

PROJECT ANNOUNCEMENT

US Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC)

Title: Evaluation of microbially induced calcite precipitation (MICP) and vegetation interaction for soil rehabilitation

Announcement Type: Initial Announcement

Funding Opportunity Number: W81EWF-23-SOI-0023

Assistance Listing Number: 12.630

Date Issued: 13 June 2023

Key Dates: Phase I announcement will be open to receive statements of interest continuously until 12:00pm Central Time (CT), 13 July 2023, at which point all statements of interest must be received.

If invited to Phase II, full proposal applications will be due at 12:00pm Central Time (CT), 14 August 2023.

Estimated Award Ceiling: \$170,000

Estimated Total Program Funding: \$170,000 for 2 years; \$85,000 for base and each option year

Agency Contact: Kisha M. Craig, Kisha.M.Craig@usace.army.mil

I. Program Description

A. Short Description of Funding Opportunity

ERDC seeks applications for: Evaluation of microbially induced calcite precipitation (MICP) and vegetation interaction for soil rehabilitation.

B. Background

Microbially induced calcite precipitation (MICP) is a form of biomediated geotechnical soil improvement that has been proposed to enhance the strength and hydraulic conductivity characteristics of soils and has been considered for a range of geotechnical applications (DeJong et al. 2006; 2014; 2022). MICP enhances geotechnical properties through the bacterial precipitation of calcite, which can act as a binding agent between particles in a soil mass. Although lab and field scale research has increasingly shown potential positive impact on engineering properties and applications, little is known about the interaction of an MICP-treated soil mass with vegetation and vegetative regrowth, which are important aspects for usability and sustainability of soil improvement techniques on many flood control infrastructure projects. Prior research has shown that MICP treated soils exhibited seedling growth but heavily treated MICP soils exhibited sparse vegetation growth (Ghasemi & Montoya, 2022). These findings suggest that a balance is needed between the biomediation to increase engineering properties and the concentration of MICP that inhibits vegetation growth. Understanding this balance is important for informing the potential for MICP implementation, particularly in light of the increasing importance of nature-based engineering solutions and ensuring that engineered infrastructure is nature-inclusive.

C. Program Description/Objective: (brief description of the anticipated work)

This agreement represents an opportunity for research into the interaction between ground improvement using MICP and vegetation. To accomplish this, the following is anticipated:

1. Conduct laboratory scale investigation on the interaction of MICP treated soils and vegetation regrowth and resilience. Potential tasks include, but are not limited to, effect of MICP on surface erosion, a comparative study on types of vegetation that grow best in MICP-treated soils, mechanical and chemical longevity of MICP in vegetated environments, and effect of surface MICP treatments on established vegetation.
2. Collaboration: Provide guidance and support to ERDC researchers in setup and operation of MICP test and production facilities at ERDC. Provide ongoing support and expertise in support of congruous tasks undertaken by ERDC researchers. Provide expert assessment of ERDC test results. Collaborate on the evaluation and interpretation of test results and potential use cases.
3. Documentation: Document findings in a peer-reviewed literature which will be publicly available

D. Public Benefit

The value of this proposed project is that it could unlock a new, sustainable, economic, and eco-friendly mitigation and remediation solution for use on weak or damaged soil. As climate change increases the threat of floods, storms, and wildfires on societal infrastructure, reliable engineering solutions are required to ensure public safety. However, solutions that are sustainable and low-impact are increasingly important not only in climate change adaption and mitigation but also in that nature-inclusive engineering quantifiably enhances benefit to the public. This project will therefore bring the engineering community a better understanding of this biologically driven alternative to current engineering methods, inform life

cycle costs of MICP relative to current practices, and provide insight into its potential use on future projects.

E. Authorization: 10 USC 4001

F. Legal Requirements

Each Cooperative Agreement awarded under this announcement will be governed by 2 CFR 200, “Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards”, 2 CFR 1100 Subchapter D—Administrative Requirements Terms and Conditions for Cost-Type Grants and Cooperative Agreements to Nonprofit and Governmental Entities and the DoD research general terms and conditions located at <https://www.nre.navy.mil/work-with-us/manage-your-award/manage-grant-award/grants-terms-conditions>.

G. Program-Specific Requirements

Quarterly meetings and reporting.

II. Federal Award Information

The following information applies to awards issued under this announcement:

- This is a one-time initiative
- The Government anticipates 1 Federal awards from this announcement, but reserves the right to award more or less
- The total amount of funding expected to be awarded through this announcement is \$170k
- The expected amount of funding for each award is \$85k for Year 1, \$85k for Year 2, etc.
- Award(s) from this announcement will be Cooperative Agreement(s)
- The anticipated period of performance is (Sept 2023-Aug 2025)
- Applications for renewal or supplementation of existing projects are eligible to compete with applications for new Federal awards
- The government reserves the right to accept only portions of an application and to negotiate with potential awardees
- Government’s substantial involvement includes: ERDC researchers will work with the selected investigator(s) in evaluating the interaction between ground improvement using MICP and vegetation. ERDC researchers will also participate by conducting tasks congruent with the selected investigators in addition to regularly scheduled meetings to discuss research findings. The selected investigator(s) are expected to actively participate with ERDC researchers in the production of final reports and peer-reviewed journal articles that describe research outcomes.

III. Eligibility Information

A. Eligible Applicants

This opportunity is restricted to non-federal partners of the Piedmont-South Atlantic Coast Cooperative Ecosystems Studies Unit (CESU).

Disclosures of current and pending support made in this application may render an applicant ineligible for funding. Prior to award and throughout the period of performance, ERDC may continue to request updated continuing and pending support information, which will be reviewed and may result in discontinuation of funding.

Religious organizations are entitled to compete on equal footing with secular organizations for Federal financial assistance as described in E.O. 13798, “Promoting Free Speech and Religious Liberty.”

B. Cost Sharing or Matching

This action will be 100% funded by USACE.

C. Conflict of Interest

a) General Requirement for Disclosure

You and your organization must disclose any potential or actual scientific or nonscientific conflict of interest(s) to us. You must also disclose any potential or actual conflict(s) of interest for any identified sub recipient you include in your application. We may have to ask you more questions if we need more information.

At our discretion, we may ask you for a conflict-of-interest mitigation plan after you submit your application. Your plan is subject to our approval.

b) Scientific Conflict of Interest

Scientific collaborations on research and development projects are generally the result of close collaboration prior to the submission of applications for support. Accordingly, these collaborations should be considered when considering potential conflicts of interest. The potential conflict is mitigated by the disclosure of these collaborations, and the list of current and pending support you provide for senior and key researchers. Therefore, you must include in your list of current and pending support all collaborators, even if they did not formally provide support.

D. Other

a) Licensure or Certification

You must include the Acknowledgment of Support and Disclaimer on all materials created or produced under our awards. This language may be found in the Terms and Conditions included in the award documents.

E. Certifications, representations, and assurances

1. To apply for grants and other funding opportunities the applicant entity must have an active registration in the System for Award Management (SAM). Applications will not be accepted through Grants.gov or other methods unless the entity is registered in SAM. Registration in SAM now includes the acceptance of Certifications and Assurances. See <https://www.grants.gov/web/grants/grantors/grantor-standard-language.html> for details on how to register in SAM, and Grants.gov
2. The Federal Assistance Certifications Report is an attestation that the entity will abide by the requirements of the various laws and regulations; therefore, as applicable, you are still required to submit any documentation, including the SF-LLL Disclosure of Lobbying Activities (if award value exceeds \$100,000.00), and, if applicable, informing DoD of unpaid delinquent tax liability or a felony conviction under any Federal law.
3. Certification Regarding Disclosure of Funding Sources. By checking "I Agree" on the SF 424 (R&R) block 17 you agree to abide by the following statement: "By signing this application, I certify the proposing entity is in compliance with Section 223(a) of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 which requires that: (a) the PI and other key personnel certify that the current and pending support provided on the proposal is current, accurate and complete; (B) agree to update such disclosure at the request of the agency prior to the award of support and at any subsequent time the agency determines appropriate during the term of the award; and (c) the PI and other key personnel have been made aware of the requirements under Section 223(a)(1) of this Act. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. code, Title 218, Section 1001)."

IV. Application and Submission Information (2 Phase Process)

A. Phase I: Submission of Statement of Interest (SOI)

1. Materials Requested for Statement of Interest/Qualifications:
 - a. Please provide the following via e-mail attachment to: Kisha M. Craig, Kisha.M.Craig@usace.army.mil (Maximum length: 2 pages, single-spaced 12 pt. font).
 - i. Name, Organization and Contact Information
 - ii. Brief Statement of Qualifications (including):
 - Biographical Sketch,
 - Relevant past projects and clients with brief descriptions of these projects,
 - Staff, faculty or students available to work on this project and their areas of expertise,
 - Any brief description of capabilities to successfully

complete the project you may wish to add (e.g. equipment, laboratory facilities, greenhouse facilities, field facilities, etc.).

Note: A proposed budget is NOT requested at this time.

The administrative point of contact is Kisha M. Craig, Kisha.M.Craig@usace.army.mil

2. ERDC will only accept SOIs submitted on or before 13 July 2023, 12:00pm Central Time (CT).

Based on a review of the Statements of Interest received, an investigator or investigators will be invited to move to Phase II which is to prepare a full study proposal. Statements will be evaluated based on the investigator's specific experience and capabilities in areas related to the study requirements.

B. Phase II (if invited): Submission of Full Application Package

1. Address to Request Application Package

The complete funding opportunity announcement, application forms, and instructions are available for download at [Grants.gov](https://www.grants.gov).

The administrative point of contact is Kisha M. Craig, Kisha.M.Craig@usace.army.mil.

2. Content and Form of Application Submission

All mandatory forms and any applicable optional forms must be completed in accordance with the instructions on the forms and the additional instructions below.

- a. SF 424 R&R - Application for Federal Assistance
- b. Full Technical Proposal – Discussion of the nature and scope of the research and technical approach. Additional information on prior work in this area, descriptions of available equipment, data and facilities, and resumes of personnel who will be participating in this effort should also be included.
- c. Cost Proposal/Budget – Clear, concise, and accurate cost proposals reflect the offeror's financial plan for accomplishing the effort contained in the technical proposal. As part of its cost proposal, the offeror shall submit a full budget in sufficient detail so that a reasonableness determination can be made. A recommended template will be included in the invitation to Phase II. The SF 424 Research & Related Budget Form can be used as a guide but is required if the sub-recipient uses it. The cost breakdown should include the following, if applicable:
 1. Direct Labor: Direct labor should be detailed by level of effort (i.e. numbers of hours, etc.) of each labor category and the applicable labor rate. The source of labor rates shall be identified and verified. If rates are estimated, please provide the historical based used and clearly

- identify all escalation applied to derive the proposed rates.
2. Fringe Benefit Rates: The source of fringe benefit rate shall be identified and verified.
 3. Travel: Travel costs must include a purpose and breakdown per trip to include destination, number of travelers, and duration.
 4. Materials/Equipment: List all material/equipment items by type and kind with associated costs and advise if the costs are based on vendor quotes and/or engineering estimates; provide copies of vendor quotes and/or catalog pricing data.
 5. Subrecipient costs: Submit all subrecipient proposals and analyses. Provide the method of selection used to determine the subrecipient.
 6. Tuition: Provide details and verification for any tuition amounts proposed.
 7. Indirect Costs: Currently the negotiated indirect rate for awards through the CESU is 17.5%.
 8. Any other proposed costs: The source should be identified and verified.

d. R&R Senior/Key Person Profile

1. Biographical Sketch
2. Disclosure of Current and Pending Support:
 - i. A list of all current projects the individual is working on, in addition to any future support the individual has applied to receive, regardless of the source.
 - ii. Title and objectives of the other research projects.
 - iii. The percentage per year to be devoted to the other projects.
 - iv. The total amount of support the individual is receiving in connection to each of the other research projects or will receive if other applications are awarded.
 - v. Name and address of the agencies and/or other parties supporting the other research projects.
 - vi. Period of performance for the other research projects.

e. SF-LLL Disclosure of Lobbying Activities (if award value exceeds \$100,000.00)

f. Data Management Plan:

A data management plan is a document that describes which data generated through the course of the proposed research will be shared and preserved, how it will be done, or explains why data sharing or preservation is not possible or scientifically appropriate, or why the costs of sharing or preservation are incommensurate with the value of doing so. See also: DoD Instruction 3200.12.

<https://www.esd.whs.mil/Directives/issuances/dodi/>

Data management plans are generally 2 pages in length, and must include the following considerations:

- (1) The types of data, software, and other materials to be produced.
- (2) How the data will be acquired.
- (3) Time and location of data acquisition, if scientifically pertinent.
- (4) How the data will be processed.
- (5) The file formats and the naming conventions that will be used.
- (6) A description of the quality assurance and quality control measures during collection, analysis, and processing.
- (7) A description of dataset origin when existing data resources are used.
- (8) A description of the standards to be used for data and metadata format and content.
- (9) Appropriate timeframe for preservation.
- (10) The plan may consider the balance between the relative value of data preservation and other factors such as the associated cost and administrative burden. The plan will provide a justification for such decisions.
- (11) A statement that the data cannot be made available to the public when there are national security or controlled unclassified information concerns (e.g., “This data cannot be cleared for public release in accordance with the requirements in DoD Directive 5230.09.”)

3. ERDC will only accept full application packages submitted on or before 14 August 2023, 12:00pm Central Time (CT).

4. Submission Instructions

Choose **ONE** of the following submission methods:

a. E-mail:

Format all documents to print on Letter (8 ½ x 11”) paper. E-mail proposal to Kisha M. Craig, Kisha.M.Craig@usace.army.mil.

b. Grants.gov: <https://www.grants.gov/>:

Applicants are not required to submit proposals through Grants.gov. However, if applications are submitted via the internet, applicants are responsible for ensuring that their Grants.gov proposal submission is received in its entirety.

All applicants choosing to use Grants.gov to submit proposals must be registered and have an account with Grants.gov. It may take up to three weeks to complete Grants.gov registration. For more information on registration, go to <https://www.grants.gov/web/grants/applicants.html>.

Organizations must have a Unique Entity Identifier (UEI) and active System for Award Management (SAM) registration to apply for Federal financial assistance.

C. Application Withdrawal:

An applicant may withdraw an application at any time before award by written notice via email. Notice of withdrawal shall be sent to the agency point of contact identified in this announcement, and are effective upon receipt.

D. Funding Restrictions

Per 2 CFR § 200.216, funds may not be used to procure telecommunications equipment or video surveillance services or equipment produced by

- Huawei Technologies Company,
- ZTE Corporation Hytera Communications Corporation,
- Hangzhou Hikvision Digital Technology Company,
- Dahua Technology Company
- any subsidiary or affiliate of such entities

Funds from an award may not be used to attain fee or profit.

V. Application Review Information

A. Selection Criteria

Applications will be evaluated using the following criteria, listed in descending order of importance:

- Technical merits of the proposed research and development; and
- Potential relationship of the proposed research and development to Department of Defense missions

B. Review and Selection Process:

Each application will be reviewed based on the selection criteria above rather than against other applications submitted under this Announcement.

Based on the Peer or Scientific Review, proposals will be categorized as Selectable or Not Selectable (see definitions below). The selection of the source for award will be based on the Peer or Scientific Review, as well as importance to agency programs and funding availability.

i. Selectable: Proposals are recommended for acceptance if sufficient funding is available.

ii. Not Selectable: Even if sufficient funding existed, the proposal should not be funded.

Note: The Government reserves the right to award some, all, or none of proposals. When the Government elects to award only a part of a proposal, the selected part may be categorized as Selectable, though the proposal as a whole may not merit such a categorization.

In addition to the technical/program review, the DoD performs a budget review and a risk review as directed by 2 CFR 200.206, including a review of the Federal Awardee Performance and Integrity Information System (FAPIIS). Applicants may review information in FAPIIS and comment on any information entered into that system. Comments made by applicants will be taken into account in addition to other information in considering applicants' integrity, business ethics, and record of performance.

VI. Federal Award Administration Information

The notification e-mail regarding a selection is not authorization to commit or expend DoD funds. A DoD grants officer is the only person authorized to obligate and approve the use of federal funds. This authorization is in the form of a signed Notice of Award. Applicants whose applications are recommended will be contacted by a DoD grants officer to discuss any additional information required for award. This may include representations and certifications, revised budgets or budget explanations, or other information as applicable to the proposed award. The award start date will be determined at this time.

VII. Reporting Requirements

The terms and conditions of the award will provide the specifics on how to submit the reports and any required sections for those reports.

In accordance with 2 CFR 200.328 (Financial Reporting) and 2 CFR 200.329 (Program Performance)

Report	Requirements/Form	Frequency	Means of Submission
ERDC Progress Report		Upon SF-270 submission	E-mail
Research Performance Progress Reports (Interim and Final)	OMB Control Number: 0704-0527	Quarterly	E-mail
Financial Report	SF 425	Bi-annually	E-mail
Payment Report	SF 270	Monthly	E-mail
Closeout Report		Once	E-mail

Awardees will need to comply with the reporting requirements in 2 CFR 170: Reporting Subaward and Executive Compensation Information.

The terms and conditions of the award will provide the specifics on how to submit the reports and any required sections for those reports.

VIII. Federal Contacts

Questions should be directed to:

Kisha M. Craig
Grants Specialist
Kisha.M.Craig@usace.army.mil

Chelsea M. Whitten
Grants Officer
Chelsea.M.Whitten@usace.army.mil

Questions regarding Grants.gov should be directed to: the toll-free number 1-800-518-4726 and email at support@grants.gov.

IX. Other Information

The Federal government is not obligated to make any Federal award as a result of the announcement. Only grants officers can bind the Federal government to the expenditure of fund.

Applicants are advised to monitor Grants.gov for potential amendments to this Notice of Funding Opportunity. You can also elect to be automatically notified by Grants.gov whenever there is a change to the opportunity.

Applications must not include any information that has been identified as classified national security information under authorities established in Executive Order 12958, Classified National Security Information.