

## Annual Project Progress Report 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.

**Project Title**

Submarine Cable Sensing (SUBsense)

**Project Reference**

NIA\_SSEN\_0034

**Funding Licensee(s)**

Scottish Hydro Electric Power Distribution

**Project Start Date**

August 2018

**Project Duration**

36 Months

**Nominated Project Contact(s)**

SSEN NIA Programme Delivery Manager – Colin Mathieson

**Year**

2020

**Scope**

The scope of the project is to install a live system on several cables which are due to be laid in a variety of different locations to monitor for third party intervention, cable movement and fault detection. These cables will be monitored during the project and the data gathered will be assessed by the relevant teams. An evaluation will be completed at the end of the trial with recommendations of the system’s suitability for transfer to BAU.

**Objective(s)**

The objectives of the project are:

- To have installed multiple fully functional Distributed Acoustic Sensing (DAS) systems providing real time monitoring of submarine cables.
- Establish an effective communications method to enable real time alerts from remote islands to be received, investigated and actioned from asset management.
- Documented a baseline condition of the monitored submarine cables.
- To monitor for an extended period to assess for alerts from third party intervention, cable movement or cable faults.
- To have gained an understanding of the system’s suitability as a condition monitoring tool for business as usual adoption and its impact on asset management.
- Created a specification for condition monitoring best practices to be used on submarine cables.
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## Success Criteria

The project will be deemed as successful if all of the items in the scope are met and the TRL level is increased to TRL 9; or if the project clearly shows that this methodology is not suitable for full scale deployment.

### Performance Compared to the Original Project Aims, Objectives and Success Criteria

Since the project start, the DAS systems have been procured and received. As the DAS systems are on a long lead-time it has taken substantial time to receive delivery of the systems. Fibre cabling has been installed at one of the selected test sites, to extend the submarine cable fibre from the shore end to the substation, where the DAS equipment will be deployed. Works are continuing to develop the systems integration and communications network before the DAS systems are deployed at the remote sites.

Below is a summary of the progress thus far:

- **To have installed multiple fully functional DAS systems providing real time monitoring of submarine cables.**  
Works are progressing to complete two installations of DAS systems in 2020. Fibre cables have been laid where required. Testing of the fibres, systems integration and communications are ongoing. Once this is completed the DAS systems will be deployed on the first two sites.
- **Establish an effective communications method to enable real time alerts from remote islands to be received, investigated and actioned from asset management.**  
The satellite communications system has been bench tested and performed as expected when integrated with DAS. The DAS system could be remotely accessed as planned. Post installation, the robustness of the communications infrastructure will be monitored and adjustments, such as changes to the supplied satellite communications bandwidth package, will be made to maximise value. The satellite communications costs represent a large percentage of the ongoing monitoring costs therefore, significant cost savings can be made by selecting the most appropriate bandwidth package.
- **Document a baseline condition of the monitored submarine cables.**  
This will be completed upon installation of the DAS system on the submarine cable. It cannot be completed until the DAS systems have been installed on the cables. This will be completed at a future date.
- **To monitor for an extended period to assess for alerts from third party intervention, cable movement or cable faults.**  
This will be completed upon installation of the DAS system on the submarine cable. It cannot be completed until the DAS systems have been installed on the cables. This will be completed at a future date.
- **To have gained an understanding of the system's suitability as a condition monitoring tool for business as usual adoption and its impact on asset management.**  
This will be completed upon installation of the DAS system on the submarine cable. It cannot be completed until the DAS systems have been installed on the cables. This will be completed at a future date.
- **Create a specification for condition monitoring best practices to be used on submarine cables.**  
This will be completed after the effectiveness of DAS for condition monitoring has been established. It cannot be completed until the DAS systems have been installed on the cables. This will be completed at a future date.

Details of how the Project is investigating/solving the issue described in the NIA Project Registration Proforma. Details of how the Project is performing/performed relative to its aims, objectives and success criteria.

### **Required Modifications to the Planned Approach During the Course of the Project**

No modifications to the planned approach have been made.

The Network Licensee should state any changes to its planned methodology and describe why the planned approach proved to be inappropriate.

### **Lessons Learnt for Future Projects**

The project is in the early stages and as such there has not yet been any significant learning on the project so far.

Recommendations on how the learning from the Project could be exploited further. This may include recommendations on what form of trialling will be required to move the Method to the next TRL. The Network Licensee should also state if the Project discovered significant problems with the trialled Methods. The Network Licensee should comment on the likelihood that the Method will be deployed on a large scale in future. The Network Licensee should discuss the effectiveness of any Research, Development or Demonstration undertaken.

### **The Outcomes of the Project**

N/A

When available, comprehensive details of the Project's outcomes are to be reported. Where quantitative data is available to describe these outcomes, it should be included in the report. Wherever possible, the performance improvement attributable to the Project should be described. If the TRL of the Method has changed as a result of the Project, this should be reported. The Network Licensee should highlight any opportunities for future Projects to develop learning further.

### **Data Access Details**

See Network Innovation Competition (NIC) and Network Innovation Allowance (NIA) Data Sharing Procedure at <https://www.ssen.co.uk/InnovationLibrary/Distribution/>

A description of how any network or consumption data (anonymised where necessary) gathered in the course of the Project can be requested by interested parties. This requirement may be met by including a link to the publicly available data sharing policy.

### **Foreground IPR**

No foreground IPR has been created during the project.

A description of any foreground IPR that have been developed by the project and how this will be owned.