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

Jan 2018

### Project Reference Number

SGNGN04

## Project Registration

### Project Title

Robotic Roadworks and Excavation System (RRES)

### Project Reference Number

SGNGN04

### Project Licensee(s)

SGN

### Project Start

April 2018

### Project Duration

4 years and 1 month

### Nominated Project Contact(s)

Oliver Machan, Innovation Project Manager

### Project Budget

£7,303,770.00

### Summary

Disruption from roadworks and excavations is a primary concern for GB residents, businesses and road users. The next transformational phase in the performance of network excavations and operations will require the integration of Artificial Intelligence (AI) with advanced digital tooling to automate routine works, making them quicker, safer, more cost effective and consistent.

The Robotic Roadworks & Excavation System (RRES) is the future for precision excavation and utility operations technology. The system will use advanced robotic arm technology fused with a mobile platform and AI working with a suite of sensors and controls to enable autonomous, safe and efficient mains excavation. Once exposed, the RRES will attach a newly developed universal access fitting to the main to enable a set of inspection and maintenance operations to be performed. This next generation system will enable urban and large rural excavation to be performed faster and at a lower cost and with greater safety than is currently possible using the most advanced methods available today.

During the project we will design, develop and field test a complete RRES capable of performing automated works on buried urban utilities via coring as well as safely excavating rural infrastructure.

### Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

### Problem Being Solved

### Method(s)

### Scope

### Objective(s)

The RRES project will be broken down into a series of delivery milestones with associated payment triggers and go/no-go project stage gates. Each element will focus on specific milestones with the opportunity to review and reassess before proceeding to the next.

The elements are broadly as follows:

**Element 1 -** Artificial Intelligence, Robotics, Sensor and Tooling Development:

a. Robotic arm excavation control development;
b. Below ground machine vision capability development;
c. Excavation `soft-touch' tooling and equipment development;
d. AI development and subsystem control integration;
e. Element 1 subsystem and integrated system testing.

**Element 2 -** Mobile Platform, Vehicle & Support Equipment Development:

a. Mobile platform specification determination and development;
b. Support equipment and control development;
c. Support vehicle specification determination and development;
d. Universal Network access fitting development;
e. Software development to integrate data from above ground surveys with RRES;
f. Element 2 subsystem and integrated system testing.

**Element 3 -** Final System Integration and Initial Field Testing:

a. Element 1-2 system integration;
b. RRES field test (alpha).

**Element 4 -** Enhancements from Field Testing and Live Gas Testing:

a. System and subsystem development and modification based on alpha testing outcomes;
b. Final RRES build;
c. RRES field test (beta).
d.

Each Element of the project will progress specific technology through the TRLs and will deliver valuable learning.

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

n/a

## Success Criteria

n/a

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

n/a

## Geographical Area

## Revenue Allowed for the RIIO Settlement

## Indicative Total NIA Project Expenditure

# 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)

n/a

## 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

n/a

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

n/a

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

### Is the default IPR position being applied?

☐ Yes

### Please demonstrate how the learning from the project can be successfully disseminated to Network Licensees and other interested parties.

### Please describe how many potential constraints or costs caused, or resulting from the imposed IPR arrangements.<

### Please justify why the proposed IPR arrangements provide value for money for customers.

## 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