

Request for Proposal

PFAS Destruction in Biosolids-Derived Biochar
Production



Collaborate Innovate Impact

RFP Summary

Project Title: PFAS Destruction in Biosolids-Derived Biochar Production

Budget: Approximately \$90,000 (ex. GST)

Timeline: 6-12 months from contract execution

Submission deadline: 3rd October 2025 – 2 PM AEST

Contact: Vincent Bianchini, WaterRA Research Manager (vincent.bianchini@waterra.com.au)

Project summary: This project will critically evaluate the current evidence and methods to assess PFAS destruction during thermal treatment of biosolids (via pyrolysis or gasification). Outputs must support utility engagement with regulators and guide industry next steps.

Research Request

WaterRA is commissioning research to address the following problem:

Thermal treatment processes such as pyrolysis and gasification are gaining attention as potential solutions for managing PFAS in biosolids. However, the sector lacks a clear, evidence-based framework to determine whether PFAS is truly destroyed during these processes, under what conditions, and how this can be credibly demonstrated. This uncertainty limits progress toward regulatory acceptance of biochar as a resource recovery product.

This project seeks to critically evaluate the current evidence and methods available to assess PFAS destruction during the thermal treatment of biosolids and places particular emphasis on:

- Why current studies struggle to close the fluorine mass balance;
- What constitutes credible evidence of destruction or risk mitigation;
- How uncertainty can be explicitly addressed, including when full data is not available, using reasoned assumptions or risk-based frameworks.

The outputs must be tailored to support:

- Water utilities engagement with regulators (e.g. EPA)
- Internal decision-making by water utilities (e.g. technology selection, risk mitigation)

Proposals must demonstrate an ability to produce practical, defensible guidance from complex and sometimes inconclusive data. Work must be **novel**: this project is **not** seeking a rehash of existing reviews but a critical, value-adding synthesis that supports the sector move forward.

What we are seeking

We are seeking proposals that:

- Come from multidisciplinary teams with relevant expertise (see table below). Partnerships across organisations are encouraged.
- Fit within a \$90,000 budget, with a clear breakdown of core activities and optional add-ons, demonstrating strong value for money
- Clearly demonstrate how their work will add new value: summaries or re-presentations of existing reviews without critical insight or synthesis will not be considered sufficient

- Are aligned with the research request and project brief, responding directly to the objectives, deliverables, and knowledge needs outlined
- Include a conflict-of-interest declaration if applicable

Expertise sought includes:

Essential	Desirable
<ul style="list-style-type: none"> • Environmental chemistry (PFAS focus) • Gasification and pyrolysis processes • Analytical chemistry (PFAS focus) • Environmental monitoring & fate and transport • Stakeholder engagement & knowledge translation 	<ul style="list-style-type: none"> • Toxicology or environmental risk assessment • Policy and regulatory experience • Advanced analytical methods • Evidence synthesis and critical review

Project Brief

Industry Need

Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic chemicals that have been widely used in various industrial and consumer products since the mid-1900s due to their resistance to heat, water and oil. However, these same properties mean PFAS can persist for long periods of time, leading to significant concerns about their accumulation in the environment and potential impacts on the health of humans and/or aquatic flora and fauna.

In the wastewater sector, biosolids from sludge treatment processes are often applied to land to improve soil structure and add valuable nutrients like nitrogen and phosphorus, which are essential for plant growth. This practice supports sustainable agriculture by improving crop production and reducing the need for additional additives or soil improvers. However, because many biosolids contain PFAS, concerns have been raised about their potential environmental impact.

The tightening of regulations on PFAS, particularly those that restrict the use of biosolids outlined in the PFAS NEMP 3.0, pose a threat to land application of biosolids. As a result, some water utilities will need to introduce additional processes to enable beneficial re-use, or resort to disposal of biosolids as waste. Alternatives such as landfilling and incineration do not support the beneficial reuse and circular economy initiatives provided by land application, and contradict National Waste Policy targets, which aim to reduce organic waste to landfill and increase resource recovery. Water utilities must therefore develop effective solutions that preserve biosolids' value whilst minimising the potential risks to the extent practicable.

Biosolids-derived biochar presents a promising solution in response to the changing regulatory landscape shaped by the National Waste Policy and PFAS NEMP 3.0. It offers a pathway to recover nutrients and carbon while addressing PFAS concerns, supporting circular economy principles and resource recovery targets. However, despite its potential, biochar is still classified as waste, creating a significant barrier to its adoption. For biochar to be recognised as a viable solution, clear, science-backed evidence of PFAS destruction is essential. Without it, utilities face regulatory and investment risks, and limited pathways to confidently advance sustainable biosolids management.

To move forward, water utilities and regulators need confidence that PFAS is effectively destroyed during biochar production. Key questions include whether PFAS compounds are fully broken down, what transformation products may form and how effectively different sampling and analytical methods can track these changes. A major challenge is proving PFAS destruction with scientific certainty while ensuring no new

environmental risks emerge, such as the production of degradation byproducts or harmful emissions. Fluorine mass balance is often used to assess PFAS destruction, but its reliability must be critically evaluated to provide confidence in biochar as a sustainable option.

This project presents an opportunity for water utilities to collaborate and build a unified, science-backed case for biosolids-derived biochar. It will consolidate and evaluate existing research, identify critical knowledge gaps, and strengthen the evidence base for PFAS destruction in biochar production. This scientific foundation will help de-risk regulatory and investment decisions, empower utilities to engage with regulators with confidence, and support the transition toward a more sustainable and circular approach to biosolids management.

Objectives

Consolidate and critically evaluate existing research on the transformation or destruction of PFAS during biosolids-derived biochar production, identify the critical knowledge gaps providing a barrier to the uptake of thermal process options, and provide a strong evidence base to recommend pathways for validating PFAS destruction in biosolids-derived biochar production.

Deliverables

Work Package 1: Systematic review and benchmarking

- Review published and grey literature on the transformation or destruction of PFAS during biosolids-derived-biochar production
- Compare international studies on methods, feedstocks, operating parameters, technology types, and regulatory contexts
- Identify trends, discrepancies and critical knowledge gaps, particularly those that limit confidence in PFAS destruction
- Explore reasons why fluorine mass balance is difficult to close in existing studies, and review examples where it has been successfully addressed
- Include perspectives from related industries on managing similar compounds and measurement challenges

Work Package 2: Evaluation of sampling and analytical methods

- Identify and evaluate sampling and analytical methods that are currently available or emerging at full-scale use internationally to best quantify PFAS destruction in thermal treatment processes (including gas, liquid, and solid phases)
- Compare analytical methods based on detection limits, precision, practicality and regulatory acceptance
- Assess the applicability of different methods to various thermal treatment technologies
- Identify combinations of sampling and analytical methods that have been used successfully to close the fluorine mass balance
- Identify analytical gaps (e.g. volatile, semi-volatile, or non-target PFAS) and evaluate potential for future methods such as isotopic tracing or fluorescent tagging
- Present the findings to industry partners to confirm alignment with project objectives

Work Package 3: Industry guidance on next steps

- Assess the strength and robustness of existing evidence that support claims of PFAS destruction during pyrolysis and gasification based on WP1 & WP2 findings

- Identify key parameters (e.g. temperature, residence time, atmosphere) and verification methods required to credibly demonstrate destruction to regulators
- Clarify which PFAS compounds have robust evidence of destruction under thermal treatment (e.g. PFOS, PFOA, PFHxS), and identify where uncertainty remains such as unknown transformation products or unaccounted residual fluorine
- Provide a risk-based framework for decision-making in the presence of uncertainty or incomplete data

Final deliverable: Consolidated report with peer review

- Integrate findings from all work packages into a WaterRA report.
- Conduct peer review to ensure scientific rigour and practical relevance.
- Present the final report to industry partners.
- Finalise report based on peer review and industry feedback.

Benefits

- Provided practical, evidence-based guidance to help build trust and confidence in PFAS destruction during thermal treatment of biosolids
- Supported water utility discussions with regulators on the effectiveness of thermal treatment for PFAS destruction from biosolids.
- Enabled coordinated industry action by bringing multiple utilities together to develop a shared understanding and response to the challenge of PFAS in biosolids

Knowledge transfer

In addition to technical deliverables, respondents must develop fit-for-purpose outputs to support uptake and application of the project findings. These should include products such as factsheets for decision-makers, executive summaries for internal use, and visuals or infographics for stakeholder engagement. Design and formatting of these materials will be managed and funded separately by WaterRA

Respondents should also propose targeted knowledge translation activities, such as dissemination workshops, to help build confidence, support regulatory engagement, and enable wider adoption of project outcomes.

Budget guidance:

- The total budget for this project is approximately \$90,000 (ex. GST).
- Proposals must demonstrate strong value for money and include a clear breakdown of core activities.
- Optional add-ons may be proposed but must be clearly identified and justified.
- WaterRA reserves the right to fund core activities only, based on budget availability and alignment with project objectives.

Conflict of interest:

Proposals must disclose any potential conflicts of interest, including current or past involvement in the development, promotion, or commercialisation of pyrolysis or gasification technologies, or ownership of related patents. WaterRA requires transparency to ensure that project outcomes remain scientifically credible and commercially neutral.

Timeline:

The expected duration for this project is 6–12 months from contract execution. Proposals should include a clear delivery timeline aligned with this timeframe. If a longer or shorter duration is proposed, it must be clearly justified and feasible within the available budget.

Instructions for preparing Proposal

Please read all Requirements of Research Providers for specific requirements essential for this project.

Submission

To submit a proposal the researcher is required to complete a project plan and budget using the templates provided.

Proposals shall be submitted by email to the WaterRA Research Manager no later than:

2.00 pm (AEST) - Friday 3rd October 2025

Vincent Bianchini | WaterRA Research Manager

M 0478 111 151

E vincent.bianchini@waterra.com.au

All technical queries and correspondence relating to the proposal must be directed to the WaterRA Research Manager.

Accompanying templates

1. Project Plan
2. Project Budget

Requirements of Research Provider

In addition to project deliverables there are specific requirements of the Research Provider for this project:

Utility Consultation

The Research Provider will direct any requests for data sharing from project partners through the Research Manager. Subsequent communications between the Consultant/Research provider and the water utility shall copy in the WaterRA Research Manager.

Monthly Status Reporting

In all cases the deliverables are to be delivered directly to the WaterRA Research Manager.

The WaterRA Research Manager will share milestone progress with the partners throughout the project.

Progress Meetings

The research provider must make an allowance to conduct at minimum four online meetings with the project team; one at project commencement, intermediate meetings at appropriate times within the project and another at project completion. These meetings are for the Consultant/Research Provider to update and seek direction with the PAC on the progress of the project.

Additional online meetings will be required during the project as determined by the research organisation(s) and the PAC. As a minimum, the WaterRA Research Manager will request monthly updates to review project progress against milestones.

All meetings or workshops must be facilitated by the research organisation(s) and include an agenda submitted to WaterRA one week prior to the session and a list of action items from the session one week later.

Provision of Review Documents

The research organisation(s) will need to deliver draft versions of each of the above deliverables to the PAC for review prior to finalisation.

Production of Knowledge Transfer Products

Knowledge transfer artefacts are a requirement of all WaterRA projects and take the form of final reports, fact sheets, and workshops. The number and type of activities will be determined by the PAC and WaterRA Research Manager.

It is the duty of the research organisation(s) to provide the fundamental information behind each of these artefacts and/or facilitate or run the workshops and training sessions.

Conditions and Standards

Confidentiality

All information provided to the organisation must remain confidential between the Consultant/Research Provider and the project team.

IP Ownership

The research organisation will be required to sign a research agreement with WaterRA to ensure that all IP and associated project materials remain the sole property of WaterRA and must be kept in strict confidence.

Standards for Deliverables

Reports shall be informed and in adherence to the WaterRA format and should be submitted to the WaterRA Research Manager.

The research organisation shall take care when preparing reports to ensure that they clearly, simply and logically present the outcomes of the work undertaken and includes any critical decision-making information.

The final versions of the outputs shall be submitted as electronic copy, in native format. A copy of all project deliverables is issued to the WaterRA Research Manager upon completion of the services.

Fees and Invoicing

A breakdown of project activities into milestones will be required. Invoices will be provided according to the payment plan as defined in the budget.

All costs are exclusive of GST and in Australian currency.

Proposal Evaluation

Criteria

The Proposal will be evaluated relative to WaterRA's confidence in the respondent's ability to:

- Provide a competitive and commercially acceptable proposal
- Demonstrate an understanding of the services required
- Detail and demonstrate recent relevant experience in providing services of a similar nature
- Provide resources to the project as described by this brief
- Demonstrate adequate project and risk management, **including ability to deliver on time and within budget.**
- Provide a realistic and achievable project program
- Provide references from organisations for whom the services have been provided including contact names and telephone numbers (if required)
- Comply with this proposal document and WaterRA Members Agreement.

Post RFP Submission

WaterRA may require a respondent to submit additional information concerning its proposal or to personally discuss its proposal before any proposal is accepted.

Should a respondent fail to:

- Submit the additional information required by the date and time stipulated; or

- Attend personally to discuss its proposal at the scheduled date and time their RFP may not be further considered.

Rectification of Errors or Omissions

WaterRA reserves the right to:

- Check RFP for errors and omissions
- By agreement with a respondent, amend a proposal price or rate submitted by a respondent to remedy the effect of any errors or omissions in the calculation of the proposal price or rate; and
- By agreement with a respondent, otherwise amend the RFP of the respondent to remedy the effect of any errors or omissions.

Acceptance of RFP

WaterRA may accept any proposal or part thereof. WaterRA is not obliged to:

- Accept the lowest proposal or
- Accept any proposal.

WaterRA will accept a proposal by notifying its acceptance of the RFP in writing.

All respondents will be notified in writing of WaterRA's decision.