National Environmental Science Program

Sustainable Communities and Waste Hub

Research Plan 2024 - Hub Indigenous-led Project

Hub Indigenous-led Project (HIP): Remanufacturing Plant and Plastic Wastes in Regional and Remote Communities

Project type: Hub Indigenous-led project (Category 1 under Three Category Approach)	
Project status: new project seeking approval, following Emerging Priority project	
Cross-cutting initiative:	No
Project start date: 01/07/2024	**Project end date**: 30/06/2025
Project leader details:	Name: Victor Steffensen Role: Project Lead Organisation: Firesticks, CEO and co-founder Name: Dr Peta-Marie Standley Role: Assistant Lead Organisation: Firesticks, Research Manager and co-founder Name: Professor Veena Sahajwalla Role: Hub Project Lead Organisation: UNSW Sydney Name: Anirban Ghose Role: Hub Assistant Project Lead Organisation: UNSW Sydney

Project description

Project summary

This is a collaborative partnership between project leader Firesticks Alliance Indigenous Corporation and Sustainable Communities and Waste Hub researchers from Impact Priority 2 (Plastics and other wastes) to analyse the properties and viability of several species of plants, being strategically harvested for the betterment of the total ecosystem, along with locally “on country” collected waste plastics, for use as input for manufacturing.

The first stage of this project has been supported via an Emerging Priority which will qualify, quantify, and provide initial pathways for the problem. This research plan details Stage 2 of the project.

The current practice for disposing of these species, once cleared, involves their incineration. The objective of this project is to redirect this waste away from burning and integrate it into a resource stream. This bio-waste will be combined with waste plastics, collectively remanufactured into input materials to produce new items intended for use within regional communities. The dual benefit of restoring the land from specific species and reinstating native grasses contributes to a more sustainable environment. Simultaneously, leveraging the bio-waste from this process, in conjunction with waste plastics, to create new products and foster economic opportunities within local communities, promotes a circular economy and yields positive outcomes for communities.

The Emerging Priority quantified and analysed materials of plant biomass being harvested from country. The second stage of this project will investigate remanufacturing methodologies to combine the harvested materials with other plastic waste materials with a view to use these waste materials to manufacture Green Ceramics that could be used in housing and other infrastructure opportunities by local Indigenous communities associated with the country concerned. With the project being Indigenous led, it will be Category 1 under the new NESP Three Category approach for Indigenous engagement.

This project is guided by national priorities including the current policies and programs to improve the lives of all Aboriginal and Torres Strait Islander people, as well as "The National Waste Policy 2018" and the "2019 National Waste Policy Action Plan" and supported by further plans including modernisation of recycling and manufacturing capability; and sustainable protection of national materials supply (critical materials). As stated by the 2019 review of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), ‘environmental management is inadequate without incorporating the knowledge, land and sea management practices of Indigenous Australians.

Firesticks is a not-for-profit Indigenous network that aims to activate and increase the use of cultural learning pathways to fire and land management and support Indigenous leadership to protect, conserve, and enhance cultural and natural values of people and Country through cultural land management practices.

This project relates to each of the Hub’s three overarching thematic areas: Rural and regional solutions; waste resources; and sustainable communities.

Project description

The HIP initiative seeks to harvest problematic plant species from landscapes to restore the health and identity of the natural environment and local Indigenous communities, and aid in environmental restoration and preservation. These species have been identified by experts in Indigenous Land Management. Additionally, the initiative involves the collection of waste, particularly plastics, from these areas. The objective is to redirect this bio-waste away from incineration and towards utilisation as a valuable remanufacturing resource. This resource will be combined with other waste materials,

primarily plastics, to possibly produce Green Ceramic tiles locally for various applications in housing and the built environment.

The techniques are to engage Aboriginal harvesting land management for healing country alongside cultural fire practices across varying locations in Australia. Mono-cultures of invasive plants stretch for tens of thousands of hectares of one species in one region alone causing environmental devastation through the loss of ecosystem identity.

Overall, the HIP project intends to assist communities to conduct feasibility studies for potential harvesting programs that tie land management opportunities with social enterprise. This will be an important process of activating innovation within Indigenous knowledge into mainstream solutions for environmental restoration, improving agriculture, and Aboriginal advancement for employment and cultural practice revival. The process will be taking plant samples from involved Indigenous communities that are currently working with Firesticks fire mentorship program and have expressed permission and interest to undertake the opportunity.

The researchers will build collaborations with relevant governmental stakeholder groups, e.g. the Regional Offices of National Indigenous Australians Agency and National Parks and Wildlife Services.

Stage 1 involves the harvesting of samples and examination of their properties and developing initial prototypes combining with other waste materials, chiefly plastics, to create Green Hybrids that can be used in the built environment. The initial phase of the research collaboration exploring potential viability and developing prototypes will run for 26 weeks.

Stage 2, the subject of this proposal, seeks to continue the project work beyond the initial laboratory testing of the waste materials, to explore the viability and potential use of the selected waste feedstock prototype/s along with estimates of economic viability for potential use within the manufacturing industry.

This stage of the project will also examine further uses of these species combined with plastics and other waste materials to examine their potential in other products. This phase will build research relationships across cross-cultural domains and different Indigenous communities across the Firesticks network, which operates around the country in many locations.

As stage 2 is underway and starts to come to its conclusion, a proposal for stage 3 will come forward as part of the Hub’s Research Plan 2025 and / or 2026.

Hub Indigenous-led Project (HIP): Remanufacturing Plant and Plastic Wastes in Regional and Remote Communities

The problem

Indigenous communities are endeavouring to reintroduce cultural land management practices in Australia, to ensure greater sustainability for both the land and local communities. Firesticks is a well-known and successful Aboriginal organisation at the forefront in leading the charge of First Nations peoples to help ensure better land management and local community sustainability.

Landscapes across the country have significantly altered due to various land practices and the absence of local Aboriginal land management knowledge. Firesticks is endeavouring to use Aboriginal land practices and knowledge to better manage invasive species including both native and non-native. Furthermore, wastes of various types – and in particular plastics – populate many of the land areas Firesticks is endeavouring to help restore and protect.

Our response

The HIP initiative aims at harvesting invasive native and introduced species of plants from landscapes as part of restoring the health and identity of the environment, as well as the collection of waste and particular plastics in those areas. This aims to divert this bio-waste from burning / incineration so it can be investigated and used as a manufacturing feedstock resource, combined with other waste, primarily plastics, to locally manufacture Green Ceramic tiles for use in housing and other built environment applications.

Researchers will investigate the mechanical and chemical properties of the harvested natural materials through fundamental material analysis, e.g. tensile testing, and engagement with Indigenous knowledge custodians to understand the beneficial and advantageous properties of these materials. This will be combined with an understanding of plastics, and other waste materials, present in the local communities to create viable functional, structural, or decorative hybrids. The formulations of the hybrids will be optimised to maximise the sustainability of the final products using tools such as Life Cycle Assessment, structural properties, economic viability, and manufacturability.

The techniques are to engage Aboriginal harvesting land management for healing country alongside cultural fire practices across varying locations in Australia. Mono-cultures of invasive plants stretch for tens of thousands of hectares of one species in one region alone causing environmental devastation through the loss of ecosystem identity.

The initial phase of the program – stage 1 as an Emerging Priority before becoming a Hub Indigenous-led Project within RP2024 with support from IP2 – intends to assist various local communities by conducting feasibility studies for potential harvesting programs that tie land management opportunities with social enterprise.

This will be an important process of activating innovation within Indigenous knowledge into mainstream solutions for environmental restoration, improving agriculture, and Aboriginal advancement for employment and cultural practice revival, i.e., more sustainable communities. The process will be taking plant samples from involved Indigenous communities that are currently working with the Firesticks fire mentorship program and have expressed permission and interest to undertake the opportunity.

This initial phase will include the harvesting of samples and examination of their properties and developing initial prototypes working with other waste materials. The initial phase of the research collaboration exploring potential viability and developing prototypes will run for 26 weeks.

In-scope

- Harvesting of sample quantities of species of plants by Firesticks, selected based on alignment with Indigenous knowledge and suitability for remanufacturing.
- Material analysis of the sample species to characterise mechanical and chemical properties.
- Determining suitability of plant materials for remanufacturing through the experimentation using prototypes.

Out-of-scope

- At-scale harvesting of plant species.
- Treatment of landscapes using fire.

Methodology

2023-2024 activities and methods

Stage 1 (this section included for continuity, with stage 2 details below, given stage 1 was included as an Emerging Priority project)

Step 1 - To develop cultural protocols around the process of applying Indigenous knowledge and IP. Create a MOU between Firesticks, the Hub and the SMaRT Centre around the protection of cultural knowledge and safeguarding community ownership of potential business opportunities.

Step 2 – Literature survey and sampling. A literature survey will be conducted to quantify the problem and validate the target species. Based on literature and expertise in Firesticks, appropriate sampling kits will be procured that will be used for the process as to SMaRT Centre requirements. Collect all parts of each sample species to send down for analysis and prototyping. This will also include the training and involvement of the community practitioners to collect the samples and the presentation of information.

Definition and Detail of Invasive Species

Note: Consultation from ecologist or related expert should be sought before deciding target species. Removal of any naturalised species from an environment will impact biodiversity.

“An invasive species is a species occurring, as a result of human activities, beyond its accepted normal distribution and which threatens valued environmental, agricultural or other social resources by the damage it causes.” (DCEEW, 2023)

Step 3 - Development of case studies (written and multimedia) with each sample of how the harvesting assists in healing landscapes through the indigenous lens, supports cultural fire aspirations, and benefits the broader community and vision towards resilience.

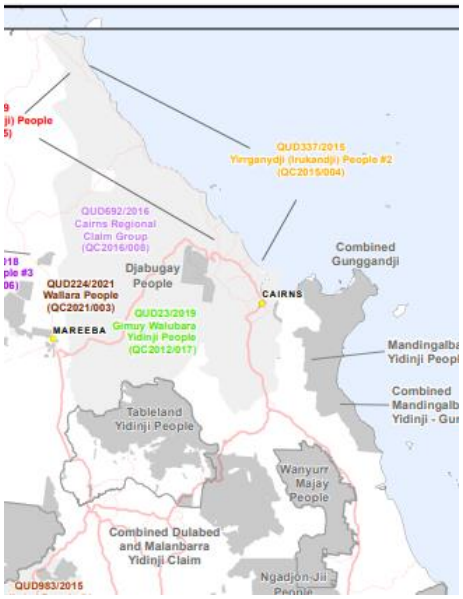
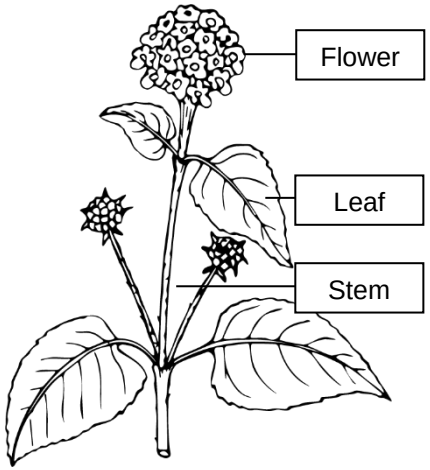
Stage two

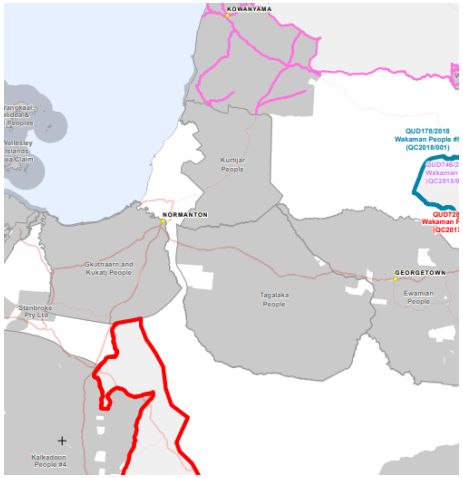
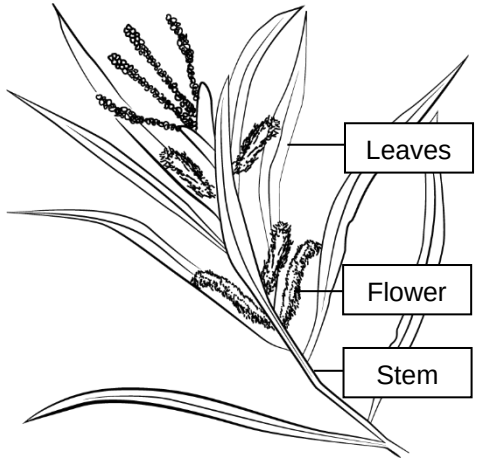
Stage two will explore the viability and potential use of the selected prototype/s along with estimates of economic viability for potential use within the manufacturing industry. The next stages will develop business plans, options of products, process, costs, equipment, employment and viability, training, and potential additional uses from local knowledge and prototype analysis.

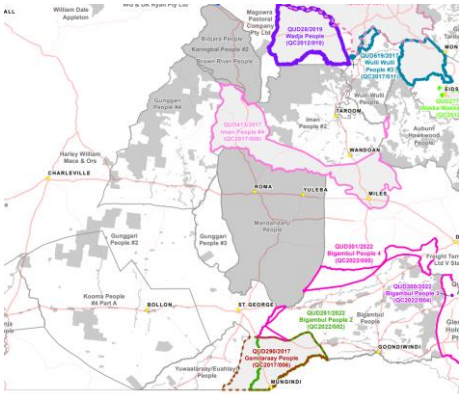
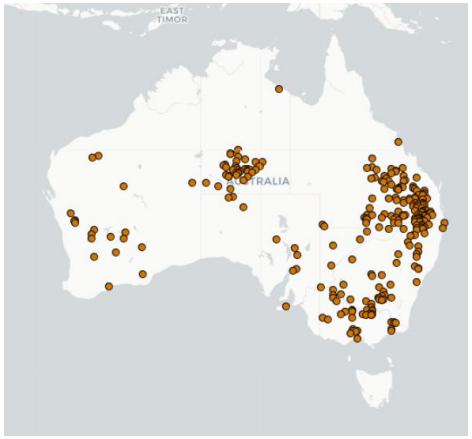
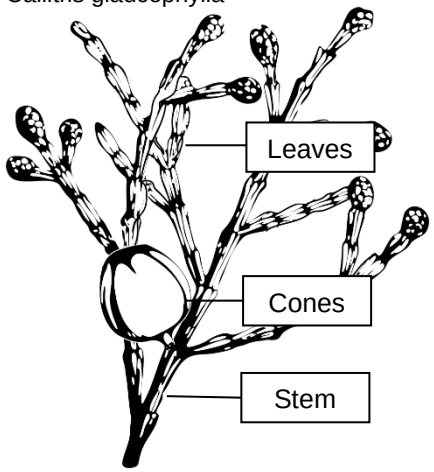
The second stage of the project will conduct on-country community workshops, GIS and drone mapping analysis and on ground surveys to estimate hectares of the materials that were determined viable for prototypes.

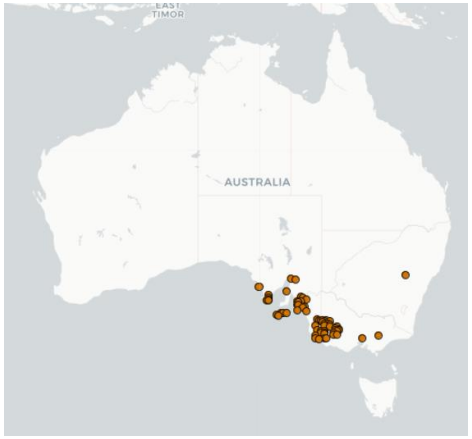
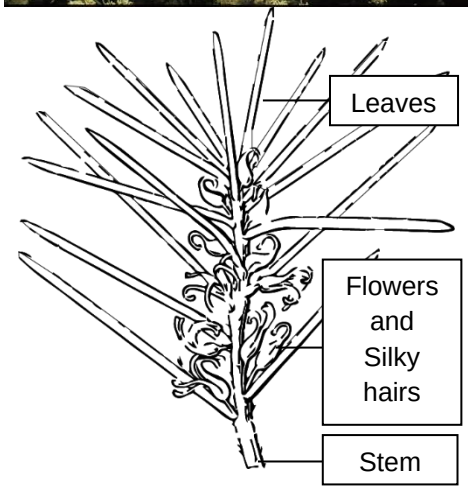
This will enable the determination of the economic viability of these species for potential use in the green ceramic manufacturing industry. This stage of the project will continue to analyse properties of these species combined with waste materials that may be viable for other purposes in the manufacturing industry.

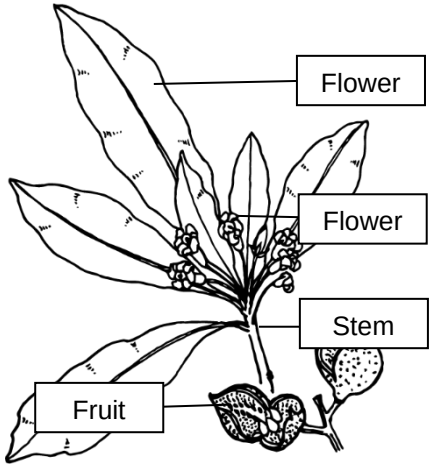
The second phase of the program intends to engage with involved communities, including:

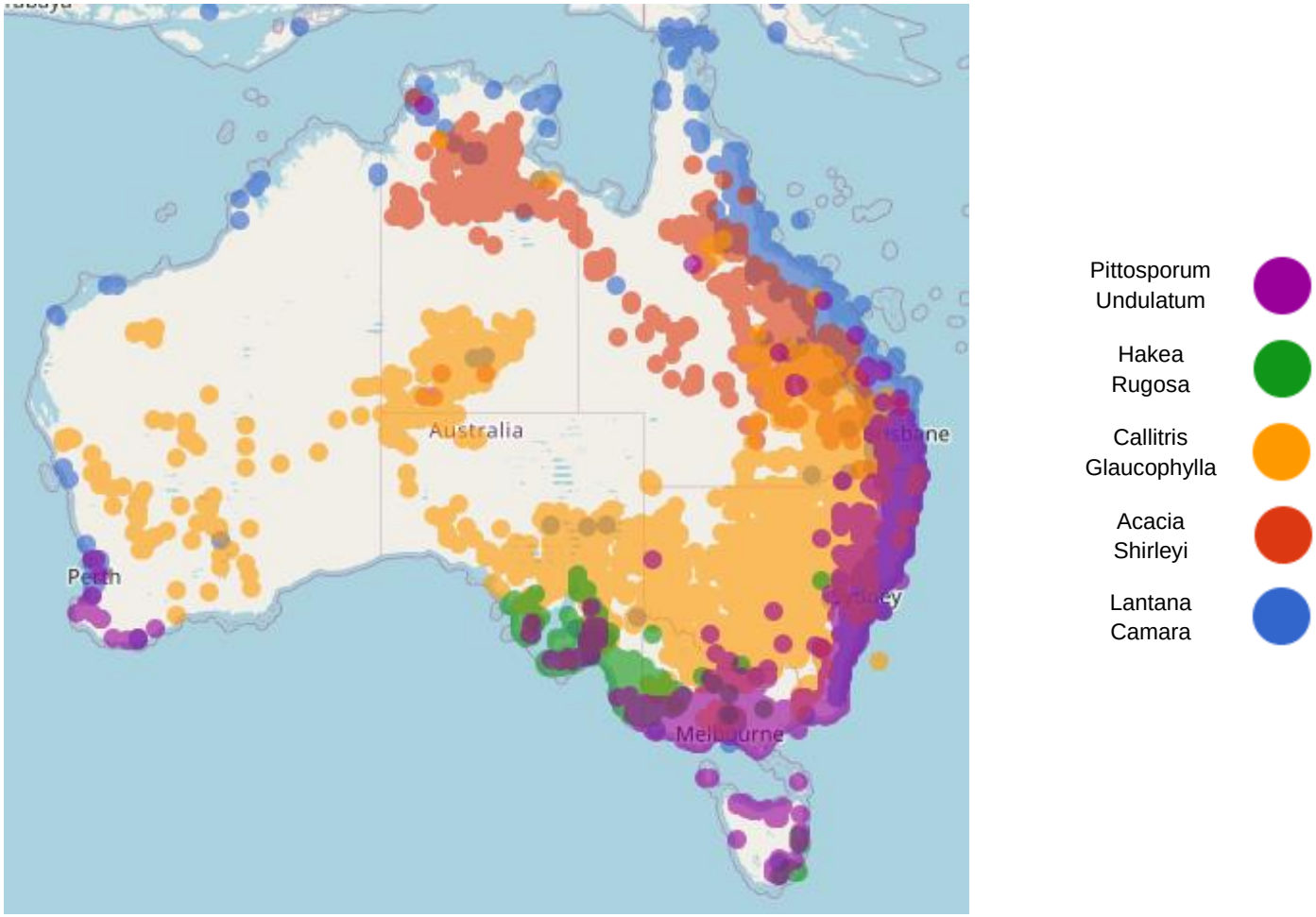
Location	Indigenous Communities	Website	Map	Target Species	Threatening Distribution	Impacts
Far North QLD: Djabugay Aboriginal Corporations	Djabuganydji, Bulwanydji, Nyagali, Yirrganydji, Gulunydji	djabugay.org.au	  (Munir & Kodela, 2023)	 Lantana camara 	NSW, NT, QLD Declared weed in NSW, NT, QLD, WA Scattered in coastal regions, from Cairns, QLD, to Nowra, NSW. Some colonies in Tamworth (NSW), Texas (QLD), some towns in NT	Regarded as one of the most pernicious weed species in Australia, it warrants significant concern. This plant has the propensity to establish dense, impenetrable thickets, displacing native vegetation and encroaching upon pastures and forests, thereby exacerbating fire hazards by accumulating fuel. Furthermore, it poses a significant threat as it is poisonous to both livestock and humans. Additionally, its presence negatively affects the diversity and health of soil fauna and fungi. Although less detrimental than the Common Lantana due to its shorter height and lack of thorns, it possesses the potential to exhibit similar aggressiveness as the Common Lantana due to its drought resistance and is also toxic to livestock with the capacity to supplant native grasses and shrubs.

Northern Gulf: Tagalaka Aboriginal Corporation	Representing peoples of the gulf savannahs surrounding Croydon, Normanton, and East Hayden	General 6 — Tagalaka Aboriginal Corporation	  (Tindale & al., 2022)	  Acacia Shirleyi (Lancewood) Kuu Mbae	Tropical and subtropical regions of Australia	Can become dominant in disturbed or drought-stricken parts of country where not naturally found

Southern Queensland: Bunya Peoples Aboriginal Corporation	Mandandanji, Kooma, Gunggari, and Bigambul Peoples	Who We Are – Bunya People's Aboriginal Corporation (bpac.org.au) - Kooma RNTBC - Gunggari Country – Gunggari Native Title Aboriginal Corporation (gunggaripbc.com.au) - Country – Bigambul Native Title Aboriginal Corporation	  (Hill, 2020)	 Callitris glaucophylla 	Some Eucalypt woodland, it can dominate previously diverse forests. White Cypress has expanded to dominance since colonisation and presents the greatest threats to ecosystems outside of typical habitat	Callitris species typically co-dominate forests with eucalypt and acacia species, but in the absence of regular burning and native grazing, cypress can dominate a forest and reduce fauna diversity that is seen in mixed forests. Callitris-only forests have extremely low fauna diversity.

Tasmania	Tasmanian Aboriginal Centre	Tasmanian Aboriginal Centre – About Us (tacinc.com.au)	 (Barker, et al., 2020)	  Hakea Rugosa	Tasmania, infestation by mainland species	Competition for soil resources and space, disruption of local indigenous habitat.

NSW South Coast	Yuin Peoples		  (Cayzer, 2022)	 Pittosporum undulatum 	Declared a weed in NSW and WA. Dangerous in and outside its native habitat, including in SA, TAS, and WA. It is most problematic in areas with >700mm annual rainfall.	Can form dense thickets of foliage in disturbed habitats. Foliage shields undergrowth from sunlight and changes soil nutrient load due to rich leaf litter.



Map of Australia outlining documented locations of the five identified problematic species (Belbin, et al., 2021)

Step 1 - Project budget will allow project leader Victor Steffensen and research team to continue to collaborate and present on the research partnership, its purpose and outcomes at suitable agreed events, on country workshops and field work and conferences.

Step 2 - To develop partner Indigenous community protocols around the process of applying Indigenous knowledge and IP. Create agreements with engaged communities to ensure the protection of their ICIP and equitable benefit sharing in community ownership of any potential emerging business opportunities.

Step 3 - Community workshops, on-country assessment and field work, drone and GIS mapping. This will also include the training and involvement of the community practitioners engaged in the project.

Step - 4 - Continuation of case studies (written and multimedia) with each viable prototype and engaged community on the research methodology, proposed future methods, species and regions and estimates of economic viability for potential use within the manufacturing industry. Submit Stage two report in March/April 2025.

Step 5 -

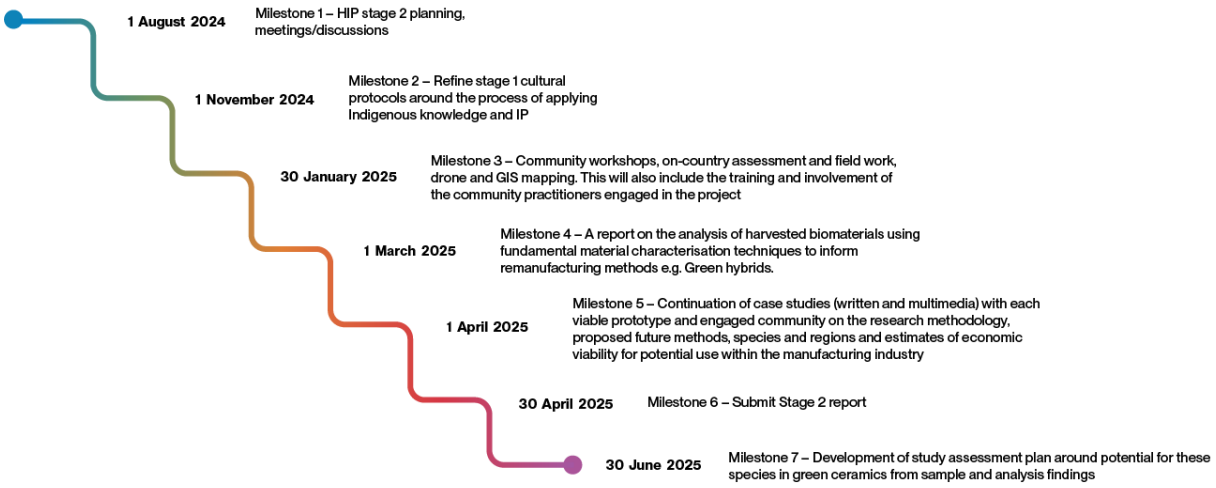
This step focuses on assessing the potential of certain species for incorporation into environmentally friendly ceramics. The research involves analysing the mechanical and chemical properties of harvested natural materials using techniques such as tensile testing. Engagement with Indigenous knowledge custodians is essential to comprehend the advantageous properties of these materials. The study also considers the presence of plastics and other waste materials in local communities. By combining this information, the aim is to develop functional, structural, or decorative hybrids. Optimisation of these hybrids will be carried out using tools such as Life Cycle Assessment, considering factors like structural properties, economic viability, and manufacturability, to maximize the sustainability of the final products.

Test	**Purpose**	**Method**
Particle Size Distribution Analysis	Measures the size distribution of particles in the plant material.	Sieving or laser diffraction techniques to determine particle sizes.
Bulk Density Measurement	Evaluates the density of the plant material.	Measuring the mass per unit volume of the material.
Chemical Composition Analysis	Identifies the elemental and chemical composition of the plant material.	Techniques such as Fourier-transform infrared spectroscopy (FTIR), X-ray fluorescence (XRF), or elemental analysis.
Thermal Stability Analysis	Assesses the thermal stability of the plant material.	Thermogravimetric analysis (TGA) or differential scanning calorimetry (DSC) to determine degradation temperatures and heat capacities. Researchers may also undertake flame and combustion testing if deemed necessary.
Mechanical Testing	Evaluates the mechanical properties of the plant material.	Tensile testing, flexural testing, or impact testing to determine strength, stiffness, and toughness.
Moisture Content Analysis and Water Absorption Analysis	Determines the amount of moisture present in the plant material and measures the ability	Weighing the sample before and after drying to a constant weight at a specified temperature.

	of the plant material to absorb water.	Immersion of samples in water followed by weighing to determine water uptake.
Dimensional Stability Analysis	Assesses the tendency of the plant material to change dimensions with moisture exposure.	Measurement of changes in length, width, or thickness under controlled conditions.
Chemical Resistance Testing	Determines the resistance of the plant material to chemicals typically found in outdoor environments.	Immersion of samples in various chemical solutions followed by assessment of changes in properties.
Biodegradability Assessment	Evaluates the potential for biodegradation of the plant material.	Testing under simulated environmental conditions to observe degradation over time.

The findings from stage 2 of this research proposal will contribute to the development for the next phases of this collaborative proposal.

It is proposed that stage 3 will run from the end of 2025 to June 2026 and it will develop business plans, options of products, process, costs, equipment, employment and viability, training, and potential additional uses from local knowledge and prototype analysis.



Project Leadership

Firesticks will be leading the on-ground program with involved Indigenous communities in partnership with IP2 researchers from the University of New South Wales SMaRT Centre. Victor Steffensen is the lead practitioner and project manager within Firesticks and on behalf of the involved indigenous communities.

The Firesticks team will involve the participation of leading, local traditional knowledge practitioners, regional fire and mentorship program coordinators, and others from Firesticks including researchers, a research assistant, its functions for Partnerships and Fundraising, Executive Assistant, Communications and Executive Director.

Outputs

- Viability and potential use of the selected prototype/s along with estimates of economic viability for potential use within the green ceramics manufacturing industry across four different geographic regions.
- Results from further analysis of the species combined with plastics and other waste materials to examine their potential use in other products.

Outcomes

- Indigenous knowledge application in the manufacturing industry - specific estimates of areas, volumes, on-country community workshops, GIS and drone mapping analysis and on ground surveys to estimate hectares of the materials that were determined viable as prototypes.
- Determination of the economic viability of viable prototype species for potential use in the green ceramic manufacturing industry
- Build research relationships across cross-cultural domains, different Indigenous communities and geographic areas across the Firesticks network.

Linkages

Linkages to IP2 (plastics and other wastes) and possibly after consideration IP1 (nature-based connections), IP4 (air quality) and IP5 (waste management initiatives).

Is this a cross-hub project?

No. But may become so once the project commences and moves through stage 2 and subsequent stages as more connections are better understood.

Does this project contribute to a cross-cutting initiative?

No. But may become so once the project commences and moves into RP2025 or RP2026 as more connections are better understood.

Pathway to impact

Outcomes
The ultimate outcome of this research over the course of the NESP program will be to create more sustainable land practices and communities and an increase in materials circularity in Indigenous, rural, regional and remote Australian communities. **Informing policy and frameworks** This outcome will contribute to the delivery of national priorities, policies and programs to improve the lives of all Aboriginal and Torres Strait Islander people, assist in emerging Indigenous land management practices, as well as National Waste Policy 2018" and the "National Waste Policy Action Plan. This new knowledge is expected to inform future policy discussion and considerations at all levels of government on enhancing Indigenous land management practices, enhancing Indigenous economic and social opportunities, and addressing waste management, including by reducing bio-waste brining and microplastics in regional and remote communities. **Community benefits** The research projects will identify ways in which local communities can benefit from regional technological solutions to transform waste materials into new products. The benefits may include local jobs, improved environment (understanding microplastics), and local education. **Economic Benefits** The project's outcomes promise to catalyse supply chains and create new markets. This work will lead to opportunities for Australian Indigenous, remote, regional and urban communities to embrace circular economy solutions to drive social and economic benefits. **Environmental Benefits** The project will divert bio-waste from burning, into an economic resource, and advance recycling and plastic related policies, providing a framework to develop and promote new and sustainable national supply chains, reducing the impacts of waste materials subject to the export ban as well as the effects of microplastics on the environment. It will inform the Department's policy design and decision making via community co-designed solutions and on-ground success. The research will also provide innovative recycling solutions for waste streams, including plastics, tyres, textiles, and glass. **Partnerships & Collaboration** Building partnerships between Indigenous communities, the Hub, SMEs, all levels of government through Indigenous project leadership and Hub support, to reduce the impact of bio and other waste materials.

Research-user	Engagement and communication	Impact on management action	Outputs
Various Indigenous communities via Firestick Indigenous project leadership Local communities and land councils Local councils and other related community organisations DCCEEW and its Indigenous links	Research-users are to be engaged in the development and design of project and outputs through Indigenous-led co-design discussions. Findings and outputs to be communicated via project workshops, project update emails and presentations. Key stakeholders will continue to be engaged through regular briefings to ensure alignment of workplans and outputs to ensure mutual benefits. Researchers will continue to work closely with industry, scientific and regulatory bodies to meet the aims of the project. The researchers will work closely with the Knowledge Broker, Industry and Impact Manager, Data Wrangler, Senior Indigenous Facilitator and Communications and Media Manager of the SCaW Hub for capturing and transferring the knowledge created in this project. Research outputs as knowledge products will be communicated through industry media, the SCaW Hub website, via social media and workshops and events.	Initial Research completed in accordance with the Emerging Priority proposal will be used to direct operations including finding fit-for-purpose technological solutions for regional and remote communities. Will assist industry and non-government stakeholders to make decisions regarding business and investment for treatment and resource recovery from wastes. Will create symbiosis between industry stakeholders across material and resources supply chains, jurisdictions, researchers, and departments.	A preliminary report of findings to inform next stage. A progress report on key findings, including policy recommendations, A final report on project outcomes and findings and recommendations for full year research plan/ A range of practice guides, fact sheets, presentations and other relevant knowledge products (such as videos).

Indigenous consultation and engagement

Australian Aboriginal and Torres Strait Islander peoples have integral physical and cultural connections with land and sea environments and their sustained protection and care. However, land management, and invasive species as well as waste streams such as plastics, tyres, glass, metal, textiles litter the landscape of regional and remote areas of Australia. Based on preliminary discussions with Aboriginal organisation Firesticks, greater action is needed to address this issue. Firesticks is committed to leading this project, initially as an Emerging Priority and then as a Hub Indigenous-led Project within RP2024.

This project proposal is a result of ongoing discussions between Firesticks and IP2 researchers from the UNSW SMaRT Centre, with the ultimate aim of both improving land management practices using Indigenous knowledge and using waste materials gathered as part of that interaction as feedstock materials for manufactured products, such as Green Ceramics.

In 2023, the Hub will be developing an interactive visual dashboard of Indigenous research across Australia, led by the Senior Indigenous Facilitator. The dashboard will allow the capture and exploration of research relevant to the SCaW remit, including for this project to inform co-design activities for RP2024 and beyond. It is anticipated that this will assist in identifying existing or proposed research relevant to the project and communities affected by the project, providing an opportunity to collaborate with Indigenous researchers or build upon their work.

This Hub Indigenous-led Project's research goals are aligned to the Environmental Science Program Indigenous partnership principles and the Hub's Indigenous Partnership Strategy, which include respect and mutual benefit, a right to Indigenous cultural and intellectual property, co-created research, Indigenous lead governance, and relationships-focused and an individual approach.

This project fit into **Category 3 of the new NESP Three Category Approach**, that is it is Indigenous led. This project will draw upon the knowledge of all project partners. In addition, all non-Indigenous project team members are required to undertake the Our Mob cultural awareness training and Indigenous Cultural and Intellectual Property (ICIP) True Tracks training to ensure engagement with Aboriginal and Torres Strait Islander communities is appropriate. The project activities will be co-designed and built on respect and mutual benefit.

Which Three-category approach the project meets	**1. Indigenous led** ☒	**2. Co-design** ☐	**3. Communicate** ☐

Project milestones

The following project milestones are specific to RP2023. Each subsequent research plan will elaborate on the annual milestones for multiyear projects.

Milestones (stage 2)	**Due date**	**Responsible person/s**
Milestone 1 – HIP stage 2 planning, meetings/discussions	1 August 2024	**Victor Steffensen /** Veena Sahajwalla / Anirban Ghose
Milestone 2 – Refine stage 1 cultural protocols around the process of applying Indigenous knowledge and IP	1 November 2024	**Victor Steffensen /** Veena Sahajwalla / Anirban Ghose
Milestone 3 – Community workshops, on-country assessment and field work, drone and GIS mapping. This will also include the training and involvement of the community practitioners engaged in the project	30 January 2025	**Victor Steffensen /** Veena Sahajwalla / Anirban Ghose
Milestone 4 – A report on the analysis of harvested biomaterials using fundamental material characterisation techniques to inform remanufacturing methods e.g. Green hybrids.	1 March 2025	Victor Steffensen **/ Veena Sahajwalla** / Anirban Ghose
Milestone 5 – Continuation of case studies (written and multimedia) with each viable prototype and engaged community on the research methodology, proposed future methods, species and regions and estimates of economic viability for potential use within the manufacturing industry	1 April 2025	**Victor Steffensen /** Veena Sahajwalla / Anirban Ghose
Milestone 6 – Submit Stage 2 report	30 April 2025	**Victor Steffensen /** Veena Sahajwalla / Anirban Ghose
Milestone 7 – Development of study assessment plan around potential for these species in green ceramics from sample and analysis findings	30 June 2025	**Victor Steffensen /** Veena Sahajwalla / Anirban Ghose

Data and information management

Knowledge products generated during the project phase, co-designed with stakeholders and the Hub knowledge broker, may be publicly accessible via the Hub website. This dissemination will align with the Hub's data management and communication strategies and will be contingent upon ethics approvals and relevant Indigenous Cultural and Intellectual Property (ICIP) arrangements. The data products developed in the EP will be co-designed with the Senior Indigenous Facilitator, Data Wrangler and Knowledge Broker to meet the FAIR and CARE guiding principles.

Project output	**Data management and accessibility**
Reports	Subject to approval by DCCEEW, these will be made publicly available on the Hub website, in accordance with the Hub Data Management Strategy. Where Indigenous knowledges are included in project outputs, the management and accessibility of those outputs will be subject to the Ethics approvals, FAIR (Findable, Accessible, Interoperable, Reusable) and CARE (Collective benefit, Authority to Control, Responsibility, and Ethics) principles and any specific Indigenous Cultural and Intellectual Property (ICIP) arrangements developed with the communities involved. We will handle the data that emerges from these discussions according to Article 31 of the United Nations Declaration on the Rights of Indigenous Peoples, which Australia has endorsed, and affirms that: *Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions.*

Location of research

The table below describes the planned locations where the majority of the research will be conducted. These locations are preliminary and may be expanded or refined as the project progresses.

Sample collection will be conducted at a number of regional and remote locations including Far North Queensland. Prototyping and laboratory work relating to materials analysis will be undertaken at the UNSW Sydney Kensington Campus. Any remanufacturing sample products will occur at the Kandui MICROfactories situated in the Shoalhaven region.

Hub Indigenous-led Project (HIP): Using invasive plant waste and plastic wastes as manufacturing feedstock			
At which spatial scale is the project working	**National** ☐	**Regional** ☒	**Local** ☒
Location(s) – gazetted region /place name	Lab Work: UNSW Sydney, Kensington Field Studies: Far North Queensland - Wet Tropics; Northern Gulf Far North Queensland - Tugalaka aboriginal corporation; South West Queensland - Murray Darling Basin, Balonne Shire Council and traditional owner groups; Pakana Truwana Tasmania Desktop Studies: various Firesticks locations		
Aboriginal or Torres Strait Islander nation or traditional place name(s)	Lab Work: Eora Nation Field Studies: Far North Queensland - Wet Tropics; Northern Gulf Far North Queensland - Tugalaka aboriginal corporation; South West Queensland - Murray Darling Basin, Balonne Shire Council and traditional owner groups; Pakana Truwana Tasmania Desktop Studies: various Firesticks locations		

Project keywords

Aboriginal land management practices, Indigenous cultural practices, invasive plants, waste/s, plastics, waste resources, sustainable communities, circular economy, regional/remote, re-manufacturing, Microfactories

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