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

Mar 2021

Project Reference Number

NIA_WWU_072

Project Registration

Project Title

Project MOLE (Minimising Our Launch Excavations)

Project Reference Number

NIA_WWU_072

Project Licensee(s)

Wales & West Utilities

Project Start

March 2021

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Rob Downes

Project Budget

£42,133.00

Summary

A project to design, build and test a new cradle for a ground mole. The new cradle will sit outside of the trench, thus reducing excavations and make the operation safer.

Nominated Contact Email Address(es)

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Problem Being Solved

Ground moling removes the need for digging long trenches. Two pits are dug a set distance apart and a mechanical mole is launched from the base of one pit. The mole bores through the ground horizontally to the second pit, creating a bore hole. The mole is then extracted and a pipe or cable is pulled in through the hole that has been created.

Large excavations are required at the two pits, especially the launch pit, to create sufficient operating space to house a cradle that stabilises the mole, these are time consuming to dig. The ground mole is supported by a cradle, the support cradles are currently bulky in design and the operator needs to access the base of the pit in order to set the correct launch altitude and direction of the mole. These requirements result in the excavation to being of a size much larger than the mole being used and inhibits our ability to reduce excavation sizes

Method(s)

The project will seek to develop a new design of surface level frame to safely secure the mole for launch. This will help to reduce the size of the excavation required and enable the operatives to do any alignment and adjustment of the mole from the surface. The solution could also be universal across multiple mole sizes, reducing the need to have a specific cradle for each mole.

The proposed design project is broken down into four main phases:

- Kick Off and Requirements Capture
- Mechanical Design
- Manufacturing Routes Investigation
- Prototype Manufacture and Test

The project partner, Frazer-Nash, will design the frame to help alleviate the problems faced by operatives using current equipment, whilst optimising the overall size and weight. A prototype test frame will be manufactured and Frazer-Nash will test this in a representative environment and in the field. As well as the design work, Frazer-Nash will carry out an investigation into manufacturing routes to facilitate follow on work and the production of a low unit cost solution.

After conducting the functional testing, the test frame will undergo further field testing.

Scope

Stage 1

- Formalise a set of requirements, which have been agreed with the key project stakeholders.
- Observe moling operation with current equipment via video supplied by WWU to be viewed and discussed in a follow up meeting
- Formalise a set of requirements, which have been agreed with the key project stakeholders.

Stage 2

- Choose a preferred concept design to be taken forward, which has been agreed with the key project stakeholders.
- Produce a detailed design and appropriate documentation to enable manufacture.

Stage 3

- Undertake an investigation into manufacturing routes to facilitate potential future production.

Stage 4

- Manufacture a prototype frame
- Conduct functional testing of the prototype
- Conduct field trial
- Review testing
- Produce a final report

Objective(s)

The objective of the project is to design, develop and manufacture a full scale, fully-functional and safe prototype demonstrator frame suitable for testing in a real environment using standard impact moling equipment

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Success for the project will enable WWU to understand if our current equipment is the safest and most cost efficient way to launch a ground mole.
To produce a safe, working prototype ground mole cradle and a set of design drawings that may be used for manufacture. The project will:

1. Present a comprehensive list of requirements for the concept design
2. Produce a concept design, detail how the product contributes to the reduction in excavation sizes and compare with equipment currently used by Wales & West Utilities
3. Manufacture and test the equipment in a relative environment, and
4. Document project findings to enable others to learn from this research and development project.

Project Partners and External Funding

Project Partners: Frazer-Nash Consultancy
This project will be fully funded via the Network Innovation Allowance.

Potential for New Learning

As the proposed design of a surface level frame differs significantly from current equipment, there is potential learning from how the system will be used and how it will perform in comparison to current cradles. Additionally, the universal mole support should provide insight into the benefits of having equipment that is more flexible and not bound to one specific manufacturer's piece of equipment.

Scale of Project

The scale of the project will create one functional cradle that will be tested in a controlled environment and limited field trial conditions.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

Trials will take place withing the Wales & West network

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

External: £31,600
Internal: £10,533
Total NIA expenditure is £42,133

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)

In GD1 WWU laid approximately 40km of pipe with the ground mole equipment, using the equipment around 2,000 times. The standard excavation size for ground moling is 1.3m x 0.8m, it is hoped the innovation could reduce the size of the excavation by 25%, which would lead to cost savings, reduce street works disruption and deliver environmental benefits.

Please provide a calculation of the expected benefits the Solution

Current excavation size, using incumbent ground mole cradles – 1.04 m2
Anticipated excavation size, using smaller cradles – 0.78 m2
Excavation saving per use = 0.26 m2
Financial saving = £28.36 p/use

Benefits will be unlocked if this project delivers a new product that is able to be manufactured. If the new method is used 2,000 times, this would see a saving of £56k when compared to the base cost method. In addition, there are non-financial benefits of excavating less material and social benefits associated with less excavations on public highways.

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

This could be fully replicated across all networks, as ground moling is common place across Great Britain by all utility companies e.g. including electricity, water and telecoms

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

It is anticipated the cradle would be of a similar price to current cradles, so roll out would be minimal as current cradles could be replaced at the end of their life cycle for no extra cost.

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

All networks undertake ground moling to reduce their impact on the environment and reduce disruption to road users. Equipment manufacture and supply is limited to very few companies, who produce the same size cradles as used by WWU. If successful, the new cradle design will be made available for manufacture and could be used by all networks to help reduce the size of excavations and improve the safety of the operation.

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

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.

No project of this kind has been undertaken by any networks. A call for innovation was launched to identify a suitable solution or a project partner to develop a solution. No market ready products or similar projects were identified during this search.

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

The current cradle has been used for many years, with no real design changes and was seen as the best possible product for securing

a cradle. A challenge was set by operations to investigate a better solution, no-one has ever sought an alternative to current practices as far as we know. Current cradles are secured in the excavation however this solution would be kept outside of the excavation, which is a novel approach that has never been attempted before.

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

There is sufficient risk in this project to qualify for innovation funding. The project will assess the feasibility of the conceptual design, progress its development through design stages and demonstrate a prototype cradle to identify modifications that can be built into a final design.

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

This is a brand-new piece of equipment that is being designed specifically for the project. There are no guarantees that the cradle will secure the mole to satisfy health and safety requirements. There are also concerns with size, weight, cost and ease of operation. All of these issues will be investigated throughout the project, with all findings shared with other networks.

This project has been approved by a senior member of staff

☑ Yes