



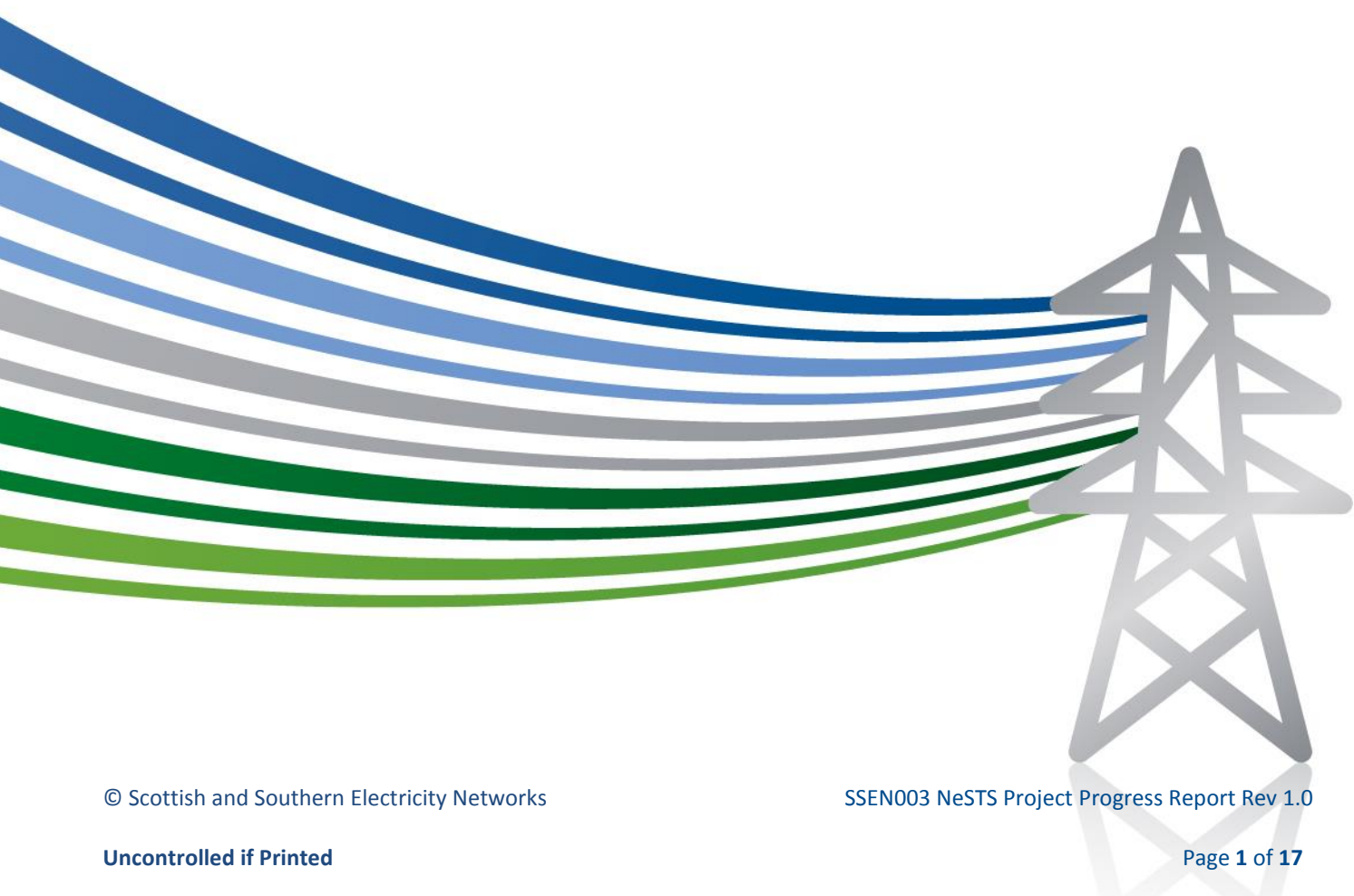
**Scottish & Southern**  
Electricity Networks

# SHE Transmission

**New Suite of Transmission Structures: NeSTS (SSEN003)**

**Project Progress Report**

**December 2016**



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# 1) Executive Summary

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## Overview of NeSTS

Scottish Hydro Electric Transmission plc (SHE Transmission) is developing a New Suite of Transmission Structures (NeSTS), which are planned to be deployed on the Transmission Network.

Overhead lines (OHLs) built using transmission structures are the most visible element of the transmission network. The impact OHLs have on the environment can cause stakeholders concern.

The only available alternative to the steel lattice structures traditionally used in OHL construction is the T-Pylon. Developed by National Grid, the T-Pylon reduces the visual impact of OHLs but may be unsuited to areas with challenging terrain and propensity for severe weather events.

Establishing new infrastructure in these areas is essential to connect renewable generation, so there is a need for a new type of structure to address stakeholder concern.

The NeSTS project is developing innovative designs for OHL structures based on new technologies and techniques. The new suite of structures will then be deployed on the transmission network.

The NeSTS Project seeks to prove the following benefits:

- Improved OHL environmental performance by lowering visual and construction impacts; and
- Lower OHL whole life asset costs via reduced land, construction, maintenance and outage requirements.

## Progress within this Reporting Period

During this reporting period, the Project has focused on:

- Completing its first SDRC by 30 September 2016;
- Completing prototype design;
- The engagement of stakeholders; and
- Appointing a main contractor for design of the NeSTS OHL.

Project stakeholder contributions are being sought. Currently, consultees, Transmission Owners (TOs), and the supply chain are being engaged to embody their inputs in the design process.

## SDRCs

The Project delivered its first SDRC, 11.1 NeSTS Design Selection, on 30 September 2016.

The next SDRC is 11.2 Output of Stakeholder Engagement; which is on-plan to be completed by 30 September 2017.

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# 1) Executive Summary

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## Risks

The main risks to the Project are:

- That there is difficulty in combining multiple innovations on one single solution; and
- That there is a delay in connection of the NeSTS project due to site selection challenges or planning application issues.

## Events

A GB Transmission Owners event was held in July 2016, hosted by National Grid Electricity Transmission at their Eakring Training Centre, where the NeSTS designs and T-Pylon learning were discussed. A video profile of the event is published on the Project website ([www.NeSTSproject.com](http://www.NeSTSproject.com)).

A Cross Arm and Access Design Review was held in October 2016 where options for cross arm and access detail design were discussed with the SHE Transmission Operations team.

## Communications

During this reporting period, Project information has been shared directly with stakeholders and published on the Project Website – [www.NeSTSproject.com](http://www.NeSTSproject.com).

Dissemination of Project learning has commenced with the publication of the Support Assessment Matrix tool and accompanying report detailing the NeSTS Design Selection.

This learning was presented at the Low Carbon Networks and Innovation (LCNI) conference on 13 October 2016.

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## 2) Project Manager's Report

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### Project Summary

The Project is managed via six work packages. An update on the progress made on each work package during this reporting period is provided below:

### Project Management

The Project team and internal stakeholders are engaged and holding monthly update meetings.

The Project Steering Group is engaged and holding monthly meetings.

External stakeholder engagement is underway. Statutory consultees, the supply chain and transmission operator engagements have commenced. The engagements with landowners/managers and other interested members of the public are being planned.

Contracts have been awarded for the supply of;

- Technical Assurance on the NIA project outputs;
- Overhead Line Design;
- Stakeholder Engagement Services; and
- Stakeholder Engagement Materials.

The Project is currently in the 'Refinement' stage.

### Prototype and Initial Testing

This work package's main activities are scheduled to commence in 2017 following refinement of the selected design which is in progress.

The selection of design concept followed engagement with internal and consultee stakeholders whose responses have been positive and encouraging.

Customers have also been polled and 81% expressed a preference for the selected design compared to a lattice steel equivalent.

Concurrently, scoping of the suite capabilities has defined three duty levels which it will address. The details of these, and of the results of stakeholder engagement have

been detailed in the Design Selection SDRC evidence, presented to the LCNI conference, and published on the Project website.

The supply chain, including main OHL contractors, has been engaged to contribute to the refinement of the selected design and is responding positively to the Project.

Procurement activity to secure the required test capacity for this, and the Full Scale Testing work package, has commenced.

### Parallel Design Process

This work package's main activities are scheduled to commence in 2017.

### Full Scale Testing

This work package's main activities are scheduled to commence in 2018.

### Planning, Construction and Monitoring Processes

This work package's main activities are scheduled to commence in 2018.

### Knowledge Dissemination

The Project Website is live and is disseminating design information and updates on progress.

Stakeholders are engaged and are informing the development of the Project designs.

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## 2) Project Manager's Report

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### SDRCs

The Project delivered its first SDRC, NeSTS Design Selection on 30 September 2016.

### Business Case Update

No changes have been made to the Business Case for the NeSTS Project, described in the NIC full submission document.

### Summary

The Project has made good progress over the last 6 months and is progressing on plan and within budget.

A design concept has been selected following assessment by internal and consultee stakeholders using the Support Assessment Matrix tool which has been published.

Learning has been published and shared with GB TOs.

Supply chain engagement and design refinement activities are underway to prepare for prototyping, initial testing, and further engagement with consultee stakeholders.

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## 3) Progress Against Plan

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### Summary of Progress

Overall the project is progressing on plan and within budget.

### Risks

The key risks to the project are:

- That there is difficulty in combining multiple innovations on one single solution .The supply chain is being engaged to mitigate this risk; and
- That there is a delay in connection of the NeSTS project due to site selection challenges or planning application issues. Consultees are being engaged to mitigate this risk.

The risk register has been updated accordingly.

### Focus This Reporting Period

The focus over this reporting period has been on:

- Completing its first SDRC by 30 September 2016;
- Completing prototype design;
- The engagement of stakeholders; and
- Appointing a main contractor for design of the NeSTS OHL.

### Key Activities in Next Reporting Period

The Key Activities between 20 December 2016 and 19 June 2017 planned are:

- Engaging with stakeholders and main contractors to review the refined design;
- Ordering cross arm prototypes;
- Commencing parallel design activity; and
- Procuring capacity for full scale design testing.

## 4) Progress Against Budget

The table below details the spend to date against the Project budget for each cost category.

Cost Category	Total Budget	Spend to Date	Comment
<b>Labour</b>			
Project team resource costs	£1,645.49k	£158.98k	On plan
<b>Equipment</b>			
Prototyping, testing, and modelling	£258.56k	£0k	On plan
<b>Contractors</b>			
Project team resource costs	£5,344.34k	£396.22k	On plan
<b>IT</b>			
IT Infrastructure	£204.79k	£1.95k	On plan
<b>Travel &amp; Expenses</b>			
Travel & Expenses	£47.44k	£2.99k	On plan
<b>Total</b>	<b>£7,500.62k</b>	<b>£560.14k<sup>1</sup></b>	

### Notes:

- Up to 23 May 2016 the project spent £182,277; and from 24 May 2016 to 22 November the project spent £357,648 (which has been processed through the Project Bank Account, see Appendix II for details), totalling spend of £539,925. From 23 November 2016 to 30 November 2016 the project spent £20,214, which has yet to be processed through the Project Bank Account, so the total project spend to 30 November 2016 is £560,139 (as detailed in the table above).

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## 5) Bank Account

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A copy of the current project bank account statement is provided in Appendix I.



## 6) SDRCs

### An update on the Project's SDRCs is provided below.

The NeSTS Project identified eight Successful Delivery Reward Criteria (SDRC) which span both the objectives and the lifecycle of the project.

The following table lists each SDRC in chronological order and details the project's progress towards their achievement.

SDRC	Due	Description	Evidence	Status
9.1	30/9/2016	<p><b>NeSTS Design Selection</b></p> <p>The completion of the development of the Support Assessment Matrix. This will be offered to TOs to compare different types of overhead line supports in a technically balanced manner, incorporating the electrical, mechanical, environmental and construction and operational factors of overhead lines design.</p> <p>Selection of the final support designs.</p>	<p>Publish the initial outputs of the Support Assessment Matrix. An accompanying report will provide the technical details of the selected designs by 30 September 2016.</p>	<p><b>Completed (SDRC met)</b></p> <p>A report on NeSTS Design Selection and the completed Support Assessment Matrix were published on 30 September 2016.</p>
9.2	30/09/2017	<p><b>Output of Stakeholder Engagement</b></p> <p>Implement a programme of stakeholder engagement, supported by a suitable project supplier. This will include organised events and one to one interviews. Quantitative and qualitative analysis will be provided to understand key priorities. SHE Transmission will factor these viewpoints into the functional specification for NeSTS where practical.</p>	<p>Report to the Authority with an assessment on the need for a Customer Engagement Plan and/or data protection strategy by 30 June 2016.</p> <p>Publish a report describing the outputs from stakeholder engagement and demonstrate where these outputs have influenced the NeSTS designs by 30 September 2017.</p>	<p><b>On Target</b></p>
9.3	30/8/2018	<p><b>Creation of Technical Specification</b></p> <p>The NeSTS overhead lines circuit will be designed in parallel with a traditional overhead lines support design - this is to create contingency in the event that NeSTS is not approved for demonstration at the stage gate process. The new technical specification for the supports will show how NeSTS design can be practically applied on a project, and is a key learning output for TOs and the supply chain. This will inform the procurement exercises for the initial deployment.</p>	<p>Publish a report on the outputs of the technical specifications of the NeSTS design stage by 30 August 2018.</p>	<p><b>On Target</b></p>


## 6) SDRCs

SDRC	Due	Description	Evidence	Status
9.4	31/12/2018	<p><b>Decision Point / Review of business case</b></p> <p>Review the NeSTS business case to conclude whether or not the Project should continue to Phase 2. The learning gathered at this point will be assessed to ensure that NeSTS still has a positive business case - impacts of any energy policy developments regarding renewable generation and the results of stakeholder engagement will be considered as part of the decision process.</p> <p>It will involve SHE Transmission's Director of Transmission and the SHE Transmission Steering Board.</p>	<p>Submit an update to Section 3 and Appendix 6, the business case of the Full Submission, to the Authority evaluating the project and recommending whether or not to proceed to Phase 2 by 31 December 2018.</p>	On Target
9.5	30/09/2019	<p><b>Type Testing Agreement</b></p> <p>Within the first stage of Phase 2 (the demonstration part of the project), the detailed designs will enable the construction of a NeSTS overhead lines support structure, which will be tested at a dedicated testing facility.</p> <p>This is crucial in ensuring the design is supply chain ready and acceptable to other TOs.</p>	<p>A signed agreement with a dedicated testing facility by 30 September 2019.</p>	On Target
9.6	20/02/2020	<p><b>Completion of Type Testing</b></p> <p>The overhead lines support will be put through a series of tests in order to ensure that it complies with the relevant standards and specifications including BS EN 60652 and BS EN 61773.</p> <p>The completed test results will provide clear analysis regarding NeSTS's capabilities.</p>	<p>Publish a report on the outputs of the type testing conclusions by 20 February 2020.</p>	On Target
9.7	29/1/2021	<p><b>Energisation of NeSTS Overhead Lines</b></p> <p>The energisation of the NeSTS overhead lines circuit is the culmination of the construction and commissioning of a section of the project is a key milestone.</p>	<p>Publish a full report detailing outputs and knowledge capture including an evaluation comparing NeSTS construction, commissioning and energisation with that of a typical steel lattice tower project by 29 January 2021.</p>	On Target


## 6) SDRCs

SDRC	Due	Description	Evidence	Status
9.8	31/03/2022	<p><b>Publication of e-learning and visualisation tools and project closedown report</b></p> <p>Knowledge capture and dissemination is of high importance to the project and the acceleration of NeSTS into TOs' business as usual activities. SHE Transmission will develop an e-learning module to assist with training and familiarisation activities amongst TOs and the supply chain.</p> <p>A visualisation tool will also be created to assist TOs with network planning, and to share learning with stakeholders.</p> <p>At the end of the project, full evaluation and key learning points will be considered for inclusion in a comprehensive project closedown process. This will include learning gathered from knowledge events and the progress of the MASC substation during operation.</p>	Complete development of both tools and share with TOs and deliver detailed closedown report to Ofgem by 31 March 2022.	On Target


 Completed (SDRC met)

 Emerging issue, remains on target

 SDRC completed late

 On target

 Unresolved issue, off target

 Not completed and late

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## 7) Learning Outcomes

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### The following learning objectives have been set for the NeSTS project:

- **Develop a proven series of NeSTS design specifications:** The NeSTS project will further develop outputs from the NIA project and demonstrate these on the live transmission network. This will allow us to create the project's key output – a set of design specifications which can be shared with licensees and the supply chain. The specifications will take into account NeSTS's electrical, mechanical and civil engineering requirements.
  - **Inform policy and procedure:** Each stage of the project will inform new policies and procedures for construction, operation, maintenance and safety. The development of these documents is fundamental to the successful adoption of NeSTS by other licensees.
  - **Create future usage options:** NeSTS will be deployed and assessed against a range of terrain and climate scenarios that are representative of conditions found across GB. We will also implement a programme of prototype and component testing to measure NeSTS against severe weather events. This allows licensees and the supply chain to understand the conditions in which NeSTS is optimally suited, and creates confidence in the new designs.
  - **Evaluate acceptance of alternative OHL supports by the consent and stakeholder processes:** During the project's first phase, a comprehensive stakeholder consultation will include discussion with licensees, landowners, statutory authorities and the supply chain. This allows us to understand and accommodate key priorities into the design where practical. Subsequent planning and consent for the planned OHL project will be evaluated to see the benefits of using NeSTS in comparison to conventional OHL methodology, and outputs from
- this learning objective will be shared with all stakeholders.
- **Develop and validate Support Assessment Matrix:** The Support Assessment Matrix (SAM) was developed through the NIA NeSTS project to evaluate and compare a series of OHL support designs against a set of Main Design Aspects (MDAs). The SAM will be developed further and validated by NeSTS to produce a highly useful matrix available to the supply chain and to licensees. This creates a centralised vehicle to evaluate and facilitate future OHL support innovations.
  - **Create a transmission infrastructure working group:** The NeSTS project will form a working group to create and share best working practices for OHL supports, similar to the Energy Storage Operators' Forum. The OHL working group will review and share best practice worldwide to facilitate further improvements in OHL methodology.

These learning objectives will be met as the NeSTS Project progresses into the design phase through to installation and final operation.

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## 7) Learning Outcomes

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### Learning during this reporting period

#### Develop a proven series of NeSTS design specifications

A NeSTS Design Brief has been drafted based on the functional requirements developed in the previous reporting period.

It will form the basis of the NeSTS Technical Specification.

#### Inform policy and procedure

The NeSTS design has been subjected to detailed analysis of its performance in construction and maintenance operations.

The resulting Design Note has informed a Cross Arm and Access Design Review with the SHE Transmission Operations team.

#### Create future usage options

Three duty levels have been defined for NeSTS design, representing use at different ratings, climatic loadings and altitudes.

These were presented to the LCNI conference and are published on the Project website.

#### Evaluate acceptance of alternative OHL supports by the consent and stakeholder processes

Public acceptance of the NeSTS design concept has been measured and reported in the NeSTS Design Selection report delivered as part of the first SDRC and has been published on the Project website.

Consultee acceptance of NeSTS design concepts has been measured and reported to the LCNI conference and published on the Project website.

#### Develop and validate Support Assessment Matrix

The completion of the Support Assessment Matrix and subsequent discussion of it with GB TOs has met one of the NeSTS learning objectives.

The completed Support Assessment Matrix was delivered as part of the first SDRC and is published on the Project website.

#### Create a transmission infrastructure working group

Learning from supply chain and stakeholder engagement activity is also being shared with GB TOs.

These discussions represent the first steps towards the establishment of a Transmission Infrastructure Working Group.

#### IPR

No relevant IPR has been generated or registered during this reporting period

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## 8) Risk Management

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### Risk Management Plan

The Project has a Project Risk Management Plan that describes how Project risks are managed throughout the Project.

The Project risk register is regularly reviewed by the Project team and the key Project risks are highlighted and discussed at the monthly steering group meetings, where mitigating actions are agreed.

### Risk Register

The current Project Risk Register is provided in Appendix II.

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## 9) Accuracy Assurance Statement

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### PPR Preparation Steps

To ensure that the information contained in this report is accurate and completed, the following steps have been taken, the report has been:

- Prepared by the Project Manager;
- Reviewed by the Project Team;
- Reviewed by the Steering Group; and
- Approved by the Project Director and Regulation.

### Sign-off

As the senior manager responsible for the NeSTS Project, I confirm that the processes in place and steps taken to prepare this PPR are sufficiently robust and that the information provided is accurate and complete.



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**Stewart A Reid**

Head of Asset Management & Innovation  
Scottish and Southern Electricity Networks



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**Date**

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## 10) Appendices

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### Appendix I

Project Bank Account Statement

### Appendix II

Risk Register





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