National Environmental Science Program

Sustainable Communities and Waste Hub **Research Plan 2025**

Contents

Introduction

The National Environmental Science Program

The National Environmental Science Program (NESP) is a long-term commitment by the Australian Government to environment and climate research. The program:

- provides evidence for the design, delivery and on-ground outcomes for environmental programs
- helps decision-makers, including from Indigenous communities, to build resilience
- supports positive environmental, social and economic outcomes.

The first phase of NESP invested over **$145 million** (2014–15 to 2020–21) into 6 research hubs and emerging priority research projects. The second phase is investing **$149 million** (2020–21 to 2026–27) into 4 new research hubs. These hubs are:

- Resilient Landscapes Hub
- Marine and Coastal Hub
- Climate Systems Hub
- Sustainable Communities and Waste Hub

The NESP is administered by the Department of Climate Change, Energy, the Environment and Water (the Department). More information on the NESP is available at dcceew.gov.au/science-research/nesp

Department role

The 4 NESP hubs have been formed to conduct applied research within their specific themes. Each activity year the Department will work with the Minister, the hubs and other key stakeholders to identify and refine research priorities and develop projects that align with these priorities.

This annual review and evaluation of research outputs and impact provides the flexibility needed for the hubs to engage in new themes of research in an adaptive manner and ensures that the focus is on the delivery of relevant and practical research. Hubs are responsible for co-design of the research projects in consultation with research-users and in partnership with relevant Indigenous communities. Hubs are also responsible for monitoring and evaluating the research project outcomes during the life of the hub.

The research prioritisation is a rolling process and will be informed by key milestones in each activity year, such as the annual progress report and submission of the next research plan.

Hub role

The Sustainable Communities and Waste (SCaW) Hub is a consortium comprising five world-class research institutions led by the University of New South Wales, Sydney (UNSW), including the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Monash University (Monash), the University of Tasmania (UTas) and Curtin University (Curtin).

The Hub provides a collaboration space for academics, government, industry and the community, with the shared objective of enhancing sustainable community outcomes and reducing negative waste impacts. The Hub is involved in a number of cross hub initiatives with the three other NESP hubs to provide information and address priority research questions to strengthen policy and decision making by research-users.

Our research agenda is co-designed with the Department and other research-users at all levels of government, industry, non-government organisations (NGOs), national associations and Indigenous and other community groups in urban, regional and remote Australia.

Our Vision

Healthy, resilient, connected and prosperous urban, regional and remote communities with reduced impact on the environment.

Purpose of this Research Plan

This Research Plan 2025 (RP2025) was developed by the SCaW Hub, in consultation with the Department and other research-users, to address key priorities identified during co-design discussions that occurred through RP2021, RP2022, RP2023 and RP2024. These are summarised in the 'Research' section of this plan, and outlined in Attachments A and B. Most projects commenced in RP2022 or 2023 and span multiple years. These projects will continue to be refined as they are delivered with our research-users over the life of the Hub. Several projects provide opportunity for cross-hub coordination, and activities have been built into projects to work efficiently with key researchers in other NESP hubs to coordinate efforts, especially through the Initiatives. Ongoing engagement with the Department is paramount.

RP2025 will be delivered, in accordance with, and guided by our agreed Hub strategies for Indigenous partnerships, data management, communications and knowledge brokering. These strategies provide direction on Indigenous engagement, data management, communication and knowledge product outputs.

Research Plan 2025 provides:

- the research priorities the Hub is funded to investigate, including those related to crosscutting Initiatives
- research projects that will address these priorities
- how each research project will be co-designed and delivered to research-users
- how the outputs of the research will be communicated with key stakeholders
- how the SCaW Hub will work collaboratively within and across hubs.

This research plan also provides summary information on the management and governance of the Hub, including the broad funding profile, key staff and research organisations, and the risks that need to be monitored and managed to ensure success.

Initiatives

In addition to its hub-level research projects, each hub is also responsible for delivering a cross-cutting Initiative and contributing research to other initiatives where appropriate. The Initiative includes cross-hub collaboration and may include multiple projects to deliver management options, data and information for the themes listed below.

The 4 initiatives are:

Initiative	Lead Hub
Protected Place Management	Marine and Coastal
Threatened and Migratory Species and Threatened Ecological Communities	Resilient Landscapes
Waste Impact Management	Sustainable Communities and Waste
Climate Adaptation	Climate Systems

For the SCaW Hub, the Waste Impact Management Initiative involves cross-hub collaboration and may include multiple projects to deliver management options, data and information. Where appropriate, SCaW projects will also undertake research to support the SCaW-led Initiative as well as other hub initiatives.

To strengthen our delivery on Waste Impact Management Initiative we have created initiative team that includes:

- Professor Matthew Kearnes joined as initiative lead for SCaW hub
- Dr. Heinz Schandl will remain working on IP5 projects, and contribute to the initiative
- Dr. Samane Maroufi joined as an initiative-focused researcher and her role is of Initiative Leader(assistant)

Emerging priorities

Each year, specific emerging priorities may be identified by the Department, hubs or third parties for delivery as research projects. If endorsed by the Department, a hub will develop research project/s to address the emerging priority.

Hubs are flexible and adaptable to respond to emerging priorities, with the ability to rapidly scale output, bring in external expertise or respond if additional resources are made available. Hubs are required to set aside 10% of NESP funding being spent per calendar year (in any category) so they can respond to emerging priorities; these funds can be rolled into the subsequent year if they are not used. Emerging priority projects are developed outside a hub's annual research proposal process. Once emerging priority projects have been approved, a hub's research plan and activity budget for the relevant calendar year will be amended, and emerging priorities will be included in the hub's annual progress reports.

Presently two emerging priority projects approved by the department are in progress in the Hub. First EP project is "Remanufacturing Plant and Plastic Wastes in Regional and Remote Communities". It is a collaborative partnership between project leader Firesticks Alliance Indigenous Corporation and Sustainable Communities and Waste Hub researchers from Impact Priority 2. Second EP project is on "Developing a real-world testing protocol for evaluating particulate and greenhouse gas emissions from Australian wood heaters" lead by impact priority 4.

Research priorities

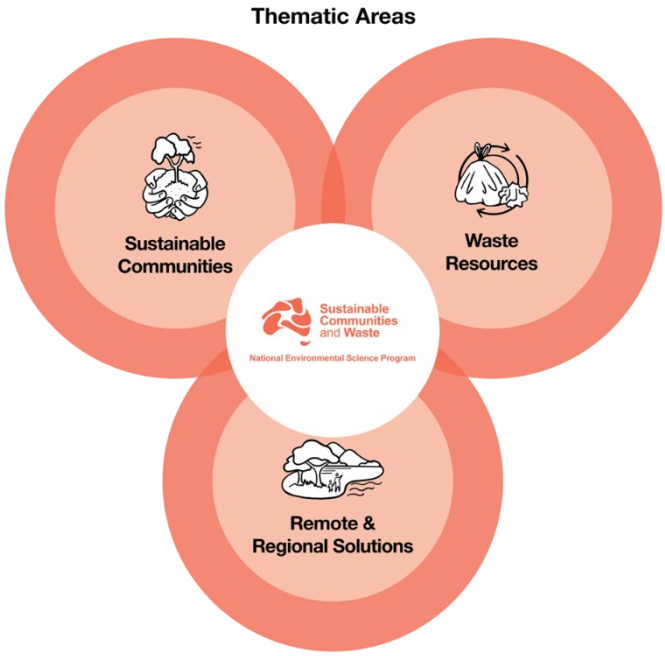
The SCaW Hub is committed to a body of activity that includes short- and long-term research projects, and the Waste Impact Management Initiative.

Broadly, the research priorities of the ScaW Hub are:

- applied scenario modelling to support sustainable people-environment interactions in communities, including urban heat island impacts and liveability analysis
- targeted information and management tools to reduce the impact of plastic and other material on the environment
- effective and efficient management options for hazardous waste, substances and pollutants throughout their lifecycle to minimise environmental and human health impacts
- maintained and improved air quality
- cross-hub coordination for the 'waste impact management' initiative to support decision maker policy development, program management and regulatory processes in both marine and terrestrial environments.

Key Thematic Areas

SCaW Hub projects impact across 3 thematic areas:

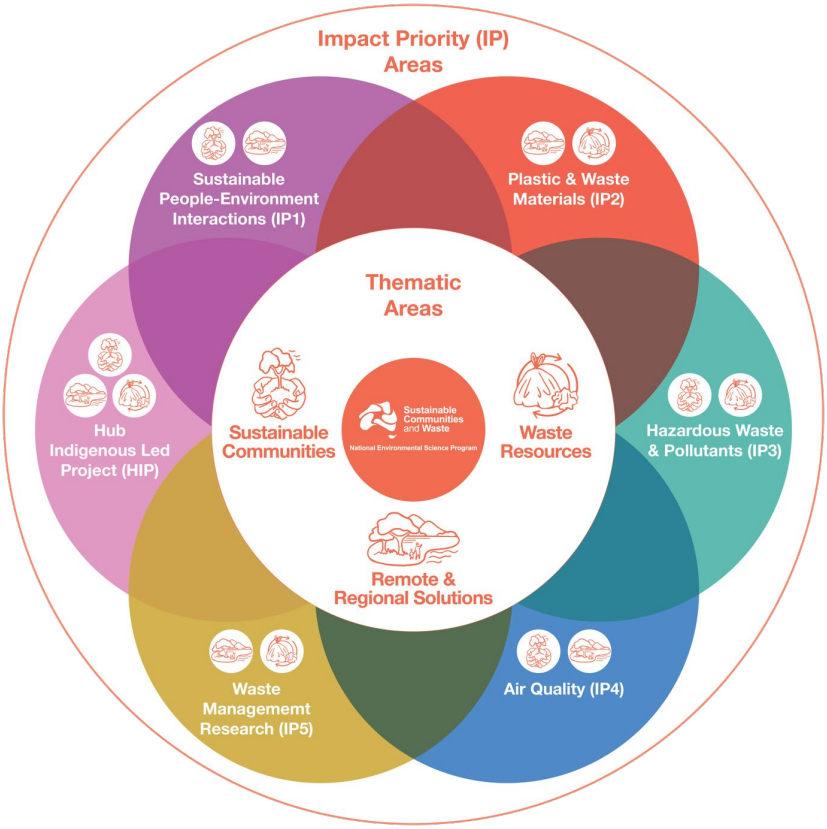


- **Sustainable Communities** explores ways to enhance and inform sustainable social outcomes, policy and cultural challenges, and the health, wellbeing and liveability of Place, including what is needed to protect, preserve and increase prosperity.
- **Waste Resources** explores the ways that a range of materials, such as plastics, tyres and e-waste can be recovered and revalued through innovative technological solutions, and a better understanding of waste flows through society.
- **Remote & Regional Solutions** explores how place-based, fit-for-purpose solutions can be developed as a response to local needs across Australia, in remote and regional communities as well as urban. It focuses on building economies of purpose rather than purely economies of scale.

Research Impact Priority Areas & Projects

The SCaW Hub has 5 Impact Priority (IP) Areas and one Hub Indigenous led project (HIP). that collectively are delivering outcomes against the 3 thematic areas. Each of these IP areas comprises of several research projects, identified and developed through co-design during RP2021, RP2022, RP 2023 and RP2024, led by collaborations of researchers across institutions. Each of the projects are briefly outlined below, with more detail provided in Attachments A & B.

All projects, but two was approved under RP2022 and/or RP2023, with some seeking amendments to budget and/or scope for RP2025. There are two new sub projects under Impact priority 2 and 4. Based on the risk identified by Hub related to delaying in contracting with collaborators and feedback received from the department for moving to multi-year contracts, hub planned to switch to multiyear contracts for RP2025 activities. In RP2025, Hub is also seeking approval for new impact priority 6 named as ‘Safe Circular Economy Projects’ which includes three-month scoping study project followed by an umbrella project that defines guidelines and directions for selecting various sub-projects.



IP1.05 - Sustainable People–Environment Interactions

Description

IP1 explores links between human wellbeing, and environmental and ecosystem health. Through research and collaboration with various stakeholders and using a Nature-based Solutions (NbS) lens, this research will develop knowledge and tools to inform and stimulate change for the shared benefit of people and nature.

This Impact Priority area also aims to empower regional, remote and Indigenous communities to become more sustainable and to improve liveability and help support the delivery of *Australia's Strategy for Nature 2019–2030*, *National Climate Resilience and Adaptation Strategy 2021–2025*, and a renewed *National Water Initiative 2004*. In RP2024, existing project details seeking amendment to scope and budget are outlined below.

Key Projects

- *IP1.02.01: Nature connection:*

The Nature Connection Project aims to increase benefits for people and the environment derived from valuing nature, through understanding nature connection in the Australian context, and identifying and supporting strategies to maximise positive impacts on health, wellbeing and sustainability for all Australians. Stream 3 of this project (Indigenous-led research) is a cross-Hub project being co-designed and co-delivered with leadership from the

melythina tiakana warrana Aboriginal Corporation (MTWAC). It is expected to focus on improving health of Tebrakunna Country and wellbeing of Coastal Plains Nation. In *RP2025, additional case studies will be identified and developed. These case studies will provide further nuances to our national work exploring the relationships between nature connection and wellbeing, and showcasing how those relationships vary across specific populations and circumstances.*

- *IP1.02.02: Water sensitive and liveable communities*

This research will help respond to the urgent call in the national discourse for research to support regional and remote communities and their local institutions to develop more effective ways to empower their voice and sovereignty in decisions that impact on their way of life, especially around areas such as water management. The research design adopts place based participatory action research and case studies of Indigenous led governance and institutional frameworks and models for Indigenous water outcomes. Stream 2 research design adopts an indigenous led series of yarning workshops with national water leaders and practitioners to identify key actions for invigorating First Nations knowledge and science. For the subsequent years (2024-2026), the research will seek engagement and partnerships with global First Nations Water leaders to strengthen perspectives and practitioner networks of Aquanulius and First Nations led water transformation requirements within the national context. This project will also support the second phase of National engagement, for the scoping of a national platform for fit for purpose capability building for regional and remote areas water needs.

Thematic Areas

- Sustainable Communities
- Remote & Regional Solutions

IP2.05 – Reduced Impact of Plastics and Other Materials

Description

IP2 investigates approaches to reduce the impact of plastics and other waste materials. In RP2025 IP2 is submitting new sub project IP2.05.03 to develop a sustainable and economically viable roadmap, for recycling end-of-life (EoL) solar panels aligning with principles of circular economy.

Key Projects

- *IP2.02.01: Understanding Microplastics*

This project seeks to address the concerns raised by councils, industry, governments and communities over microplastics and component materials to directly address gaps on the prevalence and impact of microplastic pollution. This includes understanding the sources and generators of microplastics and the finalisation of a national protocol for measuring and

monitoring microplastics, providing deeper insights for policy. In RP2025, a new project will be incorporated from 2025 which aims to open pathways for the characterisation and analysis of plastics from marine waste and electronic waste (e-waste) in the Indian Ocean Territories (IOT) of Australia. Pilots for synthetic grass waste and recycling rate improvement interception will also be initiated based on the guidelines laid out in RP2024.

- *IP2.02.02: Finding fit-for-purpose technological recycling solutions for regional and remote communities across Australia*

This project seeks to identify and trial fit for purpose technological recycling solutions, utilising hub and spoke models for remote/very remote, inner and outer regional communities across Australia. A number of case studies will provide the ground-truthing for solutions and provide lessons learned and stories to build the capacity of other communities. In 2025, the Annual Technology Forecast will be refined and updated to reflect changes to current and emerging technologies for the solutions identified for the demonstration case studies. The Circular Economy Technology framework will continue to be developed through co-design and workshopping with relevant stakeholders.

- *IP2.05.03: Creating value from metals and alloys of waste solar panels: Technological roadmap to capture economic benefits and lower carbon emissions.*

This new project focuses on advanced recycling techniques of metals to address the challenges posed by their complex material composition. These methods aim to identify the technologies and strategies for selectively recover high-value materials while enabling the creation of value-added products. This project also aims to develop a roadmap providing specific inputs on types of effective and suitable technologies and models for scalability for recovering high-value metals and alloys from EoL solar panels.

Thematic Areas

- Waste Resources
- Remote & Regional Solutions
- Sustainable Communities

IP4.05 – Improved Air Quality, Forecasting and Assessment

Description

IP4 explores how to reduce air pollution and its impacts in Australia. In RP2025 IP4 is submitting new sub project IP4.05.05 to develop the methodology to review Australian ambient air quality standards.

Key Projects

- *IP4.02.01: Let's yarn about smoke*

Bringing together practitioners from air quality, Indigenous health, and fire and land management domains with government and community stakeholders, this project aims to learn from, and where possible, support existing Indigenous-led actions towards improving air quality and health. It also seeks to identify opportunities to co-design air quality research, resources and tools that address Indigenous identified priorities for managing the impact of landscape smoke on the health of communities. RP2024-26 studies will evaluate the use of the Air Quality Forecasting model (AQFx) in the development of a smoke messaging communications framework and to develop strategies to prevent multi-morbidity by improving environmental health awareness by crowdsourcing ground-based air quality, temperature, and humidity data in three east Arnhem communities through fixed and wearable sensor monitoring.

- *IP4.02.02: How will a changing climate and emissions reduction measures impact sources of air pollution and secondary pollutant formation?*

The project is a modelling study that will provide a lens on how altered we can expect air quality to be under future emission scenarios in Australia. It will leverage modelling capability in the Climate Systems Hub and will contribute to cross hub Initiative activities. The research outcomes will be used by government agencies for managing future changes to air quality and health, IP4.02.02 will provide a lens on how altered we can expect air quality to be under future emission scenarios in Australia. The research outcomes will be used by government agencies for managing future changes to air quality and health.

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- *IP4.02.03: Wood heaters: developing and testing novel solutions to a persistent problem.*

This multi-year program aims to implement and evaluate novel solutions to wood heater emissions to (a) directly inform policy and (b) support the scaling up of successful interventions. The outcomes will provide practical guidance and solutions for decision makers across Australia. IP4.02.03 will engage a broad range of stakeholders, including the LGA's responsible for air quality complaints related to wood heater emissions and Asthma Australia who are funding the woodstove changeout intervention. This will ensure that suitable educational material can be developed to support actions.

- *IP4.02.04: Evaluation of interventions to reduce air pollution in safe havens and use of Low-Cost Sensors to identify areas of concern*

This project aims to provide up to date guidance on the choice and use of low-cost sensors and HEPA filters in the Australian context. Part of this project will include working with manufacturers to develop plain-English education material and programs to ensure research users understand the capacities and limitations of these technologies. Project outcomes will help research-users to make better choices over the selection, use of LCS and HEPA and, consequently, reduce the impacts of air pollution on health. Significant effort will be made to translate research findings into plain English and communicated through social media (infographics/fact sheets) as well as traditional peer reviewed papers and workshops/presentations.

IP4.05.05: Methodology for review of ambient air quality standards in Australia

This new project will support the development of the methodology for a review of the Australian ambient air quality standards. The review methodology will be developed in consultation with relevant policy and regulatory officials from the state and territory and Commonwealth environment and health agencies.

Thematic Areas

- Remote & Regional Solutions
- Sustainable Communities

IP5.05 Informing Australia's Circular Economy Transition (Waste Impact Management Research)

Description

IP5 focuses on providing information, data and management tools; informing design for repurposing waste and circular economy; informing the institutional and governance needs of community-based resource recovery and circular economy initiatives; and waste management and resource recovery opportunities for Indigenous communities.

Key Projects

- *IP5.04.01 - Metrics, data and indicators for material flow and stocks, waste and emissions to monitor progress of Australia's circular economy transition*

This project will further improve Australia's knowledge base for measuring progress of circular economy at the national, State and Territory and industry and product level which will include investigating opportunities for growing Australia's circularity potential and achievement. This project will employ the most up-to-date international methodologies and analytical tools for the assessment of Australia's material and waste flows. The availability of a yearly comprehensive report of material flows, waste (and emissions) and circularity will inform the policy process in Australia and will position Australia well internationally in several processes and for specific reporting initiatives. In 2025, report will include a time series of data and indicators for the 2010 – 2024 period to establish a baseline of Australia's performance in sustainable materials management, resource efficiency and circular economy. The baseline can inform future policy ambition and potentially establishing targets for key indicators.

- *IP5.02.03 - Governing community-based waste management and resource recovery and circular economy initiatives*

This project aims to develop a model for networked circular economy (CE) governance best suited to supporting regional CE in Australia. By prototyping and developing tools this project will extend existing local government networks of regional CE stakeholders and provide a platform to facilitate future CE collaborations between different local government areas that also links regional community-led initiatives with State and Australian government initiatives for CE. In 2025, the research will expand both the breadth of the regional initiatives database by increasing our ability to cover more sites; and the depth, increasing our capacity to responsively partner with interested regional groups to explore experimental interventions to governance and behavioural issues identified in the socio-technical transect.

- *IP5.02.04 - Identifying opportunities from waste management and resource recovery and the circular economy for Indigenous communities and businesses*

This project aims to identify suitable Aboriginal communities and will engage in a process to identify the magnitude and characteristics of the local waste problem and to explore potential opportunities for managing waste, recovering resources, and creating economic and employment opportunities. Building upon the understanding of circular economy solutions for Aboriginal communities in urban areas, RP2025 will focus on exploring circular economy solutions in Aboriginal communities located in remote and rural Australia. This study will consider the diverse socio-economic and geographical contexts of these communities and identify opportunities for resource recovery from waste in rural and remote settings.

Thematic Areas

- Waste Resources
- Sustainable Communities
- Remote & Regional Solutions

HIP.04- Hub Indigenous-led Project

Description

HIP project is our flagship Indigenous-led project that hardness the collaboration between First Nations Communities and our hub researchers from Impact Priority 2 (Plastics and other wastes). The objective of this project is to redirect this waste away from burning and integrate it into a resource stream. There are variations in this project under RP2024 (will be submitted to the department soon).and no changes in this project for RP2025.

Key Project

- *HIP.04.01: Remanufacturing Plant and Plastic Wastes in Regional and Remote Communities*

This project aims at harvesting invasive native and introduced species of plants from landscapes as part of restoring the health and identity of the natural environment and local Indigenous communities. This project will 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.

Thematic Areas

- Waste Resources
- Sustainable Communities
- Remote & Regional Solutions

Impact priority 6 (Proposed)- Safe Circular Economy Projects

Key Projects

- *IP6.05: Community Engagement in a safe circular economy: Scoping opportunities and barriers for participation*

Broad community engagement is increasingly recognised as an essential dimension of accelerating progress toward the circular economy. At the same time the potential for adverse public responses to specific CE initiatives, coupled with the increasingly stringent regulatory responses to the recirculating of hazardous materials, constitutes a key challenge for the CE. The project is designed to scope research and implementation opportunities for addressing these issues**. Hub is seeking approval for this scoping study. It will contribute to the further design of an IP6, leveraging synergies across existing SCAW hub programmes.**

Activities:

- Desk based scoping work – 3 months – focused on civil society, public and First Nations engagement in the CE
- Three co-design workshops involving existing SCAW Ips and relevant external stakeholders
- Development of research plan for IP6

- *Project IP6.05.01 – Community Engagement in a safe circular economy*

This project will serve as a continuation of the scoping project, using its outcomes to guide the direction and focus areas of the broader initiative. The aim is to establish an umbrella project that defines guidelines and directions for selecting various sub-projects. These sub-projects will collectively enable us to achieve the overarching objective of promoting safe circularity.

Activities:

- Develop a framework for evaluating potential sub-projects.
- Establish criteria for assessing the alignment of sub-projects with the broader goals of safe circularity.
- Define procedures for stakeholder engagement in the project selection process.

Thematic Areas

- Waste Resources
- Sustainable Communities
- Remote & Regional Solutions

Expected outcomes and outputs

The expected outcomes of NESP are to produce research that:

- enhances our understanding of Australia's environment and climate
- is communicated clearly to relevant stakeholders and the public
- is discoverable and accessible
- informs decision-making and addresses environmental priorities.

Research under the NESP is expected to inform the Department's policy and program delivery. More broadly, it will engage and inform key stakeholders with an interest in the outputs of environmental and climate science research, including state and local governments, business and industry, community groups, Indigenous land managers, Indigenous communities and education institutions.

Hub outcomes and outputs

The SCaW Hub is enabling a systemic, transformative response to Australia's sustainability, waste and pollution challenges through the integration of key research fields, including ecology, engineering, environmental monitoring, public health, data science, technology, behavioural change, environmental economics, business innovation, design, and regional and urban planning.

The research of the SCaW Hub is being undertaken across many parts of Australia's urban, regional and remote communities and environment. Working closely with all levels of government, private industry, NGOs and communities - including Indigenous - to co-design and co-implement research projects and co-create knowledge products, this research will provide positive outcomes towards solving the complex waste and sustainability problems that negatively impact society and the environment. Governance, community participation and Indigenous knowledge underpin our co-design approach. We aim to produce actionable knowledge, methods, tools and data for transitions towards circular economies and more sustainable communities.

Key outcomes and outputs of specific Impact Priority areas are outlined in Attachment B and summarised below.

Informing policy and frameworks

- **National Waste Policies**
    - Informing waste management policy design and decision making for the Department and government (at all levels) via community co-designed solutions for addressing

waste management, including for microplastics and in regional and remote communities.

- **Nature-Based Solutions Policies**
  - Data and knowledge to enable federal, state and local governments to better report on national and international policies, outcomes and obligations (e.g. *Australia's Strategy for Nature 2019–2030*, *National Climate Resilience and Adaptation Strategy 2021–2025, National Water Initiative, Closing the Gap, Protecting Victoria's Environment – Biodiversity 2037,* Sustainable Development Goals (SDGs), Aichi targets, post-2020 Global Biodiversity Framework, Ramsar triennial reporting to the conference of the Contracting Parties, post United Nations Framework Convention on Climate Change Conference of Parties 26, World Heritage Convention, IUCN).
- **Remote & Regional Water-Sensitive Community Frameworks**
  - Foregrounding Indigenous water research frameworks and methods – developing, identifying, and sharing ontologies, governances and values to better inform and develop water policy, frameworks and management in Australia.
- **Waste Demographic Frameworks**
  - Input to waste sampling, characterisation, and risk assessment methodologies to frame waste management policies around products and articles in Australia.
- **Air Quality & Emissions Planning**
  - Improved guidance on the use of HEPA filters for air quality in public spaces, guidelines on the selection and use of low-cost sensor networks for the management of local air quality problems and a roadmap for interventions to reduce exposure on high air pollution days.
  - Modelling on air quality under future emission scenarios in Australia which can be used by government agencies for managing future changes to air quality and health.
- **Circular Economy Decision Making**
  - Metrics and data on material flows, waste, emissions, resource recovery and circular economy for decision makers in federal, state and local governments and for businesses in the waste management and resource recovery sector.

Community benefits

- **Improving Health**
  - Reduction of exposure of Australian communities to poor air quality, microplastics and other hazardous chemicals from waste stockpiles.
  - Plain English guidance for the use of HEPA cleaners and outcomes of the comparison testing and intervention studies, to assist the public and stakeholders to make more informed decisions on purchasing cleaners to reduce their exposure to air pollution.
- **Enhanced Connections to Nature**
  - Quantifying, characterising and mapping Australian experiences and impacts of nature connection and pathways for a more nature-connected society and empowered Indigenous communities.
- **Waste Reduction**

  - Increasing materials circularity in Indigenous, remote, regional and urban Australian communities. This outcome will contribute to the delivery of the National Waste Policy 2018 and the National Waste Policy Action Plan, particularly the goals of "Helping to reduce total waste generated by 10% per person by 2030" and "Significantly increase the use of recycled content by governments, consumers and industry".

- **Community & Indigenous Leadership and Participation**
  - Identification of the governance and water system changes necessary to deliver water outcomes supportive of Indigenous communities.
  - Identification of ways in which local communities can benefit from regional technological solutions to transform waste materials into new products.
  - Greater understanding of knowledge exchange/capacity building for regional and remote communities, including championing Indigenous thought leaders and change champions to challenge the water and land management sectors.
  - Training and leadership to support Indigenous-led transformation in the water sector/industry and land and sea management.
  - Greater participation in research around waste and air quality, and uptake of research outcomes, by community stakeholders, and especially Indigenous researchers and stakeholders.
  - Community based experimentation of solutions for a local circular economy enabled by a sound governance framework and providing opportunities for scaling up and scaling out.

Providing valuable insights to inform policies, programs, and practices for waste management and circular economy initiatives, benefiting Indigenous communities across various locations.

- **Greater Understandings on Circular Economy and Waste**
  - Enhanced circular economy networks among community, government and industry actors in regional Australia and reduced waste generation in regional Australia.

Economic Benefits

- **Wellbeing Benefits**
  - Data and knowledge to support economic evaluations of the benefits of a society that connects with and values nature.
  - Opportunities for Australian Indigenous, remote, regional and urban communities to embrace circular economy solutions to drive social and economic benefits.
- **Circularity Solutions**
  - Innovative recycling and re-manufacturing solutions for waste streams, including plastics, tyres, and e-waste.
- **Supply Chain Opportunities**
  - Catalysing waste supply chains and creating new markets.
- **Waste & Emissions Analytics**

- Providing industry and non-government stakeholders confidence and evidence to make decisions regarding business and investment for treatment, resource recovery and product development from hazardous wastes.
- Information on what drives individual decision making on wood heater use, HEPA cleaner purchases and low-cost sensor network installations. These can be used to understand potential economic choices.

Environmental Benefits

- **Relationships to Nature**
  - Greater understanding of the characteristics and benefits of nature connection across Australia and the strategies that can support Australians valuing, connecting with and benefiting from nature, while creating positive environmental outcomes.
- **Urban Greening**
  - Knowledge and tools to effectively and equitably support nature connection, urban greening and Nature-based Solutions across rural, regional and remote Australia.

- **Reduction of Waste Impacts**
  - Reducing the impacts of waste materials subject to the export ban as well as the effects of microplastics on the environment.
  - Tangible reductions in material use, waste to landfill and emission and environmental impacts (climate change, natural resource depletion, biodiversity loss, toxic waste issues) for communities and businesses.
  - Accelerating the diversion of hazardous waste from the environment and ensuring safe reuse of waste in new products in ecological settings.
  - Diverting bio-waste from burning, into an economic resource.
- **Improved Air Quality**
  - Understanding which interventions result in increased human and environmental health outcomes. Successful interventions should see an increase in ambient air quality, with a reduction in the pollutants being emitted.

Partnerships & Collaboration

- **Diverse Stakeholder Partnerships**
  - New and strengthened partnerships among researchers, the Department, state environment agencies/departments, Indigenous groups, local communities, NGOs and other research-user partners.
  - Expanded and connected national network of key groups to create greater momentum in addressing state and federal hazardous waste diversion (from landfill) and resource recovery targets.
- **Strengthening Local Capacity**
  - Working with communities to strengthen their capacity for implementing fit for purpose waste management solutions.
- **Participatory Action Research**

  - Better understanding and inclusion of specific community needs, and ensuring diverse perspectives are incorporated into the research process, solutions and decision-making processes.
- **Transferring Learnings**
  - Reflecting on and refining localised research engagement and implementation approaches, so that they can be adapted to fit within other communities.
- **Indigenous Empowerment**
  - Greater understanding of methods that bring together knowledge systems to create frameworks and models for Indigenous-led and bi-cultural water governance and land management.
- **Cross-Hub Collaboration**
  - Deep collaboration with other NESP Hubs, such as Resilient Landscapes Hub, Climate Systems Hub, and Marine and Coastal Hub.

Hub Beneficiaries

The below list outlines broadly the types of research-users who will benefit from the SCaW Hub research.

- National, State, Regional and Local Government agencies and industries in the waste management and resource recovery sector
- Waste management authorities and industry associations
- Local authorities and communities
- Indigenous land and water councils and Indigenous communities
- Department of Climate Change, Energy, Environment and Water
  - Environment Protection Branch
  - Chemicals Management Branch
  - Waste Policy and Planning Branch
  - Waste Action and Modernisation Branch
  - Water and Resource Recovery Branch
  - Waste Policy and Planning Branch
  - Plastics, Packaging and Marine Debris Branch
  - Biodiversity Conservation Division
  - Heritage, Reef and Oceans
  - Biodiversity Policy & Water Science Branch
  - Environmental Science & Nature Based Solutions Branch
  - Protected Species and Communities Branch
  - Science partnership Branch
- All state and territory EPAs, and/or environment and primary industry departments

- Community groups, NGOs, national waste networks, water corporations and peak bodies
- Business and private sector industry partners engaged in conservation, plastics, air quality, wastes, water, agriculture, aquaculture, manufacturing.

Collaboration and partnerships

NESP encourages a collaborative, multi-disciplinary approach to environmental and climate research. Key to the success of the Hub will be the capacity to foster partnerships between hubs and with a wide range of decision-makers across the Australian community, including Indigenous communities, to achieve positive environmental, social and economic outcomes.

Co-design and co-production approaches to engagement and research are at the core of how the Hub collaborates with partners and other stakeholders. In RP2021, RP2022 and RP2023 stakeholder and research-user priorities and needs have helped to shape the focus of SCaW Hub Outcomes. In RP2025, co-design continues to play a vital role in all IP projects, as a way for primary and some secondary stakeholders to help meaningfully inform and evolve the research and improve outcomes for communities and environment.

The SCaW Hub has three main layers of collaboration:

- *Impact Priority Collaboration*, which includes cross-institutional collaboration across Impact Priority research areas
- *Stakeholder Collaboration*, which involves deep collaboration and co-production of research and knowledge with communities, research partners, and other research-users
- *Cross-Hub Collaboration*, which involves collaboration with other NESP hubs on research projects.

The following is a condensed list of collaborators and partners connected to the SCaW Hub. Detailed lists can be found in IP-specific project plans in Attachment B.

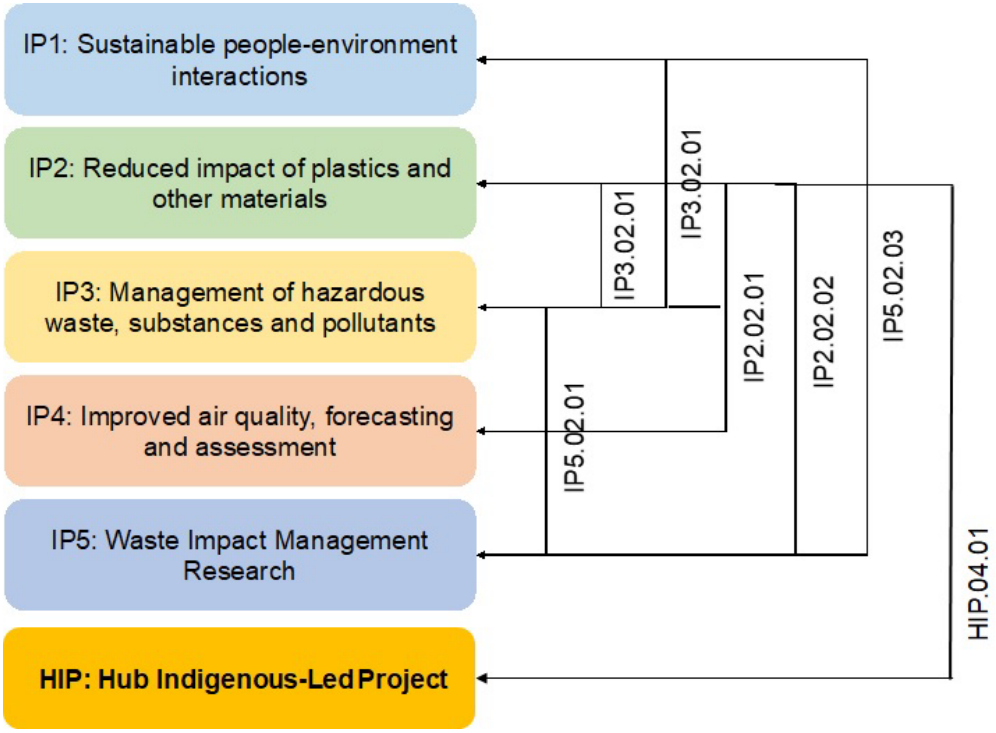
Stakeholder	Description and relationship to SCaW Hub
UTas	The Healthy Landscape Research Group (Heal) that aims to understand the connections between the environment and human health - especially in the

Stakeholder	Description and relationship to SCaW Hub
	context of rural and regional areas and small cities. It uses that knowledge to drive and learn from local initiatives to provide health benefits for Tasmanians and make Hobart a leading “healthy regional city”. Heal is currently undertaking a range of projects, including on urban and regional microbiomes; benefits of biodiversity and nature in small cities; the multiple social and health benefits of ecological restoration programs and community gardens; and dark skies conservation. Also, the Centre for Air pollution, energy and health Research (CAR).
CSIRO	CSIRO has several national programs related to plastics, critical energy metals, emissions issues, and organic waste. These are linked to government, industry and community interests, meshing strongly with the Hub vision. Health and environmental jurisdictions including the CSIRO/Bureau of Meteorology Smoke forecasting system (currently operating for fire agencies in Victoria and New South Wales).
UNSW	Various centres of excellence across UNSW, particularly the UNSW Sustainable Materials Research and Technology (SMaRT) Centre and its MICROfactorie technologies.
Monash	Monash was the lead in the Cooperative Research Centre (CRC) for Water Sensitive Cities, which wound up in June 2021, with the Water Sensitive Cities Institute, a SCaW Hub partner continuing to deliver against its mission to make cities more water sensitive. Monash is also leading two Circular Economy and Waste ARC Linkage and Discovery Projects. Behaviour Works at Monash has been collaborating since 2018 with Victorian and New South Wales -based policy partners to look at the issue of waste and how to encourage Australians to avoid, reduce, reuse and recycle waste and adopt circular economy approaches from a behavioural change perspective.
Curtin	Curtin’s Sustainability Policy Institute and extensive Indigenous Knowledge research expertise.
State Environment Departments and EPAs	Victoria Department of Environment, Sustainability Victoria, Land, Water and Planning, Western Australia Department of Biodiversity, Conservation and Attractions, South Australia Department for Environment and Water, Tasmania Department of Primary Industries, Parks, Water and Environment, NSW Department of Planning, Industry and Environment, Parks Australia,
State Health & Other Departments	Victoria, NSW, Tasmanian, WA Health Departments, Waste Authority WA, Development WA, Melbourne Water, Royal Botanic Gardens Victoria.

Stakeholder	Description and relationship to SCaW Hub
Various Local Governments	City of Knox, City of Melbourne, City of Fremantle, Perth City Council, and regional centres such as Launceston, Brighton (Tas), Ballarat, Shoalhaven City Council.
Aboriginal and Torres Strait Islander groups	Tasmanian Regional Aboriginal Communities Alliance (TRACA), Fisheries Research and Development Corporation Indigenous Reference Group, Arnhem communities, Uraah Innovations and Cultural Services. Whadjuk Noongar community, melythina tiakana warrana Aboriginal Corporation (MTWAC), Various Firesticks locations, Champion Centre (Indigenous Community Organisation in WA)
Environmental NGOs	Conservation Volunteers Australia, TierraMar, Landcare Tasmania, Tasmanian North East Bioregional Network, Australasian Dark Skies Alliance, Health and Environment Alliance, Rethink Waste Tasmania, AUSMAP.
Industry Associations	Water Services Association of Australia, Nursery and Garden Industry Victoria, , Circular Economy Networks and Hubs, Southern Waste Solutions, Asthma Australia, Charitable Recycling Australia, Tasmanian Farms & Graziers Association.
Private Enterprises	Tree Dimensions, Kandui Technology, Environex, Edge Environment, RAWTEC, Blue Environment.
External Linkages	Through the Hub's universities and CSIRO, links with leading external researchers and universities globally. Hub research-users also have research and development (R&D) capability and connections – for example Water Research Australia – who link across all water utilities in Australia and their associated researcher cohorts. Such linkages will be brought to bear on the Hub and other NESP projects of scale and complexity where capability is not housed within Hub partners.

Impact Priority Area Collaborations

Several of the research projects within the Hub are collaborations between Impact Priority teams, with the research outcomes informing other IP areas within the Hub.

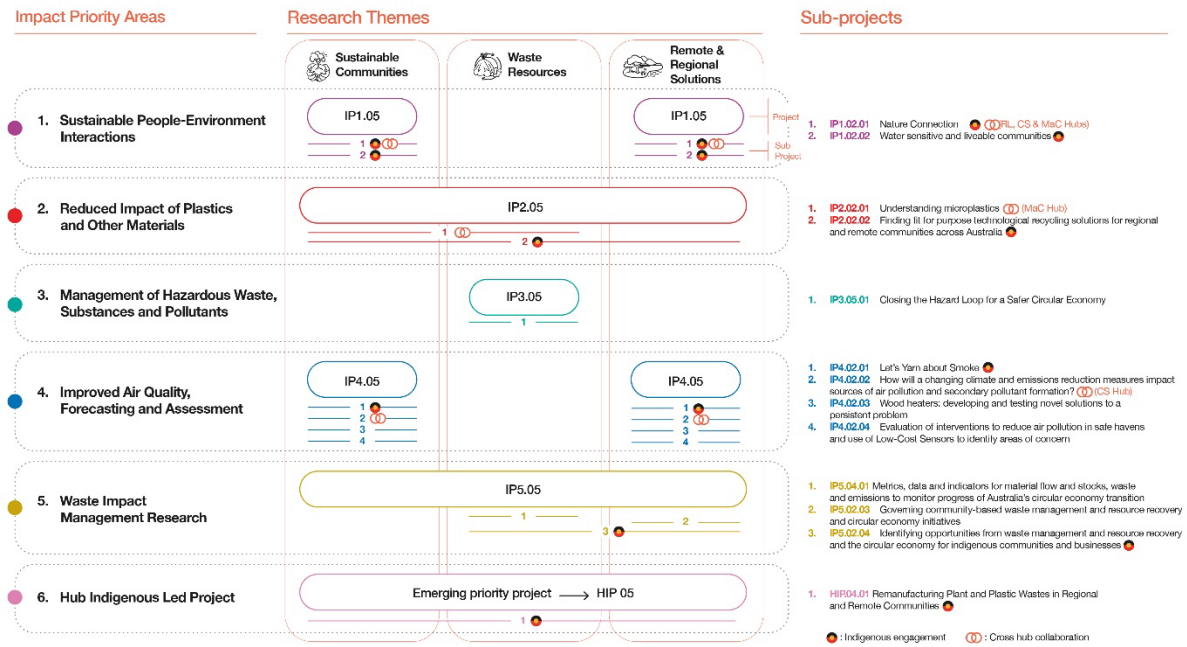


Cross-Hub Collaborations

There are several cross-hub collaborations underway within the SCaW Hub, including:

Hub	SCaW Hub Collaborators
Resilient Landscapes Hub	IP1,
Marine & Coastal Hub	IP1, IP2
Climate Systems Hub	IP1, IP4

Cross hub collaborations, Indigenous engagements and research themes for various subprojects is presented below:



These collaborations are summarised as follows:

Scaw Hub Project Details	Cross Hub Project Details	Cross Hub Linkage Activities
IP1.02.01: Nature connection **Project leader**: Emily Flies, UTAS	**Project:** 3.17. Improving environmental outcomes on conserved and managed lands **Cross Hub:** Resilient Landscapes **Project leader:** Vanessa Adams	• Stream 1: Not an official cross-Hub stream, though there is and will continue to be collaboration with RL Hub on this stream. • Stream 3: Is an official cross-Hub, Indigenous-led project which will have co-investment of funds across all four Hubs, with a collaborative, cross-Hub codesign process led by our indigenous partners (MTWAC) with data sharing as appropriate.
	Project: 4.4: An Indigenous-led approach to advance health and wellbeing of Tebrakunna Country, Coastal Plains nation, North-east Tasmania **Cross Hub:** Marine and Coastal Hub **Project leader:** Alan Jordan (and Mark Harris, as Indigenous lead at partner organisation, MTWAC)	• Stream 3: Is an official cross-Hub, Indigenous-led project which will have co-investment of funds across all four Hubs, with a collaborative, cross-Hub codesign process led by our indigenous partners (MTWAC) with data sharing as appropriate.
	Project: 2.5: Regional climate change guidance for local action and proposed project 4.3: Conservation Adapt' - a cross hub biodiversity adaptation knowledge platform **Cross Hub:** Climate Systems Hub **Project leader:** Jennifer Styger	• Stream 3: Is an official cross-Hub, Indigenous-led project which will have co-investment of funds across all four Hubs, with a collaborative, cross-Hub codesign process led by our Indigenous partners (MTWAC) with data sharing as appropriate.
	Project: 2.5. Regional climate change guidance for local action **Cross Hub:** Climate Systems **Project leader:** Jason Evans	• There will be a co-investment of funds across hubs, a collaborative co-design process, appropriate data sharing and co-production of knowledge products.
I**P2.02.01:** Understanding Microplastics **Project Leader**: Prof. Veena Sahajwalla, UNSW: Anirban Ghose ,UNSW	**Project:** 2.4. Ecological outcomes of wastewater discharges in contrasting receiving environment **Cross Hub:** Marine and Coastal Meeting and discussions with Hub leader Alan Jordan **Project collaborator:** Bronwyn Gillanders	• The collaboration between these two projects will provide opportunity to undertake appropriate tests which is already occurring under IP2 to measure the ecotoxicity investigations on the consequence of contaminants in coastal marine ecosystems. • UNSW and Bronwyn Gillander's Lab at university of Adelaide (collaborator of NESP2.4) initiated working on the investigation and examination of the microplastic samples. • A set of microplastic samples which was collected by Gillander's Lab team was sent to UNSW for further analysis. The received microplastic samples were investigated via a range of different technique including FTIR, TGA-GC/MS, and SEM and the report was sent to the University of Adelaide.

IP4.02.02: How will a changing climate and emissions reduction measures impact sources of air pollution and secondary pollutant formation? **Project Leader:** Kathryn Emmerson, CSIRO	**Project:** 2.5. Regional climate change guidance for local action **Cross Hub:** Climate Systems **Project leader:** Marcus Thatcher; Hamish Ramsey	• Project 2.5 is providing IP4.02.02 with the climate change modelling for 2048 - 2052 so that IP4.02.02 can calculate changes in air quality. • These data will come from 4 GCMs under 2 SSPs (8 simulations in total for 5 years each)

Indigenous Partnerships

Our Hub aims to create sustained, resilient and strong partnerships with Indigenous Australians through Hub projects. We recognise this enables identification of areas and challenges related to social, economic, cultural and spiritual significance to Indigenous communities. We also recognise the importance truly co-designed research has towards reconciliation and to realise opportunities of mutual benefit to Indigenous and non-Indigenous research. The result is an advantage to Australia from both a research and environmental, social and economic perspective.

Our Indigenous partnership approach seeks to facilitate appropriate participation by Indigenous Australian people, groups, and communities when undertaking research activities. We ensure compliance with Indigenous Cultural and Intellectual Property (ICIP) requirements (please see the Indigenous Data Sovereignty and Governance section below). Our projects seek to provide investment to enhance Indigenous research capability, including in regional and remote Australia. Our approach embeds skilled transfer to Indigenous people but also Indigenous people sharing Traditional Knowledge and skills about sustainable communities and waste management with non-Indigenous people. Throughout the life of this Hub, we have and will continue to foster increased cultural awareness between members of the Hub, the participating nodes, and the communities who we are conducting our research with.

Our Hub's Indigenous Partnerships Strategy outlines criteria the projects need to address to ensure appropriate engagement with Indigenous Australians. We use the Three Category Approach (2023), a tool developed under NESP, to assess each project and determine the appropriate level of partnership and engagement with Indigenous Australians.

The Hub's approach to ensuring all project and program management staff are trained in cultural capability is detailed in the SCaW Indigenous Partnerships Strategy. All staff in the Hub have been given opportunities to engage in a range of cultural capability activities including: Your Mob Learning online training (available to all and participation and completion is monitored and required before research plans are accepted). True Tracks Training which delves into considerations of Indigenous Cultural and Intellectual Property, has been offered in 2021, 2022 and 2023. However, the development of cultural capability must be demonstrated by researchers within the Hub throughout their research projects.

The SCaW Hub has several projects having have indigenous lead component in them or collaborating with Indigenous communities. While detailed in Annex B under each Impact Priority Research Plan, they are summarised as follows:

Project Title	Project Leader	Indigenous collaboration	Collaboration Highlights
IP1.02.01: Nature connection	Emily Flies, UTAS	Indigenous-led research (Stream 3) of this project being co-designed and co-delivered with leadership from the melythina tiakana warrana Aboriginal Corporation (MTWAC) in the northeast of Tasmania	Expected focus on: • Supporting the development of a Healthy Country Plan for Tebrakunna Country. • Focus on improving health and advancing wellbeing for the Coastal Plains Nation. • Designed as a cross-Hub project so as to reduce the administrative and consultation burden on the Aboriginal community and to recognise that Aboriginal community interests do not necessarily fit neatly into the Hub divisions.
IP1.02.02: Water sensitive and liveable communities	Paul Satur, Monash	Indigenous-led research (Stream 2) of this project will inform a nationally consistent approach to the structural empowerment of Aboriginal and Torres Strait Islander peoples relating to how sovereign water rights, knowledges, practices, values and aspirations of Indigenous peoples transform water governance and scientific frameworks for better water outcomes for Country, culture and community.	• IP1.02.02 has established a First Nations advisory body to oversee and guide all NESP programs including research streams 1 and 2 and all relating Post graduate studies. While the advisory body currently is in its infancy, the purpose of it is to ensure First Nations oversight and leadership in all NESP reseach matters. • Stream 1 research design adopts place based participatory action research and case studies of Indigenous led governance and institutional frameworks and models for Indigenous water outcomes. • Indigenous led stream 2 research involves collaborating with Indigenous and non-Indigenous water practitioners, to identify key actions for invigorating First Nations water rights and science and reducing the influence of aqua nullius in Australian water policy and governance. Including a water camp and Indigenous-only workshops about aqua nullius and the settler-state water

Project Title	Project Leader	Indigenous collaboration	Collaboration Highlights
			system, this stream adopts nation (re)building and decolonising frameworks to support a water sector transformation resulting in better outcomes for country.
IP2.02.02: Finding fit for purpose technological recycling solutions for regional and remote communities across Australia	Professor Veena Sahajwalla, UNSW Anirban Ghose, UNSW	IP2 collaborated with Firesticks, through the emerging priority mechanism and Hub Indigenous led project	• Aim to divert bio-waste (invasive species of plants) 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 and other built environment applications.
IP4.02.01 Lets Yarn about Smoke	Amanda Wheeler, CSIRO Erin Dunne, CSIRO	This project will collaborate with the recently announced MRFF 2022 IH project 2025273, which is a joint Indigenous/non-Indigenous led research project. Dr Wheeler (CSIRO) is a Chief Investigator to support air quality monitoring for Yolngu residents and Miwatj Health staff in East Arnhem, NT	• Improving environmental health awareness by crowdsourcing ground-based air quality, temperature, and humidity data in three east Arnhem communities through fixed and wearable sensor monitoring. • Exploring lived experiences of Yolngu regarding the health impacts of extreme environmental exposures and potential measures that can be put in place to reduce health impacts.
Project IP5.02.04: Identifying opportunities from waste management and resource recovery and the circular economy for Indigenous communities and businesses	Heinz Schandl, CSIRO Atiq Zaman, Curtin	The Whadjuk Noongar community in Armadale area (within Swan Canning Catchment) of Western Australia has been identified for collaboration on the IP5.02.04 project. Additional remote and rural Aboriginal communities will be identified in a later phase of the project duration upon consultation with the Hub Senior Indigenous Facilitator and interested community representatives of the Aboriginal communities.	• Engage with Indigenous communities and organisations from the early stages of the project to identify their needs, priorities, and aspirations related to waste management and resource recovery. • Respectfully listen to Indigenous voices, perspectives, and traditional knowledge, ensuring that research outcomes address their unique challenges and opportunities.

Project Title	Project Leader	Indigenous collaboration	Collaboration Highlights
			• Regularly seek feedback and input from Indigenous stakeholders throughout the research process to ensure continuous alignment with their needs and expectations.
Projects that are under category 'Communicate'			
IP2.02.01 **IP2.02.02** **IP2.05.03**		**IP4.02.02** **IP4.02.03** **IP402.04** **IP4.05.05**	**IP5.04.01** **IP5.02.03** **IP6.05 (scoping studies)** **IP6.05.01**

Knowledge Brokering, Communication and Data Management

NESP expects that each hub will engage and communicate research outcomes with research-users and the wider public to facilitate uptake and adoption. As part of this, the program is committed to promoting open access to public sector and publicly funded information, including optimising the use and reuse of data. It is expected that each hub will implement its data management plan to provide timely, open access to the data products and research outputs.

Knowledge Brokering

Knowledge brokering is a key function within the Hub, guided by the Knowledge Brokering Strategy to ensure that research projects are co-designed in accordance with the Department guidelines to meet the needs of research-users and knowledge products are delivered in usable and accessible formats to generate research impact and to communicate the program level impact of the Hub. The Strategy is updated annually.

The Hub's lead Knowledge Broker (KB) guides knowledge brokering activities and functions across the Hub, in partnership with the Department, all Hub partners, Indigenous facilitators and other NESP hubs, in accordance with the Hub's KB strategy. There is an active knowledge brokering presence across the Hub, with knowledge brokering roles in all Hub research institutions (also referred to as nodes), and in all Impact Priority projects, via a dedicated Hub KB group that meets regularly to coordinate function and action plans for quality outcomes. Knowledge brokering strategu has included:

- Circulating Scaw Hub updates via a quarterly Newsletter to share information about presentations, talks, community engagement activities, publications etc. among all IPs.

- An internal hub showcase organised between all IPs to share the progress on research projects, and research findings, creating pathways to explore the collaboration opportunities between Hub IPs.
- A SCaW Hub internal Monitoring and Evaluation (M&E) template has been created and circulated among all the IP's and initial reviewing commenced.
- Knowledge product development in response to IPs research findings tailored to meet stakeholder needs and easy adoption.
- Regular meetings and discussions with each IP team to understand their needs and how best to support them.
- discussions with Indigenous knowledge broker, DCCEEW who actively participated in the KB meetings with Researchers.
- Cross-hub collaboration facilitation through regular meetings with the Climate Systems, Marine and Coastal and Resilient Landscapes Hubs Knowledge Brokers to share experiences and ideas around translating research and knowledge.
- Collaborating internally to support other strategic leadership, such as Indigenous Partnerships and Data Wrangling, to enhance the ways they communicate their research and engage with research participants, research-users, and the broader public.

The KB team is involved in research project co-design across the Hub, supporting facilitated co-design workshops, connecting SCaW Hub researchers to research-users within the Department and external partners, communicating Hub research capability to research-users, and ensuring that research-user priorities are well addressed by Hub research plans

Communications

Hub and Impact Priority communication activities are guided by the strategic aims of the Hub and the Communications Strategy. Further advice, guidelines, templates and working documents to assist with the strategy's implementation are available in the internal SharePoint. The Communications Strategy is updated annually and is implemented in conjunction with the function's knowledge brokering, Indigenous partnerships and data management functions of the Hub. It compliments other hub strategies and individual projects. This is in addition to annual research plans and other considerations of the National Environmental Science Program.

A range of engagement activities are undertaken, including the ongoing interaction and engagement with the Department and internal Hub stakeholders is undertaken. Regular meetings address ongoing and emerging activities, which ensures high and low-level support across the Hub so resources are used efficiently.

Knowledge products generated through co-design are made publicly available through the Hub website, and in accordance with the Hub Data Management strategy. The co-design process identifies knowledge products to be delivered through RP2025, and data and information management plans are developed for each of these.

The Communications function enables knowledge sharing and engagement through:

- Working with researchers, knowledge brokers and other members of the Hub to identify and prioritise communication needs.

- Developing hub and NESP level content and other required communications activities.
- Showcasing and increasing impact from Hub research for practical and monitoring purposes.
- Ongoing management of communications tools such as website, social channels and templates for the use of researchers.

Data Management

The Hub's Data Management Strategy provides a framework for how the Hub and its researchers achieve findable, accessible, interoperable and reusable (FAIR) research products when project outputs and outcomes are produced. It is recognised that discipline-specific standards of data management apply, and researchers are required and expected to apply these standards wherever possible.

This data management function:

- guides data wrangling activities in the Hub, in particular outlining how the Hub manages data at all stages of research
- ensures that FAIR principles are embedded in all Hub activities, and that Hub activities are consistent with the NESP data and information guidelines
- provides clarity on the activities of data wrangling actor(s) in the Hub.

Data management in SCaW Hub is guided by several existing programs and platforms, including the Australian National Data Common (ANDC), Australian Urban Research Infrastructure Network (AURIN), and Research Data Alliance groups on data management, physical samples, and research data collections.

The Hub has continued to implement its Data Management Strategy and the framework with which researchers can create findable, accessible, interoperable and reusable (FAIR) data. The Data Wrangler has continued to support key functions of the Hub to meet FAIR data requirements. This has included supporting website updates, advising on creation of data tools and met with stakeholders to identify gaps and clarify outcomes. Indigenous data was also a key topic within the framework, covering the CARE principles (Collective Benefit, Authority to Control, Responsibility and Ethics).
In this time, the Hub identified several key challenges relevant to data products from the SCaW Hub such as:

- The diversity in possible logical data repositories for hosting data products.
- The diversity in stakeholders who may be generating relevant data products limiting access to Permanent Identification (PID) options and their findability.
- Ensuring data products comply with FAIR and CARE principles at the end of the NESP project.

The SCaW Hub has engaged with the Australian Research Data Commons (ARDC) in a 2 year long project that will aim to tackle these challenges, focussing on the Findability and Interoperability of environmental data. Utilising ARDC's decades of experience with data management, digital research infrastructure, and working with researchers on a national scale will bring new capability in supporting the measurement of impact from the Hub. The

project will enable the Hub to access further resourcing through the Domain Data Portals funded project to address data challenges relevant to SCaW.

The Data wrangler team actively working on metadata management in collaboration with the ARDC through the Domain Data Portals project. Currently, DW team have provided a basic template for researchers to collect relevant metadata, with plans to incorporate RAiDs as they become available in the coming year. The Data Wrangling team meets regularly with researchers to assist in populating the template, ensuring consistency and completeness in metadata collection.
Metadata is being collected via an Excel template and stored in a centralised SharePoint location for accessibility within the SCaW Hub. Interoperability and integration of metadata are key considerations and are being explored as part of the Domain Data Portal project with the ARDC.
In terms of longevity, metadata will remain accessible on SharePoint for the duration of the hub, while options for long-term preservation beyond the hub's lifecycle are under investigation through the same initiative.

Indigenous Data Sovereignty and Governance

Essential to advancing the Indigenous Partnership Strategy and RP2024 is the collaboration and alignment of activities relating to data, Indigenous partnerships and knowledge brokering, within the broader SCaW Hub and individual research projects.

Research with Indigenous people requires engagement, negotiation, reciprocity and free prior and informed consent. Additionally, there must be an understanding and mutual agreement on the research undertaken. Researchers must inform Indigenous Peoples of the aims, methods, implications, and potential outcomes of research projects, so they can determine their interest in the project and provide appropriate contributions. Further, researchers must convey the intended use of collected data and resulting products developed from this data. Fair consideration must be given to Indigenous Cultural and Intellectual Property (ICIP) and permission for data use in line with the AIATSIS Code of Ethics principles (which include Indigenous data sovereignty and cultural governance).

Furthermore, as part of the SCaW Hub Indigenous partnership objectives and goals - and aligned to the National NESP Indigenous partnership principles - knowledge held by Indigenous peoples must be valued and protected throughout the partnership and arrangements must be made for the ongoing protection of data. The program, hubs and individual researchers must ensure all legal obligations are understood before collecting information (including an understanding of free and prior informed consent) and be guided by the Global Indigenous Data Alliance (GIDA) objectives.

The Hub recommends and implements training with its researchers in the following topics: True Tracks regarding ICIP and the AIATSIS Code of Ethics. Additional training may include the Global Indigenous Data Alliance's CARE principles for Indigenous data governance Hub researchers.

Finally, as per the requirements of the Australian Code for the Responsible Conduct of Research and the AIATSIS Code of Ethics, it is the obligation of each research project team to develop a suitable data management plan which demonstrates how Indigenous data sovereignty, Indigenous Cultural and Intellectual Property and Indigenous cultural

governance will be managed. These considerations must be addressed within a research agreement between the institution and relevant Indigenous Australian project stakeholders.

Annexure 1: NESP project assessment criteria

1. **Identified research priority**
    - Does the project plan incorporate one or more of the research needs identified by the department for the hub?
    - How well does the project align with the NESP research scope overview and research priorities identified for the hub?
        - Does the research approach clearly address one or more of the research priorities (for example, rather than the plan just saying it does)?
        - How strong/direct is the link between the research proposal and the priorities identified? Is there a large proportion of the research that doesn't clearly address a priority?
    - Does the research clearly support policy development, environmental management, regulation and investment?
    - Is there a clear management action or policy development that could be taken as a consequence of the delivery of this project?
    - Does the project plan refer to responsibilities, policies or programs to which the research will be directly relevant?
        - Does the project plan identify one or more departmental contacts, and were they consulted in the development of the draft? Were their suggestions taken on board?
    - At a hub level how much funding is proposed for projects addressing the same research priority? Is the distribution of funds across priorities appropriate?
2. **Outcomes and outputs**
    - Are the outcomes clearly articulated in the project plan and are they directed towards research-user needs/ practical management?
    - Is there is a path to adoption for the research outcomes? Does this include direct links to line areas and the responsibilities of the department?
    - Are the outputs of the project clearly described, with at least some tailored to support management/policy actions (i.e. to assist uptake of the research by the department and other research-users)?
    - If outputs are to be co-designed with stakeholders to directly meet their needs, is this clearly stated?
3. **Project design**
    - Is the project well designed?
    - Do you have any suggestions that would increase the value of the project?

- Is there is a clear link between the research and practical and tangible environmental outcomes (direct links or secondary links with a clear path to outcomes)?
- Could the research question or approach be refined to better suit research needs or the needs of other research-users? Are specific research questions clearly articulated, or is there a clear approach to doing so?
- Does the project leverage other programs or investments?
- Does the proposal refer to current and previous work (for example, previous Australian Government programs, state and territory government research), and clearly build on the outcomes of that work rather than duplicating it?
- Is there a process proposed that will review existing understanding to help identify gaps and specific research questions? Will this scanning or synthesis process consider relevant research beyond that done by the hub partners?
- Does the project intend to have ongoing co-design and implementation with research-users?

4. Indigenous inclusion

- Do the projects have appropriate Indigenous consultation and engagement?
- Is there evidence that the Indigenous Partnership Principles will be applied?
- Does each project include a ranking for the updated Three-Category Approach?

5. Data management and accessibility

- Are the *NESP data management and information guidelines* being followed?
- Do the project proposals list a repository or repositories for data, and indicate timing for publishing of the data? Note: Timing of publication should be not more than 1 year after the end of the project.
- Have metadata standards been indicated? For example, ISO 19115-1, OGC or ISA 19139 MCP.
- If an exception is stated for sensitive data, cultural data or species data, does it align with the *NESP data management and information guidelines*.
- Has the hub indicated that publications will not be made open access? Note: All publications are to be open access at either the point of publication or at a specified future date.
- Has a data contact been specified for each project?

6. Knowledge brokering and communication

- Do the project proposals describe the approach to knowledge brokering and communication?
- Have specific communication and knowledge brokering actions and activities been included in the project proposals? For example:
    - how research-users will be engaged from the outset of the project
    - identified pathways to adoption by research-users
    - target audiences and stakeholders.
- Does the proposal align with the hub's knowledge brokering and communication strategies?

Supported	Supported with minor modifications	Supported with significant modifications	Defer for resubmission	Not supported

- Do the project proposals include a commitment to developing activities in an appropriate timeframe?

7. Time and budget

- What are the risks associated with delivering the project on time and within budget?
- Are the management actions proposed to address these risks appropriate?
- Does the project approach represent the best and most efficient way of addressing the research need?
- What is the scale and scope of the research needed to deliver the research outcomes? Is it commensurate with the budget and time and resources allocated to the project?

8. Project personnel

- Does the project team provide evidence that they have a history of delivering research that is useful and used by managers and policymakers?
- Is there evidence that their project meets the objectives of the program and requirements of the Funding Agreement?
- Has the project team demonstrated previous engagement with the department and other stakeholders in developing and delivering research?
- Is there any feedback from departmental staff involved in previous work delivered by this research group?
    - If this feedback consolidates any concerns with the current project proposal, consider deferring or providing specific feedback.

Recommendation

The proposed project performs strongly against the majority of criteria, and there are no 'red flags'. It is well supported by research-users in the department	The proposed project would perform strongly against the majority of criteria if identified modifications are made prior to final assessment. 'Red flags' are relatively easily resolved or clarified.	Significant changes or significant additional information required. Red flags are addressed with considerable work.	Red flags are identified with significant changes or significant additional information required. Project proposal to be further developed and resubmitted.	Red flags are complex/time consuming to resolve. Project not well scoped/ does not meet department's needs.