

Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

## NIA Project Registration and PEA Document

### Date of Submission

Oct 2017

### Project Reference Number

NIA\_CAD0010

## Project Registration

### Project Title

Phased Array Cable Avoidance

### Project Reference Number

NIA\_CAD0010

### Project Licensee(s)

Cadent

### Project Start

October 2017

### Project Duration

0 years and 7 months

### Nominated Project Contact(s)

Cadent Project Manager – Eithne Allen  
Cadent Technical Lead – Phil Hunter  
Cadent Project Sponsor – Neil Bethell

### Project Budget

£368,614.00

## Summary

The building of a small array with the objective of detecting and discriminating difficult to detect pot ended cables at a minimum depth of 500mm.

Stage 2 consists of:

- System Design
- Mechanical Design of a 5 element array
- Electronics Design, printed circuit board layout and small scale manufacture of 2 units
- Embedded software design and testing to excite the array and transfer captured data to a PC for analysis
- Creation of summary report on findings and next steps
- Key outputs include interim and final presentations to report on Stage 2 findings and feasibility, including supporting documents and test pieces.

### Nominated Contact Email Address(es)

Innovation@cadentgas.com

## Problem Being Solved

Utility services located below ground may contain live power cables that have been capped off (stubs); cables may be live but not transmitting a magnetic signal or may be so well balanced that they cannot be detected by existing locators. In these instances we have struck live cables, these strikes could have had potentially fatal consequences. In addition to the safety risk there is also a significant cost associated with the repair of damaged cables. This project's objective is aimed at creating a means to mitigate this risk. This is phase 2 of the programme and builds on the feasibility study work from phase 1 "Safe Digging Phased Array Feasibility study.

## Method(s)

Stage 2 of this Project continues the feasibility study by building a small array with representative custom electronics, with the objective of detecting and discriminating difficult to detect pot ended cables at a minimum depth of 500mm.

In summary, this consists of; System design, Mechanical design of a 5 element array, electronics design, printed circuit board layout and small scale manufacture of a number of units, embedded software design and testing to excite the array and transfer captured data to a PC for analysis and a detailed report on findings and next steps.

## Scope

The building of a small array with the objective of detecting and discriminating difficult to detect pot ended cables at a minimum depth of 500mm.

Stage 2 consists of:

-System Design

-Mechanical Design of a 5 element array

-Electronics Design, printed circuit board layout and small scale manufacture of 2 units

-Embedded software design and testing to excite the array and transfer captured data to a PC for analysis

-Creation of summary report on findings and next steps

-Key outputs include interim and final presentations to report on Stage 2 findings and feasibility, including supporting documents and test pieces.

## Objective(s)

The objective of this Project is to determine the technical feasibility of the concept as a means of detecting and discriminating “difficult to detect” utilities at a depth of at least 500mm.

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

## Success Criteria

Laboratory tests successfully demonstrating that the 5 phased array can both detect and discriminate difficult to detect utilities at a minimum depth of 500mm

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

Laboratory Testing.

## Technology Readiness at Start

TRL3 Proof of Concept

## Technology Readiness at End

TRL3 Proof of Concept

## Geographical Area

Device has scope to be used across all Cadent Gas Distribution Networks with applications in Repair as well as replace and extend work.

## **Revenue Allowed for the RIIO Settlement**

N/A

## **Indicative Total NIA Project Expenditure**

Internal: £82,614 External: £260,000 Contingency £26,000 Total: £368,614

## Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

### Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

#### How the Project has the potential to facilitate the energy system transition:

n/a

#### How the Project has potential to benefit consumer in vulnerable situations:

n/a

### Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

#### Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

The project is still at feasibility stage – moving to early development stage at the conclusion of this stage – thus it is too early to provide even an indicative method cost. Savings will be achieved through reduction in injury rates, and reduced volume of excavation if more accurate location of services is possible.

#### Please provide a calculation of the expected benefits the Solution

N/A

#### Please provide an estimate of how replicable the Method is across GB

N/A

#### Please provide an outline of the costs of rolling out the Method across GB.

N/A

### Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

- A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).
- A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)
- A specific novel operational practice directly related to the operation of the Network Licensees system
- A specific novel commercial arrangement

RIIO-2 Projects

- A specific piece of new equipment (including monitoring, control and communications systems and software)
- A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven
- A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)
- A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology
- A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution
- A specific novel commercial arrangement

## Specific Requirements 4 / 2a

### Please explain how the learning that will be generated could be used by the relevant Network Licensees

This technology has the potential to reduce cable strikes across all GDN's. In doing so, this new learning will be shared in order to make sure GDN's are safeguarding their employees against the risk of cable strikes.

### Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

This Project directly addresses a major issue in operational safety i.e. its purpose is to identify hazardous cables and prevent operatives striking them (and potentially creating the conditions for electrocution) during digging operations

- Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

### Is the default IPR position being applied?

- Yes

## Project Eligibility Assessment Part 2

### Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

### Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

n/a

### If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

## Additional Governance And Document Upload

### Please identify why the project is innovative and has not been tried before

n/a

### Relevant Foreground IPR

n/a

### Data Access Details

n/a

### Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

n/a

**Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project**

n/a

**This project has been approved by a senior member of staff**

Yes