STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015) CALIFORNIA ENERGY COMMISSION

New Agreement PIR-17-013 (To be completed by CGL Office)

ERDD	Joe O'Hagan	43	916-327-1544

InfraTerra, Inc.	45-3338205

Development of an Integrated Methodology for Assessing Integrity of Levees Protecting Natural Gas Infrastructure

	5/31/2018	3/31/2022	$ 549,500

☐ ARFVTP agreements under $75K delegated to Executive Director.

Proposed Business Meeting Date	4/11/2018	☒ Consent	☐ Discussion
Business Meeting Presenter	Katharina Snyder	Time Needed:	10 minutes

Please select one list serve. NaturalGas (NG Research Program)

Agenda Item Subject and Description

INFRATERRA, INC. Proposed resolution approving agreement PIR-17-013 with InfraTerra, Inc. for a $549,500 grant to test and identify non-invasive and cost-effective technologies for a survey of the structural integrity of Sacramento-San Joaquin Delta levees that protect natural gas infrastructure.

1. Is Agreement considered a "Project" under CEQA?
   ☒ Yes (skip to question 2) ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):
   Explain why Agreement is not considered a "Project":
   Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because

2. If Agreement is considered a "Project" under CEQA:
   ☒ a) Agreement **IS** exempt. (Attach draft NOE)
   ☐ Statutory Exemption. List PRC and/or CCR section number:
   ☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit 14, § 15306
   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)
   Explain reason why Agreement is exempt under the above section:

   The proposed project involves basic data collection, research, and resource evaluation activities which will not result in a serious or major disturbance to an environmental resource. Specifically, the proposed project will compile existing information on the Sacramento-San Joaquin Delta and test four non-invasive geotechnical methods for assessing levee integrity. This testing will be conducted at several sites and will include seismic surface wave surveying, electrical resistivity, ground penetrating radar, and electromagnetic surveying. Data-gathering equipment will be placed on the surface of existing levees. No digging or trenching is involved. Theis equipment will consist of small, handheld devices, approximately the size of a small appliance such as a toaster oven; and small sensors connected by cables and arranged in a line on the top or at the toe of the levee. This proposed project will have no significant effect on the environment and falls within section 15306.

   ☐ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
   Check all that apply
   ☐ Initial Study
   ☐ Negative Declaration
   ☐ Mitigated Negative Declaration
   ☐ Environmental Impact Report
   ☐ Statement of Overriding Considerations

Legal Company Name:	Budget
The Regents of the University of California, on behalf of the Los	$ 100,528
Angeles Campus	$
The Regents of the University of California, on behalf of the Berkeley	$ 148,628
Campus	$
California State University, East Bay	$ 149,427
Storesund Consulting	$ 11,750
	$
	$
	$

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List all key partners: (attach additional sheets as necessary)
Legal Company Name:
Pacific Gas and Electric Company

Budget Information			
Funding Source	**Funding Year of Appropriation**	**Budget List No.**	**Amount**
NG Subaccount, PIERDD	17-18	500.001L	$549,500
			$
			$
			$
			$
			$
R&D Program Area: EGRO: EA		TOTAL:	$549,500
Explanation for “Other” selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient’s Administrator/ Officer				**Recipient’s Project Manager**			
Name:	Chris Hitchcock			Name:	Ozgur Kozaci		
Address:	5 3Rd St Ste 420			Address:	5 3Rd St Ste 420		
City, State, Zip:	San Francisco, CA 94103-3205			City, State, Zip:	San Francisco, CA 94103-3205		
Phone:	/	Fax:	- -	Phone:	925-286-8349 /	Fax:	- -
E-Mail:				E-Mail:	okozaci@infraterra.com		

Selection Process Used
☒ Competitive Solicitation Solicitation #: GFO-17-502
☐ First Come First Served Solicitation

The following items should be attached to this GRF		
1. Exhibit A, Scope of Work		☒ Attached
2. Exhibit B, Budget Detail		☒ Attached
3. CEC 105, Questionnaire for Identifying Conflicts		☒ Attached
4. Recipient Resolution	☒ N/A	☐ Attached
5. CEQA Documentation	☒ N/A	☐ Attached

Agreement Manager	**Date**	**Office Manager**	**Date**	**Deputy Director**	**Date**

EXHIBIT A
Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Development of a Comprehensive GIS Database
3	X	Processing and Interpretation of InSAR Data
4		Geotechnical Assessment of Levee Conditions
5	X	Assessment of Pipeline Performance
6		Testing of Multiple Geophysical Methods
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
GIS	Geographic Information System
InSAR	Interferometric Synthetic Aperture Radar
PG&E	Pacific Gas and Electric Company
Recipient	InfraTerra, Inc.
TAC	Technical Advisory Committee
The Delta	Sacramento – San Joaquin Delta

II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to develop innovative, non-invasive and cost-effective methodologies to evaluate the structural integrity of Sacramento-San Joaquin Delta (Delta) levees. Natural gas pipeline infrastructure in the Delta protected by these levees includes 242 miles of pipelines and major storage facilities and is a critical component of the state's natural gas system.

Levees in the Delta were built as simple peat dikes resting on marsh soils and are therefore highly vulnerable to damage from floods, wave action, seepage, subsidence, burrowing animals, earthquakes, and sea level rise. The structural integrity of levees in the Delta has been a subject of investigations for decades and continues to be a source of concern. Work under this Agreement will leverage the wealth of information from previous studies and optimize non-

[1] Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

invasive geophysical data acquisition technologies to identify potential vulnerabilities in the Delta natural gas infrastructure from levee failures.

The Energy Commission issued solicitation GFO-17-502 to fund research to develop and test cost-effective approaches for evaluation of structural integrity of the levees protecting natural gas infrastructure in the Sacramento-San Joaquin Delta; as well as other topics addressing greenhouse gas emission from the state's natural gas system.

In response to GFO-17-502, InfraTerra, Inc. (Recipient) submitted application #9, which was proposed for funding in the Energy Commission's Notice of Proposed Awards dated February 6, 2018.

The Recipient's application and the Notice of Proposed Award issued are incorporated by reference to this Agreement in their entirety.

In the event of any conflict or inconsistency between the terms of the Solicitation and the terms of the Recipient's Application, the Solicitation shall control. In the event of any conflict or inconsistency between the Recipient's Application and the terms of the Energy Commission's Award, the Commission's Award shall control. Similarly, in the event of any conflict or inconsistency between the terms of this Agreement and the Recipient's Application, the terms of this Agreement shall control.

B. Problem/ Solution Statement

Problem

The integrity of the Delta levees is critical to protecting people, property, infrastructure, natural resources, and California's water supply. There is growing concern to protect the integrity of the Delta levees due to PG&E's plans of restructuring its natural gas storage facilities, which involves shutting down smaller storage units at Los Medanos and Pleasant Creek and focusing operations on McDonald Island within the Delta.

Previous studies have shown that the Delta levees are vulnerable to damage from a variety of natural events including, but not limited to, earthquakes, floods, and climate change. As a result, there have been extensive studies addressing levee fragility to evaluate the probability of failure for various risk scenarios. However, in order for these studies and current understanding of the Delta environment to progress and for development of realistic fragility curves, additional information, such as the spatial variability of the levees' physical properties, is needed.

Solution

The Recipient will develop a comprehensive Geographic Information System (GIS) database that includes three major data sets: geohazards, levee condition, and natural gas infrastructure. These data sets will be combined to develop a map that delineates the Delta area into distinct regions with similar cumulative susceptibility for detailed geophysical data acquisition. Interferometric Synthetic Aperture Radar (InSAR) data will be utilized to identify and characterize the distribution of geohazards in conjunction with the GIS database. Geophysical investigations will then be performed based on these levees that protect critical natural gas infrastructure. The Recipient will test four geophysical survey techniques to obtain complete subsurface and structural levee profiles and to develop an understanding of the most effective method(s) to preserve the Delta levees and environment. The results of the geophysical

investigation will also be validated by the GIS database and existing soil boreholes made by the Department of Water Resources.

Pipeline performance modeling will be conducted to understand the vulnerabilities of the natural gas infrastructure within the Delta system. Not every levee breach or geohazard impact would necessarily cause pipeline failure. Understanding the thresholds where pipelines may perform well or fail is essential for (1) prioritization of mitigation locations, and (2) allocating economic and work force resources where needed.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Develop a cost-effective method to assess the structural integrity of levees;
- Help avoid levee and natural gas infrastructure failure.

Ratepayer Benefits: This Agreement will result in the ratepayer benefits of greater reliability, lower costs, and increased safety by the identification of segments of natural gas infrastructure that are at highest risk of failure.

PG&E's largest natural gas storage field is located on McDonald Island in the Delta. Additionally, PG&E plans to restructure its natural gas storage facilities, which includes widening the range of the noncore customers supplied by the gas storage at McDonald Island to include electric generators and industrial customers. The identification and protection of vital facilities and the associated transmission lines will maintain lower costs for ratepayers. Additionally, proactively addressing potential issues avoids future clean up, emergency response, down-time, and repair costs and improves safety and reliability of resources such as gas and electricity.

Technological Advancement and Breakthroughs: This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by developing a non-invasive and cost-effective methodology for improving the reliability of natural gas infrastructure. Assembly Bill 1257 (Bocanegra, Chapter 749, Statues of 2013) directs the exploration of strategies and options for using natural gas, including the maintenance or enhancement of pipeline and system reliability.

Due to gaps in understanding of the levee conditions within the Delta, the reliability of natural gas infrastructure, including pipelines protected by levees, is at risk. By identifying the pipeline segments most susceptible to failure as a result of levee breach, resources may be concentrated at locations most in need of mitigation, thereby efficiently and effectively improving the reliability of natural gas infrastructure.

Agreement Objectives

The objectives of this Agreement are to:

1. Develop a comprehensive GIS database that includes three data sets: geohazards, levee conditions, and natural gas infrastructure conditions to develop levee condition assessments and potential failure modes. Failure modes will be defined for levees to be combined with levee condition assessments.
2. Process and interpret InSAR data to supplement the assessment of ongoing ground failure overlaid on the existing natural gas infrastructure system for identification of target sites for detailed geophysical data acquisition.

3. Test four different geophysical methods at select sites representing similar conditions; this data acquisition approach will utilize complementary techniques with high-resolution data to improve geohazard area identification and reduce the uncertainty of levee failure.
4. Pipeline performance modeling for representative cases will be conducted to understand where pipelines may perform well or fail.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

For all products

- Submit all data and documents required as products in accordance with the following:

Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**
  - Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission's software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

  The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Documents intended for public distribution will be in PDF file format.
- The Recipient must also provide the native Microsoft file format.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

o **Software Application Development**

Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:

- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
- Microsoft SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

  The administrative portion of the meeting will include discussion of the following:
  - o Terms and conditions of the Agreement;
  - o Administrative products (subtask 1.1);
  - o CPR meetings (subtask 1.3);
  - o Match fund documentation (subtask 1.7);

- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
- An updated Project Schedule;
- Technical products (subtask 1.1);
- Progress reports and invoices (subtask 1.5);
- Final Report (subtask 1.6);
- Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- Any other relevant topics.

- Provide an *Updated Project Schedule, List of Match Funds,* and *List of Permits*, as needed to reflect any changes in the documents.

The CAM shall:

- Designate the date and location of the meeting.
    - Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:

- Updated Project Schedule *(if applicable)*
- Updated List of Match Funds *(if applicable)*
- Updated List of Permits *(if applicable)*

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.

- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* and a *List of Expected CPR Participants* in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a *Schedule for Providing a Progress Determination* on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

CAM Products:

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

  The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
    - Disposition of any state-owned equipment.

- Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
- The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
- Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
- "Surviving" Agreement provisions such as repayment provisions and confidential products.
- Final invoicing and release of retention.

- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary *(if applicable)*
- Schedule for Completing Agreement Closeout Activities
- All Draft and Final Written Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
  - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Fund and in-state expenditures.

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. *(See Task 1.1 for requirements for draft and final products.)*

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Style Manual
- Comments on Draft Final Report Outline
- Approval of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
  - Ensure that the document is written in the third person.
  - Ensure that the Executive Summary is understandable to the lay public.
    - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
    - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.

        - If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
    - Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
    - Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
    - Include a brief description of the project results in the Abstract.

- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of Energy Commission funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

  If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:
    - A list of the match funds that identifies:
        - The amount of cash match funds, their source(s) (including a contact name,

address, and telephone number), and the task(s) to which the match funds will be applied.
    - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
    - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter *(if applicable)*
- Match Funds Reduction Notification Letter *(if applicable)*

Subtask 1.8 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If <u>no permits</u> are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
    - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
    - The schedule the Recipient will follow in applying for and obtaining the permits.

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.

- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

- Permit Status Letter
- Updated List of Permits *(if applicable)*
- Updated Schedule for Acquiring Permits *(if applicable)*
- Copy of Each Approved Permit *(if applicable)*

Subtask 1.9 Subcontracts

The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

- Subcontracts *(draft if required by the CAM)*

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.

- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.11 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.

- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

IV. TECHNICAL TASKS

*Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

TASK 2 DEVELOPMENT OF A COMPREHENSIVE GIS DATABASE

The goal of this task is to develop a comprehensive GIS database that includes geohazards, levee conditions, and natural gas infrastructure conditions.

The Recipient shall:

- Integrate three essential data sets into a *Comprehensive Delta GIS Database* including:
  - Geohazards including but not limited to fault surface rupture, strong ground motion, liquefaction, slope failures, settlement, lateral spreading, subsidence, seepage, flooding, sea level rise, scour and erosion, corrosive soils, and expansive soils;
  - Levee conditions including but not limited to age, type, height, past failures; and
  - Natural gas infrastructure conditions based on but not limited to distribution or transmission systems' age, depth, size, and past performance.
- Combine relevant datasets for each category in the Delta database to develop a classification system. Classification for each category will aim to represent similar conditions from a geohazard, levee condition, and infrastructure perspective separately.
- Develop geospatial intersection of classification groups from each category for identification of target sites representing similar level of cumulative susceptibility.
- Draft technical memo *Hazard Maps Memo* that includes but is not limited to maps showing different geohazards, levee conditions and natural gas infrastructure conditions, description of the maps, and of the sources of the data.

Products:

- Comprehensive Delta GIS Database.
- Hazard Maps Memo

TASK 3 PROCESSING AND INTERPRETATION OF INSAR DATA

The goals of this task are to identify the type and spatio-temporal distribution of shallow deformation in the Delta using satellite-based InSAR data.

The recipient shall:

- Review InSAR datasets including but not limited to the recent Sentinel platform for availability and project applicability.
- Process InSAR data covering the Delta.
- Interpret the signals observed on InSAR data for integration with the comprehensive Delta GIS database..
- Select sites for geophysical field testing.
- Draft technical memo *InSAR Maps Memo* that includes but is not limited to maps showing InSAR maps for the Delta, description of the maps, and of the sources of the data.
- Draft *CPR Report* #1 and participate in CPR Meeting #1 as described in subtask 1.3

Products:

- InSAR Maps Memo
- CPR Report #1

TASK 4 GEOTECHNICAL ASSESSMENT OF LEVEE CONDITIONS

The goal of this task is to provide a geotechnical characterization of levee stability conditions in the Delta.

The recipients shall:

- Model geotechnical levee cross-sections that will utilize geophysical measurements from the GIS Database.
- Develop a method for assigning spatial correlation relations to levee fragility functions based on observed spatial distributions of soil properties identified by the high-resolution geophysical measurements within the levees.
- Draft technical memo *Method of Enhancing Geotechnical Characterization of Levee Conditions.*

Product:

- Method of Enhancing Geotechnical Characterization of Levee Conditions Memo

TASK 5 ASSESSMENT OF PIPELINE PERFORMANCE

The goal of this task is to conduct pipeline performance modeling for representative conditions in order to identify the most at-risk regions of the Delta.

The Recipient shall:

- Perform nonlinear analysis of representative pipelines in critical levee environments.
- Develop a methodology to identify areas with both (1) pipelines in poor condition with high risk of failure in the event of a levee breach and (2) levees in poor condition that are susceptible to failure.
- Draft technical memo *Method of Identification of Pipeline Performance Thresholds in the Delta* which includes but is not limited to description of the methodology and analysis of the current pipeline performance thresholds.
- Draft *CPR Report* #2 and participate in CPR Meeting as described in subtask 1.3

Product:

- Method of Identification of Pipeline Performance Thresholds in the Delta Memo
- CPR Report #2

TASK 6 TESTING OF MULTIPLE GEOPHYSICAL METHODS

The goals of this task are to test four different geophysical methods in order to: (1) develop an understanding of appropriate geophysical method(s) for a range of environments specific to the Delta; and (2) re-evaluate and refine the data sets developed in Task 2.

The Recipient shall:

- Test an array of geophysical methods (seismic surface wave surveying, electrical resistivity, ground penetrating radar (GPR), and electromagnetic (EM) surveying) at McDonald Island and other possible levee locations representing a range of conditions identified in Tasks 2 and 3.
- Compare and validate geophysical methods with existing borehole data obtained from DWR.
- Re-evaluate and refine the interpretations input into the geohazard and levee conditions layers of the GIS geodatabase with high-resolution site-specific data.
- Draft *Geophysical Methods Testing Memo* that includes but is not limited to findings for geophysical acquisition correlations, recommendations for data acquisition optimization specific to the Delta and levee conditions, and multi-methods geophysical data cross-plots for subsurface characterization.

Products:

- Geophysical Methods Testing Memo (Draft and Final)

TASK 7 EVALUATION OF PROJECT BENEFITS

The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including: targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:

    - For Product Development Projects and Project Demonstrations:
        - Published documents, including date, title, and periodical name.
        - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
        - Greenhouse gas and criteria emissions reductions.
        - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
        - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
        - A discussion of project product downloads from websites, and publications in technical journals.
        - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
        - Additional Information for Product Development Projects:
            - Outcome of product development efforts, such copyrights and license agreements.

- Units sold or projected to be sold in California and outside of California.
- Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
- Investment dollars/follow-on private funding as a result of Energy Commission funding.
- Patent numbers and applications, along with dates and brief descriptions.

- Additional Information for Product Demonstrations:
  - Outcome of demonstrations and status of technology.
  - Number of similar installations.
  - Jobs created/retained as a result of the Agreement.

o For Information/Tools and Other Research Studies:
- Outcome of project.
- Published documents, including date, title, and periodical name.
- A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
- The number of website downloads.
- An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
- An estimate of energy and non-energy benefits.
- Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.

- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:
- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 8 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

The Recipient shall:
- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:

- An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
- A description of the intended use(s) for and users of the project results.
- Published documents, including date, title, and periodical name.
- Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
- A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
- The number of website downloads or public requests for project results.
- Additional areas as determined by the CAM.

- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop(s) on the project.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 18-0411-9d

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: INFRATERRA, INC.

RESOLVED, that the State Energy Resources Conservation and Development Commission (Energy Commission) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the Energy Commission approves Agreement PIR-17-013 from GFO-17-502 with Infraterra, Inc. for $549,500, to test and identify non-invasive and cost-effective technologies for a survey of the structural integrity of Sacramento-San Joaquin Delta levees that protect natural gas infrastructure; and

FURTHER BE IT RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the Energy Commission.

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on April 11, 2018.

AYE: [List of Commissioners]
NAY: [List of Commissioners]
ABSENT: [List of Commissioners]
ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat