Scottish & Southern Electricity Networks

SSEN Transmission

RIIO-T2 Business Plan T2BP-EJP-0010

Emergency Response & Contingency Planning

Engineering Justification Paper

1 Executive Summary

Changes to and the growth of the electricity network, increased consumer expectations of reliability and increased exposure to environmental events have caused SHE Transmission to revisit our process for responding to emergency situations and to review our growing network to identify potential vulnerabilities.

In order to better manage emergency situations, we intend to completely review our response to significant events on our network, designing potential mitigation including the use of temporary masts to bypass faulted sections. We therefore intend to set up a review team to design potential mitigation including site evaluation of higher risk routes. In order to better respond to these situations, we propose to purchase 12 new temporary masts for use in emergency situations, in addition to the 8 currently in place, which will now be used solely for planned works.

In addition, SHE Transmission wish to undertake a review of the network during RIIO-T2 and develop proposals to improve network resilience for delivery in RIIO-T3 and beyond.

This paper will cover the costs for temporary masts in RIIO-T2 price control period which are estimated as £1.55m. Successful completion of the project will increase network resilience, improve operational efficiency, reduce our environmental impact and help to achieve our goal to aim for 100% network reliability for homes and businesses.

This scheme is not flagged as eligible for early or late competition due to it being under Ofgem's £50m and £100m thresholds respectively.

Name of Scheme/Programme	Emergency Response & Contingency Planning
Primary Investment Driver	Resilience
Scheme reference/ mechanism or category	SHNLT2043
Output references/type	NLRT2SH2043
Cost	£1.55m
Delivery Year	RIIO-T2
Reporting Table	D4.3a
Outputs included in RIIO T1 Business Plan	No

2 Introduction

This Engineering Justification Paper sets out our plans to reinforce our Emergency Planning and Contingency Response capabilities during the RIIO-T2 period (April 2021 to March 2026).

The Engineering Justification Paper is structured as follows:

Section 3: Need

This section provides an explanation of the need for the planned works. It provides evidence of the primary and, where applicable, secondary drivers for undertaking the planned works. Where appropriate it provides background information and/or process outputs that generate or support the need.

Section 4: Optioneering

This section presents all the options considered to address the need that is described in Section 3. Each option considered here is either discounted at this Optioneering stage with supporting reasoning provided or is taken forward for Detailed Analysis in Section 5.

Section 5: Detailed Analysis

This section considers in more detail each of the options taken forward from the Optioneering section. Where appropriate the results of Cost Benefit Analysis are discussed and together with supporting objective and engineering judgement contribute toward the identification of a selected option. The section continues by setting out the costs for the selected option.

Section 6: Conclusion

This section provides summary detail of the selected option. It sets out the scope and outputs, costs and timing of investment and where applicable other key supporting information.

Section 7: Price Control Deliverables and Ring Fencing

This section provides a view of whether the proposed scheme should be ring-fenced or subject to other funding mechanisms.

Section 8: Outputs included in RIIO-T1 Business Plan

This section identifies if some or all the outputs were included in the RIIO-T1 Business Plan and provides explanation and justification as to why such outputs are planned to be undertaken in the RIIO-T2 period.

3 Need

The UK Electricity industry has changed dramatically in recent years with the loss of conventional thermal power stations, and the growth of renewables as the country looks to decarbonise. This is particularly true in the North of Scotland where natural resources for renewables are available in abundance. This coincides with an increasing reliance on electricity for day to day life, a trend which is only likely to increase as we further electrify to decarbonise, and corresponding increasing customer expectations.

This growth in renewables has also led to a growth in our network, particularly at 275kV and 400kV. Overhead lines at these voltages are supported by steel towers and we need to be able to respond to faults on these lines.

SHE Transmission has also seen its network increasingly exposed to environmental events, such as landslides and wildfires. Such events are, by their very nature, unpredictable and cannot be completely mitigated against. Therefore, restoring the network to normal operation as soon as is possible must be the target in these circumstances.

While the RIIO-T1 period has predominantly focussed on decarbonising our network and facilitating the connection of renewables, greater attention must now be on how to run a safe, secure and reliable network which meets growing customer expectations of reliability. This includes addressing key points on our network to reduce vulnerability.

3.1 Wider Impacts of Plant Failure

While the network has grown, there are still areas of radial or minimally interconnected network due to the rural nature of the area covered by the SHE Transmission network. Therefore, a failure often has a wider network impact on the SHE Transmission network than it would in other areas of the GB transmission network. Even in more interconnected areas of the SHE Transmission network, assets are more heavily loaded and [redacted] than in the past.

The loss of a line could have a significant impact on consumers in these areas where there is minimal interconnection, as well as leading to significant cost to the system operator. It is therefore imperative that a response to any unexpected event can be co-ordinated and implemented quickly and efficiently to restore the network.

A recent experience of this issue was a major landslip at Quoich in North West Scotland, which resulted in large numbers of customers connected to a radial network losing power for a considerable period of time. Backup generators were required to restore supply at considerable expense until a bypass line could be erected several days later This required design to be carried out in real time. A faster response would secure customers supply, reduce the environmental impact from diesel generation (in line with our sustainability values), and reduce the resource requirement and knock on impact of staff displacement from planned work. However, other circuits would not have had access to diesel generation, under which circumstances, customers would have been off supply or generators would have to be constrained.

Availability of suitable equipment and plans to allow for efficient and effective disaster recovery is a critical aspect of this; both proactively and reactively. We propose to address this through carrying out design works and scenario planning to minimise risk, improve response time, and investing in temporary arrangements and equipment to allow for a faster response where mitigation is not practical.

3.2 Interconnection

In addition, many parts of the network still carry high risk costs for planned work due to the lack of interconnection. [redacted] whole system planning require consideration to address network resilience issues. Consideration to proactive, whole system improvements will be made as part of our review, alongside improvements to our reactive capabilities.

4 Optioneering

When reviewing our options in this area, we produced a three-tier approach to our development:

- ***Minimum Requirements***
    - The bare minimum required to "keep the lights on" & maintain legal/regulatory compliance
- ***Responsible Operator***
    - A more resilient network for longer term customer benefit
- ***Progressive Network Enabler***
    - An adaptable, sustainable and flexible network providing enhanced value to current and future customers

In this workstream, "Minimum Requirements", "Responsible Operator" and "Progressive Enabler" options are considered. The scope, risks and benefits of each of these is laid out below.

4.1 Minimum Requirements

The minimum requirement in this scenario would be to continue to operate the "Business as Usual" model, deploying a reactive response methodology to Emergency Incidents. This option involves the deployment of existing temporary masts during emergency incidents involving overhead lines. SHE Transmission currently owns 8 Lindsay masts, although they have not been used extensively. However, this does not address any of the issues raised in Section 3. Additionally, our existing equipment cannot be utilised on the 400kV network.

On this basis, this option has not been taken forward for detailed analysis.

NOT PROGRESSED TO DETAILED ANALYSIS

4.2 Responsible Operator

The Responsible Operator option involves the deployment of existing temporary masts during emergency incidents involving overhead lines. SHE Transmission currently owns 8 Lindsay masts, although they have not been used extensively. In addition, we will set up a project team to review whole system solutions including DNO backfeeds for faults.

The limited number of masts in stock would also restrict their use to emergency situations only and not allow for their deployment in construction works. However, this does not address any of the issues raised in Section 3. Additionally, our existing equipment cannot be utilised on the 400kV network.

On this basis, this option has not been taken forward for detailed analysis.

NOT PROGRESSED TO DETAILED ANALYSIS

4.3 Progressive Network Enabler

This option allows for the purchase of 12 new masts from [redacted], in order to allow the replacement of one typical section of overhead line. Engagement with external parties with experience of using temporary masts for other TOs and DNOs suggests the [redacted] to be a preferable solution for emergency response. Experience was shared of [redacted] being lighter in weight, more flexible, easier to use, and the preference of more companies.

There is also a business desire to further develop the use of temporary masts in planned works to reduce both the capital cost of building full bypass circuits and project risk.

This option proposes to retain the existing Lindsay masts and develop a strategy for their use in construction projects and deploy the additional [redacted] masts for emergency response. Training and procedure development is required to ensure effective use. Up front design work is also recommended, creating designs for various scenarios. This would allow for a faster response, with design validation rather than full design required.

It is noted that SP Transmission utilise the [redacted] Tower. Initial engagement has been made with SP Transmission and plans will be made to look at how resources can be pooled for emergency outages. This would have benefits to the resilience of both TOs through greater availability of material, trained personnel and suitable contractors. Unlike the existing Lindsay mast, the [redacted] mast is also suitable for use on the 400kV network.

In addition to this, we also propose to undertake a comprehensive, Whole System review of our network during RIIO-T2 to understand the vulnerabilities of our growing network and develop whole system solutions to these in line with our Whole System Strategy.

On this basis, this option has been taken forward for detailed analysis.

PROGRESSED TO DETAILED ANALYSIS

A summary of the above optioneering is shown in Table 1, below.

Table 1 - Optioneering Summary

	Minimum Requirements (Do nothing)	Responsible Operator	Progressive Network Enabler
Masts for emergency use up to 132kV	✓	✓	✓
Masts for emergency use up to 400kV	✗	✗	✓
Masts for use in construction projects	✗	✗	✓
Pooled use with other TOs / DNOs	✗	✗	✓
Review of interconnected circuits for future whole system remediation	✗	✓	✓

5 Detailed Analysis

5.1. Risk and Benefit Analysis

Due to the nature of this project, risks and benefits involved are not easily quantifiable and are not suitable for traditional Cost Benefit Analysis.

In order to demonstrate the benefits of delivering this project, we have carried out a Risk and Benefit Analysis. For each option taken forward to Detailed Analysis, it looks at the existing risks, the likelihood of these risks being realised, and the severity should that happen. The likelihood and severity combine to give an overall Unmitigated Risk Rating.

Mitigation actions delivered by each option are then identified, and the likelihood and severity are reappraised, resulting in a Mitigated Risk Rating.

This exercise was carried out for these proposals. As can be seen in Table 2, the Unmitigated Risk Rating is "Severe". Once all the mitigations are taken into account, the Mitigated Risk Rating falls to "Medium". The full Risk & Benefit Analysis is contained within Appendix A.

			Progressive Network Enabler	
Risk ID	Risk Title	Risk	Unmitigated Overall Risk Rating	Mitigated Overall Risk Rating
1	Plant Failure	Large areas of radial or minimally interconnected network where a failure can add higher risk to other assets	Severe	Medium
2	Plant Failure	Large areas of radial or minimally interconnected network where a failure lead to consumers or generators can be disconnected.	Severe	Medium
3	Projects	The cost and risk of building full bypass circuits is high	Severe	Medium
4	Project scale	Work that requires more towers than we have access to and unable to complete the work	High	Medium
5	Whole System	Our growing network has vulnerabilities which could lead to failures and unplanned system outages	High	Medium
		OVERALL	**Severe**	**Medium**

Table 2 - Risk and Benefit Analysis Results

5.2. Stakeholder Engagement

Consultation with stakeholders at our Stakeholder Engagement event "Operating a Resilient and Reliable Network" indicated support for proactively improving the resilience of the system with a preference to proactively act, with a small cost, to mitigate the cost and outage time later.

There were no costed options in this area, so stakeholders did not vote on it as part of the table exercises but, when questioned, the response from stakeholders indicated that a combination of proactive mitigation and planned responses was the best response, and that a risk-based approach would be favourable.

5.3. Costs – Progressive Network Enabler

As outlined above, the only viable option available to us is the "Progressive Enabler" approach, which entails the purchase of an additional twelve temporary masts and work on network solutions for faults including for whole system. Costs for this option are outlined below.

	Cost (£k)
Tower Purchase	[redacted]
On Costs	[redacted]
Risk & Contingency	[redacted]
TOTAL	£1,550

Table 3 - Cost for Progressive Network Enabler Option

6 Conclusion

It is necessary for SHE Transmission to continually review and amend its contingency planning approaches, given increased customer expectations on reliability, our RIIO-T2 goal to aim for 100% transmission network reliability for homes and businesses, and our increased exposure to environmental events such as wildfires and landslides.

Three options were examined with only one being taken forward for detailed analysis. After consulting with our stakeholders and reviewing the options available to us through a risk-based approach, we propose to purchase 12 new temporary masts for use in emergency situations, in addition to the 8 currently in place, which will be used solely for planned works. In addition, SHE Transmission wish to undertake a Whole System review of the network during RIIO-T2, in line with our Whole System Strategy, and develop proposals to improve network resilience for delivery in RIIO-T3 and beyond.

This option is estimated to cost £1.55m and will be delivered over the course of the RIIO-T2 price control. This scheme is not flagged as eligible for early or late competition due to it being under Ofgem's £50m and £100m thresholds respectively.

7 Price Control Deliverables and Ring Fencing

As set out in our Regulatory Framework paper (section 1.12 and Appendix 3) we support a key principle from Citizens Advice – one that guarantees delivery of outcomes equivalent to the funding received - to ensure that RIIO-T2 really deliver for consumers. At the project level this means that if we don't deliver the output, or a materially equivalent outputs, we commit to returning the ex-ante allowance for the output not delivered.

This means that if the funding for Emergency Response and Contingency Planning should be ring-fenced and if it does not go ahead, we will return the allowances of £1.55m in full (minus any justified preconstruction expenditure).

It also means that we commit to delivering the outputs specified above for the costs of £1.55m. If we do not deliver the output, or a materially equivalent output, we commit to returning a proportion of the ex-ante allowance. The detailed methodology should be decided at when developing the Close Out methodologies but should apply the same principles of uncertainty mechanisms - that any under delivery should be material.

8 Outputs included in RIIO-T1 Plans

There are no outputs associated with this scheme included in our RIIO-T1 plans.

9 References

- SQSS
- Whole System Strategy

Appendix A

Scottish & Southern Electricity Networks
TRANSMISSION

Project Risk & Benefit Matrix - Progressive Network Enabler

Risk ID	Risk Title	Risk	Unmitigated Risk Likelihood	Unmitigated Risk Impact	Unmitigated Overall Risk Rating	Mitigation Action	Mitigated Risk Likelihood	Mitigated Risk Impact	Mitigated Overall Risk Rating	Benefits
1	Plant Failure	Large areas of radial or minimally interconnected network where a failure can add higher risk to other assets	Almost Certain	Major	Severe	Purchase of bypass towers	Almost Never	Major	Medium	Reduced outage time will reduce risk
2	Plant Failure	Large areas of radial or minimally interconnected network where a failure lead to consumers or generators can be disconnected.	Almost Certain	Major	Severe	Purchase of bypass towers	Almost Never	Major	Medium	Reduced outage duration
3	Projects	The cost and risk of building full bypass circuits is high	Almost Certain	Major	Severe	Purchase of bypass towers	Almost Never	Major	Medium	Reduced project cost and risk
4	Project scale	Works being carried out may need more than 12 towers	Possible	Major	High	Pool resources with Scottish power Transmission	Almost Never	Major	Medium	Reduced project cost and risk
5	Whole System	Our growing network has vulnerabilities which could lead to failures and unplanned system outages	Possible	Major	High	Undertake Whole System review of network	Almost Never	Major	Medium	Reduced project cost and risk

Figure 1 - Risk & Benefit Matrix – Progressive Network Enabler

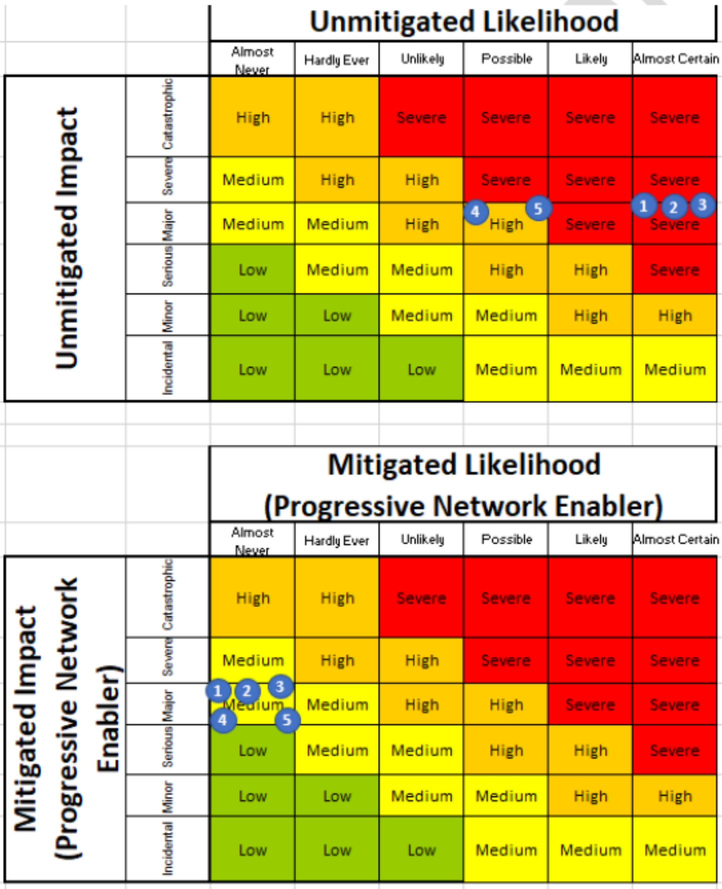

Figure 2 - Risk Heat Maps for Preferred Option