LP200200379	<b>Promoting Long-Term Employment of Autistic Individuals</b>	68,000.00	139,000.00	145,918.50	74,918.50	0.00	0.00	427,837.00	DXC TECHNOLOGY AUSTRALIA PTY LIMITED, AUTISM SPECTRUM AUSTRALIA (ASPECT)
Dissanayake, Prof Cheryl	<p>Autistic adults tend to have poor employment outcomes and poor well-being, but these outcomes have mostly been treated separately. This project aims to investigate the links between sustainable employment and well-being of autistic adults. Survey and interview data will be collected in partner organisations after implementing two training programs for autistic staff and colleagues. Expected outcomes include enhanced capacity of both employers and employees to pro-actively manage job demands and build resources of autistic employees. This should provide significant benefits by improving sustainability of autism employment programs, thus providing social and financial benefits to autistic individuals, employers, government, and society.</p> <p><b>National Interest Test Statement</b></p> <p>Project findings will benefit the national interest as follows: 1. Contribute to economic and social benefit by ensuring successful and sustainable autism employment. Research from Deloitte suggests 100 autistic individuals with a 20-year working career results in savings accrual of \$167 million and the additional generation of \$425 million in gross domestic product. 2. Support 'better models of health care and services that improve outcomes, reduce disparities for disadvantaged and vulnerable groups, increase efficiency and provide greater value for a given expenditure'. A project objective is to provide an evidence base for business and government to improve existing workplace training programs to reduce disparities in the employment of autistic people, as well as reducing economic and social costs associated with their un- and under-employment. 3. Increase the likelihood and success of autism employment by enhancing well-being and the dissemination of effective autism employment practices to organisations, thereby 'promoting greater integration and co-investment between the health system and industry.'</p>								
LP200200884	<b>Outfoxing the fox: new cost-effective ways to protect threatened species</b>	104,073.00	185,016.50	164,829.00	115,495.50	31,610.00	0.00	601,024.00	NORTH EAST REGION WATER CORPORATION, WINTON WETLANDS COMMITTEE OF MANAGEMENT INCORPORATED, WODONGA CITY COUNCIL, TIVERTON ROTHWELL IMPACT COMPANY PTY LTD, GREENING AUSTRALIA LTD
Van Dyke, Dr James U	<p>This project aims to address the damage caused by invasive foxes by applying new methods of protection for threatened species. This project expects to generate new knowledge in the areas of conservation biology and invasive species management by comparing the effectiveness of fox control strategies for improving the population viability of declining freshwater turtles. Expected outcomes of this project include a community-based conservation model that prevents turtle extinctions in south-eastern Australia at considerable cost savings. Significant benefits include improved management of the impacts of invasive species, and restoration of ecosystem services provided by the scavenging role of freshwater turtles for maintaining water quality.</p> <p><b>National Interest Test Statement</b></p> <p>Australia's annual \$10 billion investment into feral and invasive species control represents considerable waste due to the ineffectiveness of lethal predator management for protecting many native species. This project tests a revolutionary model of conservation that protects threatened species from foxes at a much lower cost. The conservation model saves cost by giving local communities a range of independent ways to protect their local threatened species from invasive predators, which has direct benefits for the strategic research outcome "environmental change". The model is designed to serve as a blueprint for collaborative community-led conservation that does not rely heavily on federal and state support. As federal funds for conservation dwindle, community-driven initiatives like ours will be essential for protecting Australia's biodiversity. The project will restore threatened freshwater turtle populations, whose scavenging of carrion in rivers is essential to maintaining water quality, particularly during fish kill events. This outcome will directly benefit communities who rely on rivers for water.</p>								
<b>La Trobe University</b>		214,247.00	432,131.00	457,347.00	333,502.00	94,039.00	0.00	1,531,266.00	

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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## Monash University

LP200200262	<b>The culture of implementing Freedom of Information in Australia</b>	37,221.50	98,367.50	137,731.50	76,585.50	0.00	0.00	349,906.00	OFFICE OF THE VICTORIAN INFORMATION COMMISSIONER, THE SOUTH AUSTRALIAN OMBUDSMAN, OFFICE OF THE INFORMATION COMMISSIONER
Lidberg, A/Prof Johan K	In partnership with three Australian Information Commissioners/Ombudsmen this project aims to map the culture of administering Freedom of Information (FOI) laws across a number of Australian jurisdictions. The study aspires to capture and analyse the attitudes among FOI practitioners, government agency managements and political leaders toward information access implementation. The project aims to provide the partner organisations with an increased understanding of the culture of administering FOI to inform training/awareness programs and campaigns in order to increase the functionality of FOI. Well-functioning access to information systems is crucial both for good governance and Australia's participation in the digital economy.								

### National Interest Test Statement

Freedom of Information laws have existed in Australia since 1982. Over time, legal amendments led to some minor improvements in functionality from the user's point out view. However, it is clear from previous research that the culture of implementing the laws is as important as legal reforms. In spite of this, there has not been any comprehensive, in-depth and systematic research done capturing and assessing the importance of the information access culture. This project will capture and analyse this culture. Understanding how information access culture impacts access to information will be a crucial building block if Australia is to benefit fully from the digital economy, which will increasingly be built on machine learning and Artificial Intelligence (AI). Without access to information and data, AIs cannot learn effectively and Australia risks missing out on major parts of the digital economy. Contributing to Australia's capacity to be part of the global digital economy and making sure FOI fulfils its promises of being a governance accountability tool are the two principal national benefits of this project.

LP200200817	<b>Diaspora Humanitarians: How Australia-based migrants help in crises abroad</b>	65,000.00	122,500.00	115,000.00	57,500.00	0.00	0.00	360,000.00	DIASPORA ACTION AUSTRALIA INC, INTERNATIONAL ORGANIZATION FOR MIGRATION, DEPARTMENT OF DEFENCE, REFUGEE COUNCIL OF AUSTRALIA INC, SETTLEMENT SERVICES INTERNATIONAL LIMITED, NETWORK FOR EMPOWERED AID RESPONSE
Gamlén, A/Prof Alan J	This project aims to map the extensive humanitarian activities and contributions of Australia-based migrants to crises abroad. Australia is home to large diasporas who are connected to communities in many humanitarian crisis hotspots, including the project's focus areas: Afghanistan, Syria, South Sudan, Myanmar, Indonesia, Nepal, and the Pacific Islands. By generating much-needed knowledge on how and why migrants engage in humanitarian responses, the project expects to support and improve the work of diasporas themselves, the Australian Civil-Military Centre and other humanitarian organisations, who are partners in the project. This will benefit Australia by highlighting our innovative leadership role in humanitarian and migration issues.								

### National Interest Test Statement

Since its landmark 2017 Foreign Policy White Paper, the Australian Government has been 'committed to working with diaspora communities to promote Australia's image and reputation', because they 'have the knowledge and networks to help improve our understanding of development and humanitarian issues in other countries'. However, there is little evidence available to guide Government agencies to establish effective working relationships with diaspora communities. For the first time in Australia, this project will map the extensive and varied humanitarian contributions of diaspora communities. It will generate new knowledge and tools to help diaspora communities, Government agencies, NGOs and Australia-based international organisations to provide more effective humanitarian aid in times of humanitarian crises. It will bring together diaspora communities, INGOs and government agencies and provide evidence on how to successfully engage with diaspora communities to enhance Australia's humanitarian efforts overseas.

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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LP200201042	<b>The role of hyaluronan in antigen and immune cell trafficking</b>	83,551.50	176,139.00	189,924.00	97,336.50	0.00	0.00	546,951.00	HALOZYME THERAPEUTICS, INC
Porter, Prof Chris J	<p>This project aims to examine how hyaluronidase, an enzyme that breaks down hyaluronan (a structural component of the skin), affects antigen and cell trafficking to lymph nodes. The project expects to generate new knowledge on the role of hyaluronan in antigen presentation and immunity and to build an interdisciplinary collaboration across immunology, lymphatic transport and material science. The expected outcomes of the project are the development of new knowledge and new models to explore immunity, interdisciplinary training for researchers and post graduate students and a roadmap of the importance of hyaluronan in antigen trafficking.</p> <p><b>National Interest Test Statement</b></p> <p>This project aims to examine how hyaluronidase (an enzyme that breaks down a structural component of the skin) affects the transport of material from the skin to the lymph nodes. This is important because these transport networks are critical for understanding, and ultimately controlling, the first barrier to our immune defence. The project will generate new knowledge in the rapidly growing field of macromolecular biotechnology and will provide an interdisciplinary training ground for early career scientists at the biotechnology/immunology interface. Ultimately, these fundamental studies have significant potential to add economic benefit in the design of enhanced protein therapeutics, immunomodulators and vaccines which rely on the transport mechanics we will study. The licensing arrangements of valuable IP underpinning these new technologies will be negotiated on commercial terms to ensure Australian benefit.</p>								
	<b>Monash University</b>	185,773.00	397,006.50	442,655.50	231,422.00	0.00	0.00	1,256,857.00	
<b>Swinburne University of Technology</b>									
LP200200084	<b>Defending AI based FinTech Systems against Model Extraction Attacks</b>	66,167.50	134,141.50	137,752.00	69,778.00	0.00	0.00	407,839.00	RENHE GROUP PTY LTD
Wen, Dr Sheng	<p>This project aims to develop new methods for defending artificial intelligence (AI) based FinTech systems from highly potent and insidious model extraction attacks whereby an adversary can steal the AI model from the system to cause intellectual property (IP) violation, business advantage disruption, and financial loss. This can be achieved by examining various attack models, creating active and utility-preserving defences, and inventing non-removable watermarks on AI models. The outcomes are new tools for securing AI-based FinTech systems before deployment and tools for IP violation forensics post-deployment. Such capabilities are beneficial by improving the security and safety of FinTech systems and other nationally critical AI systems.</p> <p><b>National Interest Test Statement</b></p> <p>We are in the era of embedding artificial intelligence (AI) within software systems to achieve exceptional performance in tasks traditionally dominated by humans. Australia is an early adopter in bringing AI technologies into critical areas, such as financial services. Many FinTech companies in Australia rely on AI to provide intelligent products and services, and our FinTech market is estimated as AUD 4.2 billion in 2020. However, recent work has shown that AI systems are vulnerable to model extraction attacks, which can lead to intellectual property (IP) violation, business advantage disruption and financial loss. The outcomes of this project can protect the IP and reputation of Australian businesses, as well as preventing substantial economic loss. In addition, this project aligns with Australia's national priority in cybersecurity. This project will advance knowledge towards ways to protect the security and robustness of AI systems, enhancing their critical applications and safeguarding Australia.</p>								
	<b>Swinburne University of Technology</b>	66,167.50	134,141.50	137,752.00	69,778.00	0.00	0.00	407,839.00	



# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

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The University of Melbourne										
LP200200107	<b>Can real-time control deliver environmental flows to protect urban streams?</b>	65,246.50	126,695.00	113,769.50	96,132.50	43,811.50	0.00	445,655.00	MELBOURNE WATER CORPORATION, SOUTH EAST WATER CORPORATION, YARRA RANGES SHIRE COUNCIL	
Fletcher, Prof Timothy D	Increased frequency and severity of both droughts and floods in a changing climate accentuate the already-severe global impacts on urban streams. This project aims to test a world-first approach to tackling this problem, using advances in real-time control technology. The approach facilitates a public-private co-management of water resources, offering simultaneous benefits in water supply, flood mitigation and provision of environmental flows to maintain healthy urban streams. It has the potential to revolutionise the way we manage water in cities, providing a model for the water industry around the world in adapting to a changing climate, turning excess and damaging urban runoff into a dual resource of water supply and environmental flows.									
	<b>National Interest Test Statement</b>									
	Urban water and waterway managers face the multiple challenges of meeting demand for water resources, while protecting cities from flooding and streams from degradation. This project aims to revolutionise urban water management to meet these challenges, using real-time control technology to bring together water authorities and urban landholders. If successful, it will underpin a digital revolution in how both water and streams are managed in cities and towns, allowing households, businesses, communities and water authorities to work together in providing environmental water to streams in a variable and changing climate. It also aims to provide new understanding of how people interact with the novel technology—critical if it is to be mainstreamed. With global investment in smart water technology predicted to reach \$22 billion in 2020 alone, this project seeks to establish Australia as a leader in smart water technology. It aspires to be a proof-of-concept for a much wider range of future smart water technologies, and to create new young researchers capable of leading this frontier.									
LP200200847	<b>Researching an all-of-family program in family violence &amp; substance misuse</b>	59,924.00	122,072.50	124,291.00	62,142.50	0.00	0.00	368,430.00	KIDS FIRST AUSTRALIA, ODYSSEY HOUSE; VICTORIA, DEPARTMENT OF HEALTH AND HUMAN SERVICES	
Humphreys, Prof Cathy F	Family violence services and drug and alcohol services have been inappropriately siloed given co-occurrence of these problems is common. This project aims to evaluate an innovative program which integrates these services, focuses on fathering to ensure recognition of the needs of children (50% of family violence victims) and provides all-of-family support to ensure the safety and well-being of women and children. Expected outcomes include better evidence for countering family violence, and policy frameworks for integrated service provision. Changing the behaviour of men who use violence is a significant social challenge and the outcomes of this targeted approach should have ramifications nationally and internationally.									
	<b>National Interest Test Statement</b>									
	The cost to the nation of family violence is estimated at \$2.2 billion annually. Millions of dollars are expended each year to support men to desist from family violence. The results have been equivocal, particularly for groupwork programs to which thousands of men are referred each year. The 4th National Action Plan to Reduce Violence Against Women and their Children urges a more targeted response, which addresses the specific needs of men accessing these programs. The potential efficiency and effectiveness of bringing two traditionally siloed service systems together (family violence and services to address problematic substance use) to improve the safety, health and wellbeing of all family members is a potentially important innovation, and one that will need to be evidenced. The increase in both alcohol consumption and family violence during COVID highlights the project’s relevance, while the focus on fathering holds potential benefits by interrupting intergenerational abuse, with immediate advantages to children.									

# Minister's Approval for Linkage Projects 2020 Round 2 for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)			Total (\$)	Partner Organisation(s)
		2020-21 (Column 4)	2021-22 (Column 5)	2022-23 (Column 6)	2023-24* (Column 7)	2024-25* (Column 8)	2025-26* (Column 9)	(Column 10)	(Column 11)
LP200200917	<b>Control systems for irrigation networks in storage critical operations</b>	81,447.50	213,150.00	215,370.50	83,668.00	0.00	0.00	593,636.00	RUBICON RESEARCH PTY. LTD.
Weyer, Prof Erik	<p>The aim of the project is to further develop automatic control technologies for irrigation channels, with particular focus on supply mode operations for channels with critical limits on storage and inflow. The significance relates to the role of irrigation channels in food and fibre production. New knowledge generated will help Rubicon Water expand its Total Channel Control product, already used extensively in Australia, to suit emerging markets with significant export potential. Beyond the commercial impact, expected benefits include improved service, reduced environmental footprint, the safeguarding of assets in extreme events, and the training of engineers in the important areas of modelling and control for infrastructure management.</p> <p><b>National Interest Test Statement</b></p> <p>This project will develop new automatic control technologies for irrigation channels that are to be operated in a supply driven manner and in which limits on the capacity to store water and constraints on the inflow of water at the source are critical factors. Irrigators in parts of Australia will also see better water delivery service, particularly in the critically important periods of high demand, which will lead to more productive farming and increased yields. Moreover, there will be increased water savings as the delivery efficiency of channel networks is improved, with follow on environmental benefit through a reduction in the amount of water diverted for irrigation, leaving more for the maintenance of lakes and natural waterways. The project outcomes will also provide Rubicon Water potential commercial opportunities, nationally and internationally, leading to economic benefits and the consolidation of Australia's standing as a world leader in irrigation channel automation technology.</p>								
	<b>The University of Melbourne</b>	206,618.00	461,917.50	453,431.00	241,943.00	43,811.50	0.00	1,407,721.00	
	<b>Victoria</b>	720,305.50	1,509,196.50	1,552,685.50	901,645.00	137,850.50	0.00	4,821,683.00	

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(Columns 1 and 2)	(Column 3)	2020-21 (Column 4)	2021-22 (Column 5)	2022-23 (Column 6)	2023-24* (Column 7)	2024-25* (Column 8)	2025-26* (Column 9)	(Column 10)	(Column 11)
Western Australia									
The University of Western Australia									
LP200200680	<b>Predicting seed lifespan for improved curation of conservation seed banks</b>	75,657.50	143,294.50	142,965.50	147,747.50	72,419.00	0.00	582,084.00	DEPARTMENT OF BIODIVERSITY CONSERVATION AND ATTRACTIONS
Withers, Prof Philip C	This project aims to improve the practice of seed banking for the conservation of the Australian flora. Recent evidence points to diverse and complex storage behaviour for wild seeds and to seeds of many species being shorter-lived than anticipated. Predicting seed storage behaviour and viability decline is central to effective seedbanking. This project expects to develop new high throughput technologies and data interrogation techniques for predicting seed lifespan in storage, and alternative storage protocols for problematic seeds. Results will allow seed bank managers to more efficiently triage and curate their seed collections and will benefit seed banks globally.								
<b>National Interest Test Statement</b>									
Seed banking is a primary strategy employed across Australia for the conservation of plants and the mitigation of biodiversity loss, and represents a major investment by the Federal and State governments, NGO's and industry groups. However, seed banks and seed collections are costly to establish and maintain, and our incomplete understanding of seed performance in storage pressures the utility of seed banks as a low-maintenance means of "extinction-proofing" Australia's diverse flora. Our project will have positive economic and environmental benefits by providing empirical tools to evaluate seed quality prior to, and during storage to increase efficiencies in curation, to ensure irreplaceable collections are not lost, and viable seeds are available when required. The project will increase the capability of conservation science and management in Australia, maintaining our position as world leaders in the field of agriculture and environment, and by developing and promoting new technologies with international application.									
LP200200835	<b>Combined Terahertz Imaging and Optical Coherence Tomography</b>	49,927.00	101,766.50	105,594.00	53,754.50	0.00	0.00	311,042.00	THE TRUSTEE FOR LASTEK UNIT TRUST, THWAITES-MORRISSEY TRUST
Wallace, A/Prof Vincent P	This project aims to exploit the synergies between terahertz imaging and optical coherence tomography. These novel imaging modalities will be combined into a single multi-modality technique which will have application in numerous industry sectors like manufacturing, non-destructive testing, pharmaceutical and medicine. The intended outcome of the project is to create an internationally leading position for Australia in cutting-edge research in optical and terahertz imaging. This innovative, fundamental research will expand Australia's research capacity in imaging with wide ranging applications. The anticipated goal of the project is to build a prototype imaging system with industry partners ready for the next step to commercialisation.								
<b>National Interest Test Statement</b>									
The project will fuse two imaging techniques, terahertz and optimal coherence tomography, thus creating new instrumentation to measure the structure and hydration of complex layered materials like the human eye or the coatings of pharmaceutical tablets. Such imaging will lead to extensive commercial and healthcare benefits for both the Australian population and for medical and manufacturing industries. For example, determining how the coating of a tablet dissolves will lead to better drug delivery and faster development of new drugs. A non-invasive procedure for revealing the microstructure and hydration of a human cornea will allow early detection of eye disease, which will prevent vision impairment and distressing expensive procedures like corneal transplants. As these cannot currently be measured directly, there is no competing technology. The market for this technology is thus expected to be significant. The technology will be commercialised to a broad market leading to high-paid jobs in Australia's high-tech industry, whilst also improving the wellbeing of Australians and saving healthcare costs.									

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		2020-21 (Column 4)	2021-22 (Column 5)	2022-23 (Column 6)	2023-24* (Column 7)	2024-25* (Column 8)	2025-26* (Column 9)	(Column 10)	(Column 11)
LP200200897  Thebaud, Dr Nicolas J	<b>Defining the multi-scale controls on high-grade gold mineralisation</b>  This project aims to improve our understanding of how extremely high-grade gold occurrences form in order to further our understanding of metal transport and accumulation within the Earth's crust. This project will generate new knowledge in the area of gold geochemistry using novel experimental programs, interdisciplinary approaches and by utilising advanced technologies. Expected outcomes of this project include reducing the unpredictability of high-grade gold occurrences that impact both production and exploration strategies. This project should benefit the mineral industry partners by helping to discover high grade gold resources which is of great benefit to Australia.	126,950.00	253,527.50	236,462.00	109,884.50	0.00	0.00	726,824.00	CSIRO, NORTHERN STAR RESOURCES LTD, KARORA RESOURCES PTY LTD, FOSTERVILLE GOLD MINE PTY LTD
<b>National Interest Test Statement</b>  In a resource constrained world and with growing cost and energy pressures, sustainable gold production relies on the maximisation of near-mine resource development and productivity. Current world-wide gold production mainly comes from low-grade deposits associated with high energy and water consumption together with vast volumes of waste. Furthermore, as easily accessible resources are steadily depleting, there is a growing shift towards exploration and extraction for high-grade mineralisation. Down the line, the development of environmentally friendly mineral processing techniques to reduce the environmental impact of mining, represents a growing challenge for the Australian mining industry. A better understanding of the chemical processes leading to the solubilisation, transport and deposition of high-grade gold in natural ore systems is therefore critical for future sustainable development of a the gold resource sector and associated technological applications.									
LP200201020  Metaxas, Dr Peter J	<b>High-resolution optical studies of solids nucleation in cryogenic processes</b>  During liquefied natural gas (LNG) production, low concentration impurities can freeze and block the cryogenic heat exchangers at the heart of the liquefaction process. Substantial knowledge gaps exist regarding the kinetics of these solids (i.e. the rate at which they form), especially at the part per million concentrations relevant to LNG. This project, in partnership with ExxonMobil Upstream Research Company, will use a proven high resolution optical technique to deliver new insight into solid nucleation and growth kinetics in the high-pressure cryogenic fluids that govern industrial blockage risk. The results will enable energy optimisation to increase liquefaction efficiency as well as tests of innovative blockage-remediation methods.	75,000.00	150,000.00	150,000.00	75,000.00	0.00	0.00	450,000.00	EXXONMOBIL UPSTREAM RESEARCH COMPANY
<b>National Interest Test Statement</b>  In 2019, Australia became the world's largest exporter of LNG (liquefied natural gas) with Australia's annual LNG exports worth an estimated \$47B. LNG will continue to play a major role in the global energy landscape as the world transitions away from coal: in 2019 Australia provided almost half of Japan and China's total LNG imports. The outcomes from this research will enable more economic, energy efficient and safer liquefaction of natural gas which is critical to its cost-effective export. The project will ensure that LNG producers in Australia remain globally competitive in an increasingly crowded market, enabling continued local economic benefits and job creation to come from the export of this key energy commodity. The new technologies developed during this research will also be applied to oxygen liquefaction which is critical for health, manufacturing and space industries. The project outcomes will pave the way for broader use of the technologies and liquefaction expertise developed in this project to support new industries including that associated with Australia's emerging hydrogen economy.									
The University of Western Australia		327,534.50	648,588.50	635,021.50	386,386.50	72,419.00	0.00	2,069,950.00	
Western Australia		327,534.50	648,588.50	635,021.50	386,386.50	72,419.00	0.00	2,069,950.00	
		<b>4,658,790.50</b>	<b>9,600,352.00</b>	<b>9,463,797.00</b>	<b>5,600,344.00</b>	<b>1,210,700.00</b>	<b>132,591.50</b>	<b>30,666,575.00</b>	