WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Date of Submission

19/11/2015

NIA Project Registration and PEA Document

Notes on Completion: Please refer to the **NIA Governance Document** to assist in the completion of this form. Please use the default font (Calibri font size 10) in your submission. Please ensure all content is contained within the boundaries of the text areas. The full-completed submission should not exceed 6 pages in total.

Project Registration

Project Title		**Project Reference**
Airborne Inspection Phase 1		**WPD_NIA_007**
Funding Licensee(s)	**Project Start Date**	**Project Duration**
Western Power Distribution (East Midlands) Western Power Distribution (West Midlands) Western Power Distribution (South West) Western Power Distribution (South Wales)	Nov 2015	2 Years (Nov 2017)
Nominated Project Contact(s)		**Project Budget**
James Bennett – WPD Innovation & Low Carbon Engineer		£530,000

Problem(s)

Currently helicopter based overhead electricity line inspections rely on the observer visually (Either directly or through cameras) assessing the line and documenting their findings with any significant issues relayed back to the local maintenance team for rectification on return to base.

Whilst historically tried and tested the availability of much improved sensors together with image recognition and wider system integration (Asset records, GIS, GPS etc.) means that there is now scope for a much more efficient inspection style over a greater length of network resulting in cost savings and improved network reliability.

Method(s)

The project shall consist of six distinct aspects;

1) Identify key user requirements for a helicopter mounted sensing system which will be used to inform a tender document in order to specify a camera system. Further work under Phase 2 of the project shall procure and integrate a LIDAR system.
2) Integrate existing asset management information in to the sensing system
3) Develop 'in air' reporting capabilities to allow timely data transfer to interested parties
4) Develop a semi-automated condition report generating function
5) Develop automatic tracking capabilities for overhead lines
6) Develop image recognition capabilities in order to automatically identify ESQCR non-compliance together with other asset condition issues

Scope

Distribution Network Operators have statutory duties under the Electricity Safety Quality and Continuity Regulations 2002 to maintain its system in a safe condition and to undertake an assessment of the risk of unauthorised access, interference or vandalism. Regular inspection and subsequent condition based maintenance also reduces customer interruptions. By improving the existing helicopter based inspection regime cost savings in a number of areas can be achieved together with an improvement in network performance.

The overarching aim of the project is to produce a helicopter based system which can automatically assess line condition and produce reports on any issues for the end user in an appropriate form. In order to achieve this, the existing sensing capabilities need to be assessed and recommendations for improvements made, the new sensing system shall be integrated with existing asset databases and a condition monitoring system developed.

It is anticipated that the sensing capabilities shall be limited to commercially available cameras but the subsequent developed system shall be scalable to include future hardware such as LIDAR and RF PD

It is not anticipated that the system shall replace the observers' role within the inspection regime but rather will become the observers' tool for inspecting.

Objective(s)

1) Identify the optimum helicopter mounted sensing system which will enable long range data acquisition in the most operator friendly manner. The system should be able to present data in a format which can be integrated with other technologies and also used within analysis software
2) Produce a data analysis package capable of autonomously gathering data in order to identify faults and deterioration. The package should integrate with existing asset records and GIS data to produce reports and record inspection against existing records.
3) Produce a system capable of the real-time reporting of condition back to interested parties on the ground

Success Criteria

1) Production of a firm recommendation for the helicopter mounted sensor setup
2) Successful integration of existing asset information with camera data
3) Development of 'in air' data transfer
4) The accurate identification of a number of asset conditions using data analysis software

Technology Readiness Level at Start	Technology Readiness Level at Completion
4	8

Project Partners and External Funding

None

Potential for New Learning

The successful conclusion of this project could result in significant new learning associated with automated image recognition covering a number of imaging technologies and there integration with existing asset management systems.

Scale of Project

The project size is kept at the smallest that is practical. We will focus on equipping one helicopter with the necessary hardware which can then be replicated if successful as business as usual. Any reduction in scale would not produce results of the required quality.

Geographical Area

It is anticipated that the project will take place across all four of the WPD licence areas (South West, South Wales, West Midlands & East Midlands).

Revenue Allowed for in the RIIO Settlement

NIL

Indicative Total NIA Project Expenditure

£477,000

Project Eligibility Assessment

Specific Requirements 1

1a. A 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 systems and 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	☐

Specific Requirements 2

2a. Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees ☒

Please answer one of the following:

i) Please explain how the learning that will be generated could be used by relevant Network Licenses.

As all UK electricity DNOs use helicopter patrols in some way the learning gained from this project would allow for more efficient working practices to be adopted across the country.

ii) Please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the Project.

Is the default IPR position being applied?

Yes	☒
No	☐

If no, please answer i, ii, iii before continuing:

i) Demonstrate how the learning from the Project can be successfully disseminated to Network Licensees and other interested parties

ii) Describe how any potential constraints or costs caused, or resulting from, the imposed IPR arrangements

iii) Justify why the proposed IPR arrangements provide value for money for customers

2b. Has the Potential to Deliver Net Financial Benefits to Customers ☒

Please provide an estimate of the saving if the Problem is solved.

It is estimated that the project could provide a saving of £2.25million per year across the company through a reduction in foot patrols, increased speed in helicopter patrol and increased accuracy in fault identification. The project will also ensure a reduction in CIs and CMLs.

Please provide a calculation of the expected financial benefits of a Development or Demonstration Project (not required for Research Projects). (Base Cost – Method Cost, Against Agreed Baseline).

Base Cost £1.40Million – Method Cost £1.05Million = £0.35Million per year

The reduction in business costs associated with foot patrols & faults can also be added to give an overall benefit of £2.25million per year.

Please provide an estimate of how replicable the Method is across GB in terms of the number of sites, the sort of site the Method could be applied to, or the percentage of the Network Licensees system where it could be rolled-out.

The method is easily replicable across the whole of the GB network licensees

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

It is anticipated that there will be negligible roll-out costs associated with the new technology. As the majority of DNOs use contractors it is anticipated that the investment will be made by them. This increase in hardware cost will be offset by the increased efficiency resulting in a lower cost per km inspected for the DNO.

2c. Does Not Lead to Unnecessary Duplication ☒

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

Research has shown that no electricity licensees have any projects which may cause duplications

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

National Grid Gas Transmission Project Reference NIA_NGGT0064 'High Altitude Aerial Surveillance' presents some similarities but the fundamental aims are different to those presented in this application and thus findings from both projects will have very limited overlap.

Scotia Gas Networks Project Reference NIA_SGN0035 'Beyond Visual Line of Sight Aerial Inspection Vehicle' looks to provide a CAA confirmed specification for unmanned vehicles which ultimately will undertake inspection. Although covering inspection it is not anticipated that there will be any duplication.