ED3 CLIMATE RESILIENCE STRATEGY

ED3-S03

CONTENTS

Executive Summary 4
1. Introduction 6
1.1 Why climate resilience matters 6
1.2 Our strategic approach to climate resilience 8
1.3 Evolution from RIIO-ED2 to ED3 10
1.4 How evidence and stakeholder priorities shaped our choices 10
1.5 How our strategy connects to the wider business plan 11
2. Climate Hazard, Exposure and Asset/Network Vulnerability Assessment 12
2.1 Introduction 12
2.2 Climate change risk assessment methodology 12
2.3 Climate change risk assessment 15
3. Climate Resilience Interventions 26
3.1 Introduction 26
3.2 Hazard and needs case 26
3.3 Current intervention and residual gaps 28
3.4 Portfolio prioritisation29
3.5 Strategic commitments 38
4. Long-Term Linkages 43
4.1 Climate resilience as business-as-usual 43
4.2 Whole system climate resilience and net zero 44
4.3 ED3 Climate resilience proposals and alignment with long term goal 45
5. Adaptation pathways 47
5.1 Pathways as decision architecture 47
5.2 Scope 47
5.3 Adaptation pathway for increased rainfall & rainstorms 48
5.4 Adaptation pathway for increased sea levels & tidal surges 49
5.5 Adaptation pathway for increased wind 50
5.6 Adaptation pathway for increased rainfall causing dam burst 51
5.7 Adaptation pathway for lightning 52
5.8 Adaptation pathway for snow and ice 53
5.9 Adaptation pathway for increased air and ground temperatures 54
6. Capability Building 55
6.1 Review of existing capabilities 55
6.2 Future capability requirements and proposals 55
6.3 Collaboration and interdependencies 55
7. Governance, Monitoring and Reporting 57

Appendix A: Climate resilience definitions 58

Appendix B: Stakeholder Engagement 60

EXECUTIVE SUMMARY

Why climate resilience matters

Climate change is already changing the conditions in which we design, operate and maintain our network. Increasingly frequent and severe weather events, including storms, flooding and extreme heat, have the potential to increase asset failures, disrupt network operations, restrict access for repairs and restoration and increase the support required by customers and colleagues. At the same time, society's growing reliance on electricity means that the consequences of network disruption are becoming more significant for communities, businesses and critical services.

Recent severe weather events have demonstrated that climate resilience must be addressed as a whole-system and whole-business challenge, rather than solely through asset protection measures. The impacts of Storm Éowyn highlighted the interdependent and cascading nature of climate-related risk and demonstrated the critical role that electricity and telecommunication networks play in enabling the continuity and recovery of other essential services. Similarly, the extreme heat experienced across our SEPD licence area illustrates that climate risks are not uniform across our operational regions, a finding that is consistent with our regional climate change risk assessments. Together, this evidence reinforces the need for a regional, evidence-led and adaptive approach to climate resilience that reflects both local risk profiles and wider system dependencies.

Our long-term ambition

Our long-term ambition is to maintain at least today's level of network resilience under projected 2080 climate conditions, while continuing to deliver a safe, reliable and affordable electricity network for our customers. ED3 is the next step towards achieving this ambition. It targets investment where climate risks are already well understood and action is justified, while improving the evidence base in areas where uncertainty remains. It also establishes the governance, monitoring and decision-making framework required to support adaptive planning, enabling future interventions to be informed by evolving climate risks, asset performance and customer needs.

Our ED3 Approach

Our ED3 approach is founded on the need to transition from a predominantly reactive approach to one that anticipates future climate risks, targets interventions where they deliver the greatest benefit for customers and enables an adaptive approach as evidence and circumstances evolve. To achieve this, we have made five strategic choices:

1. **Embed climate resilience into how we run the business**
   We will integrate climate risk into governance, asset strategies, engineering standards, planning, operational process and build the internal capabilities required to interpret, challenge and apply climate evidence to our decisions. This will ensure climate considerations are consistently applied.
2. **Act earlier through better climate intelligence**
   We will draw on climate projections, network and asset data, operational experience, environmental monitoring and local knowledge to better understand our risks, how they may change over time, and when intervention is justified. We will use new data and modelling where they improve the quality and/or timing of decisions. This will ensure investment decisions are evidence led.
3. **Make adaptation decisions dynamically**
   We will adopt an adaptive planning approach to account for the uncertainty associated with climate change. Using adaptation pathways, we will define the outcomes we need to protect, monitor key indicators and risk thresholds, and establish clear decision points that enable us to act, defer or adjust interventions as evidence develops. This will ensure investment remains proportionate and responsive to changing risk.
4. **Target intervention where risk and consequence are greatest**
   We will tailor our adaptation action towards location-specific priorities considering the combination of hazard, exposure, vulnerability, operational experience and local consequences and target investment where there is a clear need to act. This ensures regional, asset-specific and proportionate intervention.
5. **Prepare for and recover from events we cannot prevent**
   We will strengthen our preparedness, response and recovery capabilities through enhanced emergency response, workforce resilience, customer welfare support and collaboration with other critical infrastructure operators and resilience partners. This will ensure we can restore supplies safely and efficiently and minimise disruption for our customers.

We've translated our strategic choices into a focused set of ED3 strategic priorities and have developed commitments, targets and investment proposals under each pillar to ensure we can deliver our long-term climate resilience ambition. Strategic pillar 1, **Continuity, transparency & capability** and 2, **Effective stress testing, measurement and forecasting** establish the governance, capability, data and evidence needed to manage climate risks proactively and consistently across our network. Strategic pillar 3, **Improved resilience through adaptation**, addresses how to manage uncertainty and interdependent risks. Whilst strategic pillar 4, **Improved asset resilience and design standards** and 5, **preparedness, planning & emergency response** focus on translating climate resilience intelligence into practical actions that strengthen the network and improve our ability to respond to severe weather events.

To deliver our ED3 ambition, we are proposing £86.04m of targeted climate resilience investment focused on flood resilience, storm hardening, environmental monitoring, climate modelling, restoration capability, workforce welfare and whole-system resilience. This programme will strengthen the resilience of overhead lines and substations, improve preparedness for severe weather events, enhance understanding of emerging climate risks and support faster restoration when disruption occurs. For customers, this will help reduce the frequency and impact of weather-related interruptions, improve resilience for vulnerable communities, and ensure network investment is prioritised where it delivers the greatest long-term value and resilience benefit.

Our ED3 commitments supported by this strategy

	ED3 Commitment	Metric
More resilient networks for customers		
We will modernise our network and assets, and strengthen climate resilience	**Compared to a 'do-nothing baseline', we will reduce overall network risk by targeting investment on our highest-risk assets, rebuilding or undergrounding ~350km of high-risk overhead line and replacing ~250km of climate-vulnerable cable, removing 20% of network risk in SEPD and 12% in SHEPD by the end of ED3.**	Deliver our Climate Resilience investment programme by 2033, including rebuilding or undergrounding ~350km of high risk overhead line, and replacing ~250km cables that are exposed to increased rainfall, ground movement and climate-related degradation.
		Add environmental monitoring to all grid and primary substations to monitor climate conditions and determine future climate resilience investments.
We will introduce targeted improvements to reduce unplanned power cuts	**We will halve the number of customers experiencing frequent power cuts compared to a March 2026 baseline, while maintaining overall 99.98% network reliability by the end of ED3, despite more challenging climate conditions.**	Maintain our current high levels of reliability despite worsening conditions, with the network at 99.98% reliability.

1. INTRODUCTION

1.1 WHY CLIMATE RESILIENCE MATTERS

Climate resilience is now a core business requirement for electricity distribution networks. The relevant policy, legislative and regulatory context confirms the direction of travel, but our strategy is driven by the practical challenge facing our network and organisation: climate hazards are already affecting assets, operations, customers and communities, and those impacts will become more material as reliance on electricity increases. We therefore need to anticipate changing risk, strengthen resilience where action is justified and efficient, improve preparedness where disruption cannot be prevented, and retain flexibility where future conditions remain uncertain.

Severe weather events are increasingly demonstrating that climate resilience must be addressed as a whole-system and whole-business challenge. A clear example was the impact of Storm Éowyn, which caused widespread disruption across electricity, telecommunications, transport and water infrastructure, with further information provided in the case study below. However, the challenge extends beyond the consequences of individual extreme weather events. The increasing frequency of climate-related hazards creates the potential for multiple events to occur in close succession, resulting in cumulative and compounding impacts that can constrain recovery activities, reduce operational flexibility, place sustained pressure on resources and supply chains, and amplify risks arising from infrastructure interdependencies. These experiences reinforce the need for our ED3 Climate Resilience Strategy to adopt an integrated approach that addresses asset resilience, operational readiness, organisational capability and interdependent infrastructure risks, ensuring the network remains resilient to both acute shocks and the escalating effects of repeated climate-related disruption.

CASE STUDY: STORM ÉOWYN 24 JANUARY 2025

Storm Éowyn struck the UK and Ireland in late January and became one of the most severe windstorms experienced in recent decades. The storm generated record-breaking wind speeds and caused widespread disruption to electricity, telecommunications, transport, and other critical infrastructure.

Climate Hazards:

The primary climate hazard was **extreme wind**, with prolonged damaging winds and peak gusts of 95mph across parts of SHEPD, **particularly affecting remote rural communities in Argyll & Bute**. Red and Amber Met Office warnings were issued across much of Scotland. The storm also brought heavy rainfall and snowfall on higher ground, increasing the complexity of the operational response.

Business Impacts:

The storm caused fallen trees, flying debris and damage to overhead network infrastructure, resulting in **527 HV and 236 LV incidents and interruptions for 94,849 customers**, mainly in Argyll, Kintyre, Southern Perthshire and the Trossachs. The average number of minutes customers were without power (Customer Minutes Lost) was [redacted]. Restoration was made more difficult by road damage, ferry cancellations, telecommunications disruption, transmission network faults and limited access to specialist resources such as helicopters, demonstrating why **adaptation must address infrastructure interdependencies, site access, communications and welfare**, as well as physical network strengthening. Further information on interdependent and cascading impacts can be found in Cha et al. (2025)[1].



[1] Cha, Y., White, C.J., Gonzalez, P.L.M., Wallace, E., Harkin, D., Brett, L., Mattu, K., Smith, R.S., Thom, C., Alix, M.D., Olbert, C., Burnett, L., Hampton, E., Sheppard, A., Campbell, A., Rees, G. and Steller, R. (2025) *Assessing the cascading impacts of natural hazards on Critical National Infrastructure (CNI) using Scotland as a case study*. npj Natural Hazards, 2(1), Article 108. Available at: https://doi.org/10.1038/s44304-025-00161-9 (Accessed: 25 August 2026).

Operational Response and Recovery

Ahead of the storm, we mobilised operational and welfare resources, increased our customer support capacity and proactively contacted our vulnerable customers. During recovery, we had a team of 1,100 people fixing faults and supporting affected communities when conditions were safe to do so with zero safety incidents experienced. [redacted]. There were nearly 500,000 visits to the Power Track website, providing customers with real-time outage information and reducing pressure on other contact channels. Additional welfare support included outreach to over 12,000 vulnerable customers, temporary power to vulnerable customers through deployment of 29 generator sets and provision of more than 7,000 hot meals to those awaiting reconnection.

Cost and Resource Implications

[redacted]



Lessons Learned and Future Resilience Planning:

The internal review concluded that lessons from previous storms had improved performance, while also identifying further opportunities to strengthen customer and employee welfare, storm-role training, pre-mobilisation and local resilience. The key lessons that have helped to shape the identification, prioritisation and timing of our proposed interventions are:

- Tree contact remains a major contributor to weather-related interruptions on overhead line networks.
- The most exposed overhead line sections experience disproportionate customer impacts during severe weather events.
- Large-scale restoration requires sufficient internal and external resource capability.
- Access, logistics and welfare arrangements are critical to restoration performance during prolonged events.
- Severe weather events can create cascading impacts across infrastructure systems.
- Historic weather experience alone is insufficient for future resilience planning.

From these lessons we have identified that in ED3 we need action on targeted vegetation and overhead line resilience, selective undergrounding, additional internal capability, improved workforce welfare, more systemic work with other critical infrastructure operators and better climate modelling to inform future resilience investment decisions.

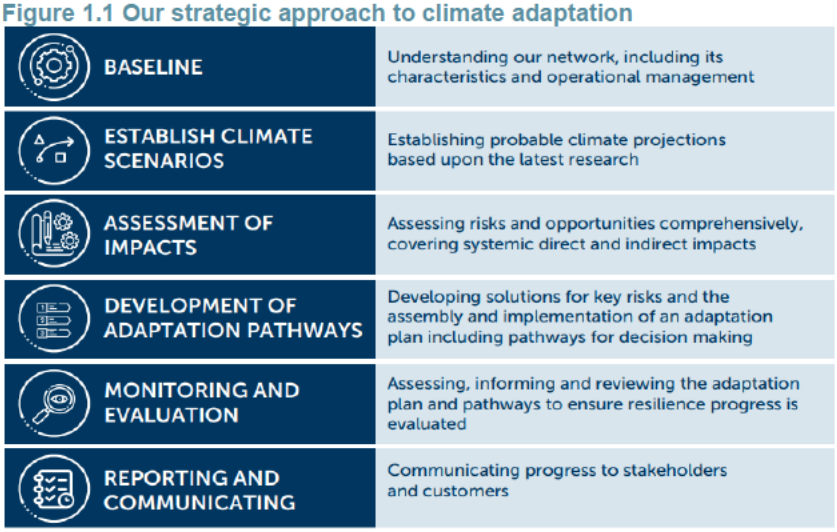
In addition to Storm Éowyn, extreme heat across our SEPD licence area in late June 2025 affected network performance. Temperatures above 36°C contributed to increased faults, including seven days with significantly elevated fault volumes that did not meet the threshold for an exceptional storm event, with the most severe day causing [redacted]. The event highlighted growing climate risks beyond storms and **reinforces the need for a regional, evidence-led and adaptive approach** to managing climate risks that reflects location-specific risk profiles.

1.2 OUR STRATEGIC APPROACH TO CLIMATE RESILIENCE

Our long-term climate resilience ambition is to maintain at least today's level of network resilience under projected 2080 climate conditions. We will do this while continuing to provide a safe, reliable, and affordable electricity network for our customers as the dependence on electricity grows over time.

To meet this long-term ambition, we have developed a strategic approach to climate adaptation which is based on the principles of ISO 14090:2019 Adaptation to Climate Change. Our strategic approach is outlined in ***Figure 1.1*** and focuses on building, operating and maintaining a network that remains resilient under a changing climate.

Figure 1.1 Our strategic approach to climate adaptation



ED3 is the next step towards achieving our long-term ambition and is founded on the need to transition from a predominantly reactive approach to one that anticipates future climate risks, targets interventions where climate risks are already well understood and action is justified and enables an adaptive approach as evidence and circumstances evolve. To achieve this, we have made five strategic choices for ED3:

1. **Embed climate resilience into how we run the business**

   We will integrate climate risk into governance, asset strategies, engineering standards, planning, operational process and build the internal capabilities required to interpret, challenge and apply climate evidence to our decisions. This will ensure climate considerations are consistently applied in decision-making and will avoid treating them solely as a compliance or reporting requirement.

2. **Act earlier through better climate intelligence**

   We will draw on climate projections, network and asset data, operational experience, environmental monitoring and local knowledge to better understand our risks, how they may change over time, and when intervention is justified. We will use new data and modelling where they improve the quality and/or timing of decisions. This will ensure investment decisions are evidence led and will avoid the risk of inefficient timing or premature investment.

3. **Make adaptation decisions dynamically**

   We will adopt an adaptive planning approach to account for the uncertainty associated with climate change. Using adaptation pathways, we will define the outcomes we need to protect, monitor key indicators and risk thresholds, and establish clear decision points that enable us to act, defer or adjust interventions as evidence develops. This will ensure interventions are proportionate and responsive to changing risk and will avoid creating future lock-in to one climate scenario.

4. **Target intervention where risk and consequence are greatest**

   We will tailor our adaptation action towards location-specific priorities considering the combination of hazard, exposure, vulnerability, operational experience and local consequences and target investment where there is a clear need to act. This ensures regional, asset-specific and proportionate intervention and will avoid inefficient investment.

5. **Prepare for and recover from events we cannot prevent**

   We will strengthen our preparedness, response and recovery capabilities through enhanced emergency response, workforce resilience, customer welfare support and collaboration with other critical infrastructure operators and resilience partners. This will ensure we can restore supplies safely and efficiently and minimise disruption for our customers and will avoid treating all climate risks as preventable.

Our strategic choices are underpinned by the growing complexity of climate risk as described in ***Section 2***, changing demand driven by electrification, and demographic shifts that increase the number of vulnerable customers and expectations during disruptions. We've translated our strategic choices into a focused set of ED3 strategic priorities and have developed commitments, targets and investment proposals under each pillar to ensure we can deliver our long-term climate resilience ambition. Strategic pillar 1, **Continuity, transparency & capability** and 2, **Effective stress**

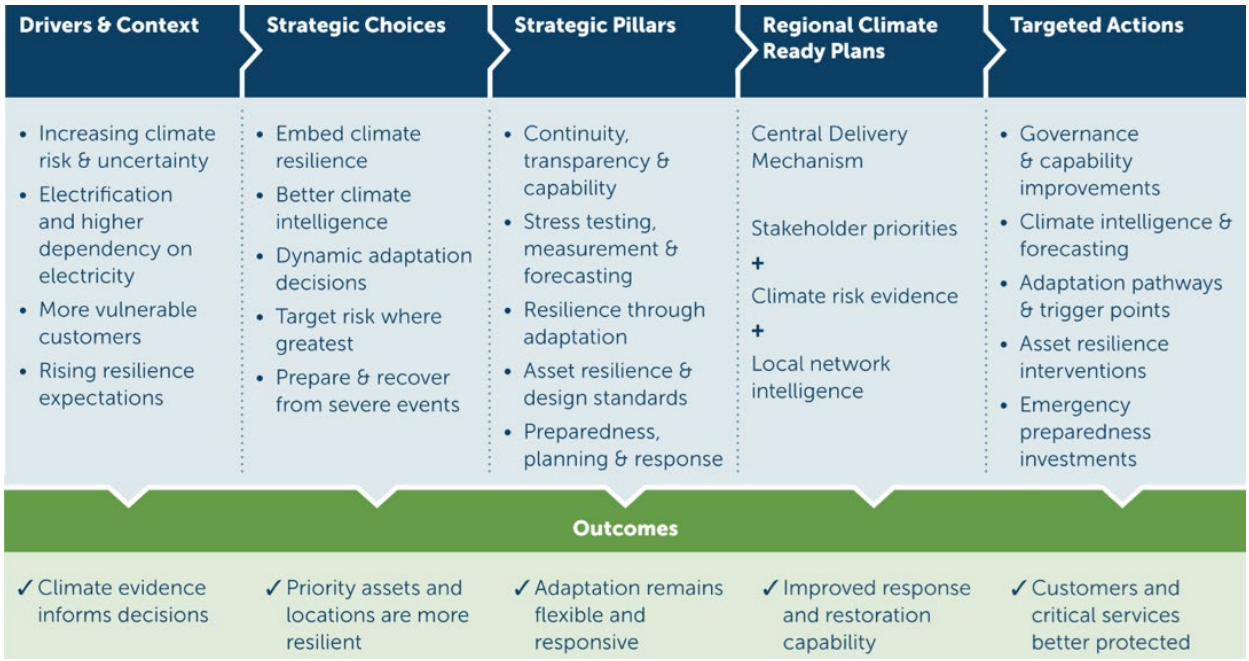
testing, measurement and forecasting establish the governance, capability, data and evidence needed to manage climate risks proactively and consistently across our network. Strategic pillar 3, **Improved resilience through adaptation**, addresses how to manage uncertainty and interdependent risks. Whilst strategic pillar 4, Improved asset resilience and design standards and 5, preparedness, planning & emergency response focus on translating climate resilience intelligence into practical actions that strengthen the network and improve our ability to respond to severe weather events. Further information is provided in ***Section 3.5***. To ensure our approach remains targeted and effective, Climate Ready Plans will sit at the centre of delivery, translating stakeholder concerns and identified risks into practical, location-specific informed actions.

Together our strategic choices, priorities, commitments, targets and proposals for ED3 have been developed to protect the following outcomes:

1. Climate evidence consistently informs our asset management and operational investment decisions.
2. Priority assets and locations are more resilient to climate-related risks and disruption.
3. Our adaptation approach remains flexible and responsive as risks, evidence and network conditions evolve.
4. We are better prepared to maintain supplies, respond to disruptions and restore power during severe weather events.
5. Customers, vulnerable communities and critical services are better protected from the impacts of disruption.

Figure 1.2 sets out our ED3 Climate Resilience Theory of Change, illustrating the relationship between the key drivers of climate risk, our strategic choices, strategic priorities and proposed interventions. It demonstrates how these activities are expected to deliver measurable resilience outcomes and support the long-term adaptation of the network, ensuring that customers, vulnerable communities and critical services remain protected from the increasing impacts of climate change.

Figure 1.2 ED3 Climate Resilience Theory of Change



1.3 EVOLUTION FROM RIIO-ED2 TO ED3

During RIIO-ED2, we successfully established the foundations of our climate resilience programme through activities such as climate risk assessment, asset vulnerability analysis, resilience planning, and the implementation of targeted adaptation measures. These initiatives have enhanced our understanding of climate-related risks and strengthened our capability to respond to them.

The ED3 framework builds on this progress by placing increased emphasis on climate resilience planning, stress testing, and evidence-based investment. It encourages anticipatory investment, low-regret adaptation measures, and adaptive pathways that remain effective across a range of future climate scenarios. This represents a significant shift from primarily responding to climate impacts and addressing known vulnerabilities towards proactively managing future climate risks and embedding resilience considerations into long-term network planning and investment decision-making.

Please refer to ***Section 3*** of this Strategy for further details on the interventions implemented to date, the residual climate resilience gaps that remain, and our proposed measures to address these gaps during ED3.

1.4 HOW EVIDENCE AND STAKEHOLDER PRIORITIES SHAPED OUR CHOICES

Stakeholder and consumer insight has shaped the choices in this strategy. Rather than treating engagement as a standalone activity, we have used it to test where customers and stakeholders expect us to prioritise action. Their key concerns include reliability during severe weather, affordability, transparency of investment decisions, protection for vulnerable customers, and stronger management of interdependencies with other essential services. Detailed engagement evidence is retained in the supporting stakeholder log; the core strategy explains how that evidence changed our choices and commitments.

The principal change arising from stakeholder engagement is that our ED3 approach is not limited to physical asset protection. It also includes clearer reporting of resilience outcomes, stronger operational preparedness, improved customer and workforce welfare during events, and more systematic collaboration with telecommunications, transport, water and other critical infrastructure operators. Regional Climate Ready Plans provide the mechanism for translating this evidence into local priorities and proportionate action. ***Table 1.1*** summarises key feedback from our stakeholder engagement and how this influenced our choices and response. Please see ***Appendix B*** for a detailed summary of stakeholder engagement feedback and how it has shaped the strategy.

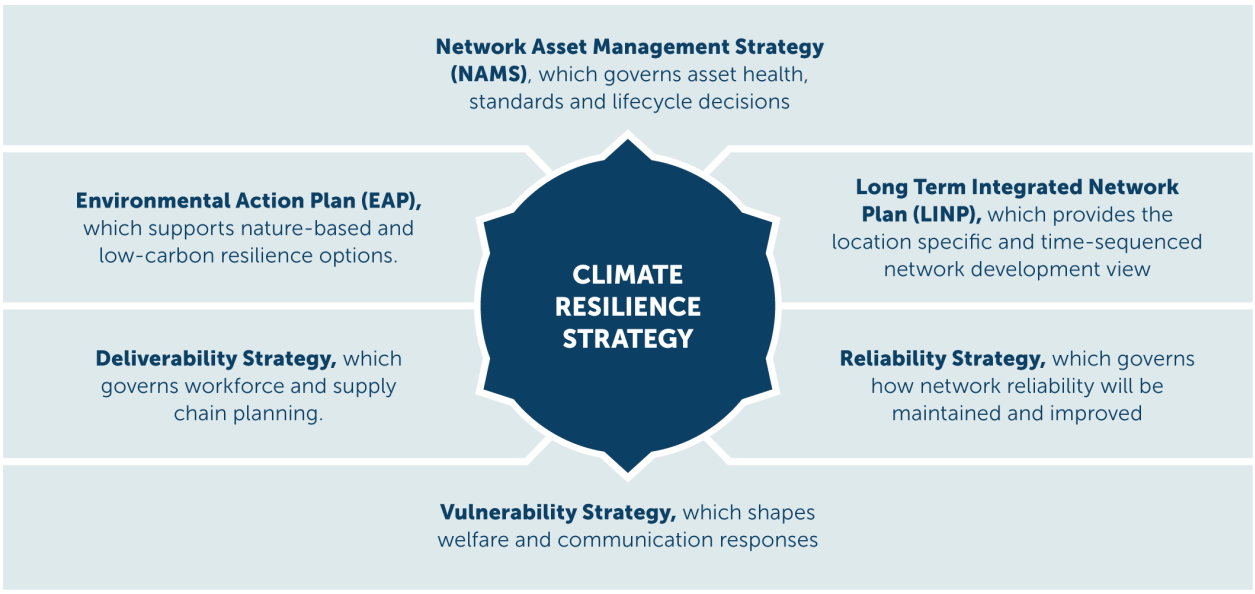
Table 1.1 Stakeholder engagement key feedback and our response

What we heard	What it means for our strategy	Choice or response	Where delivered
Reliability, transparency and clear customer benefit remain central	Resilience expenditure must have a visible link to service and customer outcomes	Target action by risk and consequence; report decisions and outcomes transparently	Strategic choices 2 and 4
Stakeholders favour proactive and evidence-led planning	Waiting for failure is not sufficient, but premature investment must be avoided	Use climate intelligence and adaptation pathways to decide when to act	Strategic choices 2 and 3
Severe-weather impacts extend beyond network damage	Readiness, access, communications and welfare are part of resilience	Strengthen preparedness, restoration and interdependency planning	Strategic choice 5
Risks and needs vary by location and customer group	A uniform network-wide response will not be proportionate	Use Regional Climate Ready Plans to identify local priorities	Strategic choice 4
Confidence in expenditure depends on visible value	Generic statements of "improved resilience" are insufficient	Link each commitment to an outcome, measure and evidence route	Enhanced reporting against key metrics

1.5 HOW OUR STRATEGY CONNECTS TO THE WIDER BUSINESS PLAN

To ensure we can meet our long-term ambition of maintaining today's level of network resilience under projected 2080 climate conditions, our ED3 CRS approach has been embedded into our wider ED3 business plan. Key interfaces are presented in **Figure 1.3**.

Figure 1.3 Wider ED3 business plan interfaces



Together, these strategies provide a coordinated approach to climate resilience, ensuring that network investment, asset management, reliability, customer support and environmental actions work collectively to maintain a safe, reliable and affordable electricity network, minimise the impacts of climate-related disruption, and deliver long-term value for customers and communities. Further information on these linkages and how our ED3 CRS sets us on a pathway to ensure we meet our long-term ambition is provided in ***Section 4***.

2. CLIMATE HAZARD, EXPOSURE AND ASSET/NETWORK VULNERABILITY ASSESSMENT

2.1 INTRODUCTION

To assess our climate risk, we need to understand three components as set out in **Figure 2.1**.

Figure 2.1 Climate risks definitions



These climate hazards can present different types of risk, which can broadly be categorised as:

- **Acute risks:** short-term, high impact events such as storms, flooding and heatwaves that can result in widespread asset damage, operational disruption and customer interruptions
- **Chronic risks:** long-term changes such as increasing temperatures, changing rainfall patterns and altered ground conditions that gradually affect asset condition, network performance and operational resilience.

To assess climate-related risks, we have adopted long-term planning assumptions that reflect the scale of climate change our network may need to withstand over its asset life. These assumptions are based on preparing for approximately **2°C of global warming by 2050** and considering resilience requirements under a **4°C global warming scenario by 2100**, broadly aligning with the upper range of climate outcomes represented by UKCP18 RCP8.5. This aligns with Ofgem's long term resilience goal of maintaining at least current levels of network resilience under future 2080 climate conditions.

These temperature thresholds are not intended to represent separate climate scenarios or forecasts. Rather, they provide a simple and accessible way of communicating the range of future climate conditions considered within our risk assessment and resilience planning. Our approach recognises the inherent uncertainty associated with future climate projections and focuses on identifying adaptation measures that are robust across a range of plausible climate futures.

Section 2.2 describes the methodology used to assess climate-related risks, including the climate scenarios, projections and assumptions applied. ***Section 2.3*** presents the outputs of these assessments and explains how they have informed the development, prioritisation and targeting of our proposed ED3 climate resilience interventions.

2.2 CLIMATE CHANGE RISK ASSESSMENT METHODOLOGY

We have undertaken a structured climate risk assessment to evaluate the potential impacts of climate change on our network, assets, operations and workforce. The assessment follows the Electricity Networks Association (ENA) industry standard approach, which characterises climate risk through the interaction of climate hazards, exposure and vulnerability, and considers how these factors may change under different global warming scenarios and over time.

The assessment draws on climate projections, network and asset data, operational experience, risk information, and stakeholder guidance to evaluate potential climate-related impacts at asset, network, regional and organisational levels. Risks are scored by considering the impact of climate hazards on our network and organisation and the likelihood of those climate hazards occurring using the risk assessment matrix presented in Table 2.1 . We have further categorised our risks as low, medium or high as indicated in the key below the table to align with Ofgem ED3 Business Plan Guidance (BPG) and this is how they are referred to throughout the document. Medium and high risks

have been assessed further in ***Section 3*** whilst low risks require continued monitoring through adaptation pathways which are discussed in ***Section 5***.

Table 2.1. Climate Change Risk Assessment Matrix

		Impact				
		Limited (1)	Minor (2)	Moderate (3)	Significant (4)	Extreme (5)
Likelihood	Almost Certain (5)	5 / moderate	10 / major	15 / major	20 / severe	25 / severe
	Likely (4)	4 / moderate	8 / moderate	12 / major	16 / major	20 / severe
	Possible (3)	3 / minor	6 / moderate	9 / moderate	12 / major	15 / major
	Unlikely (2)	2 / minor	4 / moderate	6 / moderate	8 / moderate	10 / major
	Very Unlikely (1)	1 / minor	2 / minor	3 / minor	4 / moderate	5 / moderate

Key: High risk | Medium risk | Low risk | Low risk

The climate hazards considered within this assessment are those developed and agreed collaboratively across DNOs through the ENA Climate Change Resilience Working Group (CCRWG). Referred to as Adaptation Risks (ARs) 1-15, they provide a consistent basis for identifying, assessing and managing climate-related risks across distribution networks. The ARs consider the effects of climate hazards including increased air and ground temperatures, changes in precipitation, sea level rise, lightning and wildfire on network assets and operations, including overhead lines, underground cables, substations, switchgear, earthing systems and electricity demand. The framework has been adopted across the sector to support reporting under the Climate Change Act Adaptation Reporting Power (ARP), providing evidence of how DNOs understand, assess and respond to current and future climate-related risks. Further detail on the ARs and the outcomes of our previous assessments under ARP can be found on our website2 (note the most recent round was the fourth known as ARP4).

Recognising the significance of windstorm impacts on overhead line networks, the CCRWG has committed to developing a sixteenth Adaptation Risk (AR16) for inclusion in the next round of ARP reporting. To ensure this risk is appropriately reflected in our CRS, we have proactively defined and included it, identified as AR16 - Overhead lines affected by increased intensity and frequency of high winds in our assessments. A graphical summary of the principal climate hazards affecting our network is illustrated in ***Figure 2.2*** below.

Figure 2.2. Our Principal Climate Hazards



We have also assessed snow and ice risks in line with Ofgem's ED3 BPG. Together, the assessment of AR1-16 and snow and ice hazards provides a comprehensive view of the physical climate risks that could affect network performance and reliability.

[2] Climate change adaptation reports - SSEN

While the ENA ARs provide a robust framework for assessing asset and network-related climate risks, we also identified a number of wider organisational risks that were not sufficiently captured through the AR framework. We have therefore assessed additional organisational risks as outlined below in **Figure 2.3**.

Figure 2.3. Wider organisational risks



The combined assessment of ARs 1-16, snow and ice hazards, and wider organisational risks ensures that our CRS considers both the direct impacts of climate change on network assets and operations, and the broader organisational challenges that could affect our ability to deliver a safe, reliable and affordable electricity network for our customers.

We have evaluated climate risks under both current and future climate conditions, considering multiple time horizons (2050 and 2100). This is a scenario-based approach to assess future climate conditions to recognise the inherent uncertainty associated with future climate change whilst providing a robust basis for understanding the range of plausible futures that may affect our network and organisational performance. This approach supports evidence-based adaptation planning and helps ensure that proposed interventions remain effective under a range of future climate conditions.

Future climate projections rely on assumptions regarding future greenhouse gas emissions, climate system responses and socioeconomic development pathways and are therefore subject to increasing uncertainty over longer time horizons. While the assessment provides a robust indication of the direction and relative magnitude of climate change impacts, future risk ratings should be interpreted within this context. In particular, confidence in projected climate conditions and associated risk ratings reduces significantly beyond 2070 as uncertainty in long-term climate projections increases. Consequently, the assessment informs an adaptive approach to decision-making, whereby actions can be implemented where risks are already material, whilst emerging risks continue to be monitored, reviewed and refined as climate science, evidence and data evolve.

For our network climate risk assessment, we considered two future climate scenarios, UKCP18 RCP4.5 and UKCP18 RCP 8.5, to understand the sensitivity of network assets and operations to different warming trajectories. To capture the uncertainty associated with future climate conditions, we analysed the spread of model outputs within each scenario using the 10th to 90th percentile range. This provides a balanced representation of the range of projected outcomes whilst avoiding undue reliance on either extreme projections or central estimates alone. The assessment draws on climate projections and impact assessments presented within the ENA's *Energy Industry Specific Risk Assessment on Climate Change Impacts – Work Package 3 Report (Met Office, 2020),* supplemented where necessary with additional UKCP RCP4.5 projections from the UK Climate Risk Indicator Explorer[3]. The purpose of considering both RCP4.5 and RCP8.5 is to indicate whether a risk is likely to emerge sooner or later under different climate futures, and whether a proposed response remains justified across a range of plausible outcomes. Where confidence is high and risks are already material, interventions can be progressed during ED3. Where potential future risks are identified but uncertainty remains, we will continue to improve the evidence base, monitor developments and establish decision points and adaptation triggers to support future investment decisions.

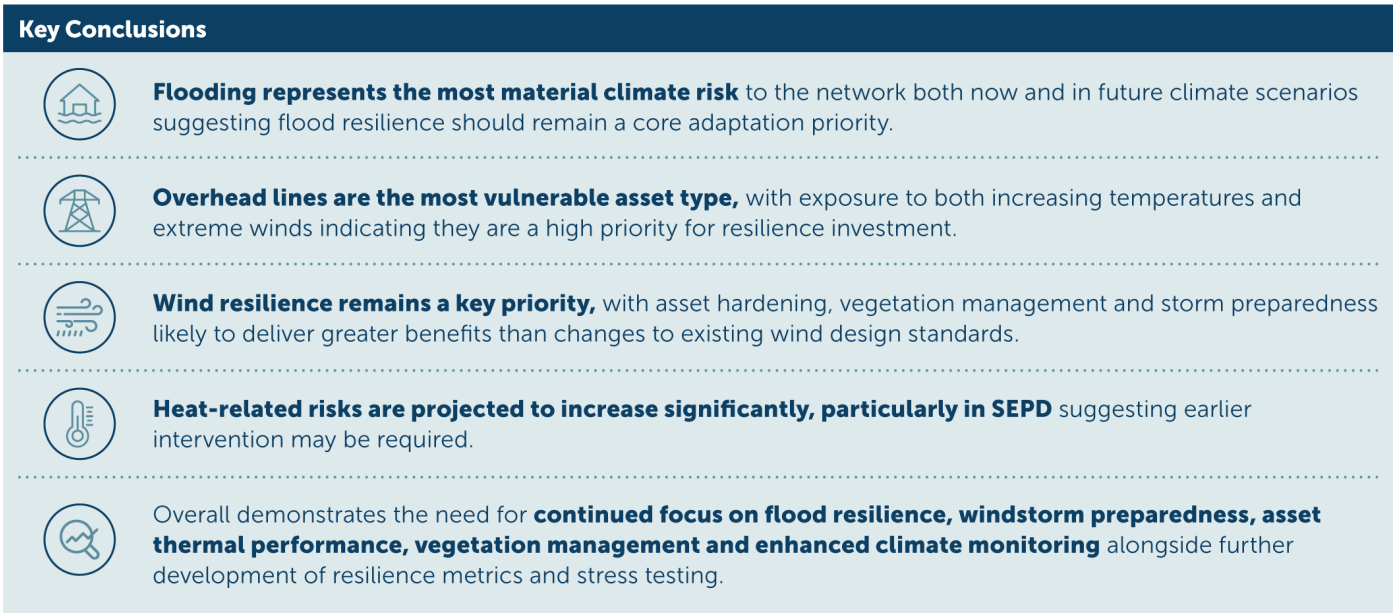
For our regional and organisational climate risk assessment, we considered UKCP18 RCP8.5 only. As these assessments have been undertaken for the first time, a high-warming scenario provides an appropriate basis for understanding the upper range of potential climate impacts and ensuring that proposed ED3 adaptation measures are robust across a broad range of plausible future climate conditions, including those represented by RCP4.5. As with the network climate risk assessment, the analysis draws primarily on the ENA's *Energy Industry Specific Risk Assessment on Climate Change Impacts – Work Package 3 Report (Met Office, 2020).* This was supplemented with regional climate projection data from the Intergovernmental Panel on Climate Change (IPCC) Interactive Atlas[4], using CMIP6 and CORDEX EURO models to assess projected changes in key climate variables across our licence areas.

[3] Climate Risk Indicators
[4] https://interactive-atlas.ipcc.ch/

2.3 CLIMATE CHANGE RISK ASSESSMENT

2.3.1 NETWORK EXPOSURE & VULNERABILITY ASSESSMENT

Figure 2.4. Network exposure and vulnerability assessment key conclusions



The output of our asset/network climate risk assessment is summarised in Table 2.2 below. Our assessment shows that the future risk is not uniform across hazards or asset classes. Flooding of substations is already a high current risk and remains a high risk across future climate scenarios. Wind-related risk for overhead lines is currently a medium risk and moves to a high risk across future climate scenarios. Temperature-related risks affecting overhead lines, underground cables and vegetation management are already material and remain significant throughout the assessment period. Impacts from snow and ice on overhead lines, drought on underground cables and heat-related impacts on switchgear and transformers remain low-risk under all climate scenarios and time horizons and require continued monitoring through adaptation pathways.

Table 2.2. Network Climate Change Risk Assessment

Risk Code	Climate Hazard	Climate Impact	Current Risk Score	RCP4.5		RCP8.5	
				2050 Risk Score	2100 Risk Score	2050 Risk Score	2100 Risk Score
AR1	Temperature – High air temperature	Overhead line conductors affected by temperature rise reducing rating and ground clearance	9 - Medium	12 - Medium	12- Medium	12 - Medium	15 - Medium
AR2	Temperature – High ground temperatures	Overhead line structures affected by summer drought and consequent ground movement leading to asset deterioration and damage	2 - Low	4 - Low	6 - Low	4 - Low	9 - Medium
AR3	Temperature – High air temperature / Rainfall – Increased rainfall	Overhead lines affected by interference from vegetation due to prolonged growing season	9 - Medium	9 - Medium	9 - Medium	9 - Medium	9 - Medium
AR4	Temperature – High ground temperature	Underground cable systems affected by increase in ground temperature, reducing ratings	10 - Low	10 - Low	10 - Low	10 - Low	15 - Medium
AR5	Temperature - High ground temperature	Underground cable systems affected by summer drought and consequential ground movement leading to asset deterioration and damage	1 - Low	2 - Low	4 - Low	2 - Low	4 - Low
AR6	Temperature – High air and ground temperatures	Substation and network earthing systems adversely affected by summer drought conditions, reducing the effectiveness of earthing systems	6 - Low	6 - Low	6 - Low	6 - Low	9 - Medium
AR7	Temperature – High air temperature	Transformers affected by temperature rise, reducing ratings.	6 - Low	6 - Low	6 - Low	6 - Low	6 - Low
AR8	Temperature – High air temperatures	Transformers affected by urban heat islands and coincident air conditioning demand leading to overloading	4 - Low	4 - Low	4 - Low	4 - Low	6 - Low
AR9	Temperature – High air temperatures	Switchgear affected by temperature rise, reducing ratings.	6 - Low	6 - Low	6 - Low	6 - Low	8 - Low
AR10	Rainfall – Increased rainfall	Substations affected by river (fluvial) flooding due to increased winter rainfall.	20 - High	20 - High	20 - High	20 - High	25 - High
AR11	Rainstorms – Increased rainfall	Substations affected by pluvial (flash) flooding due to increased rainstorms in Summer and Winter	20 - High	20 - High	20 - High	20 - High	25 - High
AR12	Increased Sea Levels / Tidal surges	Substations affected by sea flooding due to increased sea levels and/or tidal surges	20 - High	20 - High	25 - High	20 - High	25 - High
AR13	Rainfall / Rainstorms – Increased rainfall	Substations affected by water flood wave from dam burst	5 - Low	5- Low	5 - Low	5 - Low	10 - Medium

Risk Code	Climate Hazard	Climate Impact	Current Risk Score	RCP4.5		RCP8.5	
				2050 Risk Score	2100 Risk Score	2050 Risk Score	2100 Risk Score
AR14	**Thunderstorms - Lightning**	Overhead lines and transformers affected by increasing lightning activity leading to asset deterioration and damage	6 - Low	6 - Low	9 - Medium	6 - Low	9 - Medium
AR15	**Temperature – High air and ground temperatures - Wildfire**	Overhead lines and underground cables affected by extreme heat and fire smoke damage leading to asset deterioration and damage	9 - Medium	12 - Medium	12 - Medium	12 - Medium	12 - Medium
AR16	**Wind – Increased windstorms**	Overhead lines affected by increased intensity and frequency of high winds	12 - Medium	16 - High	16 - High	16 - High	16 - High
N/A	**Snow/Ice – Reduced frost and snowfall**	Overhead lines affected by snowfall and ice accretion causing localised and temporary outages.	3 - Low	3 - Low	4 - Low	3 - Low	4 - Low

For climate risks that have been assessed as low under current climate conditions, we have considered whether the level of risk is expected to materially change during the ED3 period (2028-33).

For snow and ice impacts on overhead lines, whilst individual winters may still experience severe snowfall events due to natural climate variability, there is limited evidence of a material increase in risk during 2028-33, and the overall level of exposure is not expected to increase significantly over the ED3 period.

For drought impacts on overhead lines and underground cables, whilst periods of prolonged dry weather may become more frequent in some areas, particularly in southern regions, projected changes over the 2028-33 period are not expected to materially result in asset deterioration and damage. Existing asset design standards and operational practices are considered sufficient to manage foreseeable impacts during ED3, although longer-term climate change may require further assessment in future price control periods.

Heat-related impacts on underground cables, substations, earthing systems, switchgear and transformers are expected to increase over the longer term as average temperatures rise and heatwave events become more frequent. However, our assessment indicates that the level of risk during 2028-33 remains relatively low and below intervention thresholds for large-scale adaptation investment. Nevertheless, because temperature extremes are already being observed across our network and uncertainty remains regarding localised asset performance, we have included targeted monitoring and intelligence-gathering activities within our ED3 portfolio to improve understanding of future heat-related vulnerabilities and inform subsequent investment decisions.

For flooding impacts on substations resulting from dam burst, although extreme rainfall is projected to increase over time, our exposure analysis did not identify evidence of a material change in the likelihood or consequence of dam-burst-related flooding affecting our assets during 2028-33. Existing reservoir safety regulation, inspection regimes and flood-risk management arrangements provide a significant level of risk mitigation, and consequently no additional targeted adaptation interventions are currently considered proportionate.

For lightning impacts on overhead lines, whilst some climate projections suggest the potential for changes in convective storm activity over the longer term, there is insufficient evidence to indicate a significant increase in lightning-related network impacts during 2028-33. Existing lightning protection measures and established network design standards are expected to continue providing an appropriate level of resilience. However, trends in lightning incidence and associated network faults will continue to be monitored to determine whether future intervention may be required.

Overall, these risks are not expected to increase sufficiently during the ED3 period to justify targeted adaptation investment at this stage. However, given the inherent uncertainty, and the influence of natural year-to-year climate variability, they will continue to be monitored through the adaptation pathways framework described in ***Section 5***. This approach enables us to track changes in climate science, asset and network performance and operational experience,

ensuring that emerging trends, changes in risk exposure or evidence of increasing vulnerability can be identified early and used to inform future adaptation decisions and subsequent investment planning cycles.

We've also considered findings from Ofgem's Phase A climate resilience stress testing programme, including fragility curves and return-period analysis.

Figure 2.5 Example Temperature Fragility Curve: MEI = 2, CML = 40,000

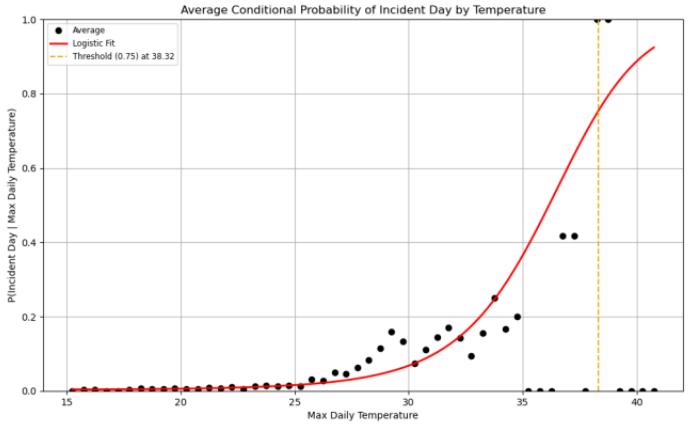


Figure 2.6 Example return periods for wind speed

MEI code	Incident day	Threshold	Present Day Return Period	2051-2080 Return Period
N/A	N/A	35 ms^{-1}	1.0 years	1.0 years
0 (OH lines)	CML = 50,000	43.94 ms^{-1}	1.3 years	1.3 years
	CML = 150,000	44.75 ms^{-1}	1.7 years	1.7 years
00, 01, 02, 03, 09, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21, 30, 72, 82, S4, S5, S6, X	CML = 10000	41.57 ms^{-1}	1.0 years	1.0 years
	CML = 50,000	41.07 ms^{-1}	1.0 years	1.0 years

Phase A of the stress testing regime generated fragility curves for temperature and wind for overhead lines, underground cables, switchgear and transformers. Fragility curves illustrate the probability of failure or unwanted outcomes of an asset or a structural component. Phase A also calculated return periods which estimate the likelihood of an event occurring, presented in years. This can also be referred to as the expected frequency of an occurrence or event.

Key points from analysis:

Temperature Fragility Curves

- Overhead lines become much more vulnerable once temperatures exceed ~30°C and by 37°C, the probability of an incident is extremely high.
- There is more variability at higher temperatures indicating secondary factors may be compounding heat-related incidents.
- The fragility curves for underground cables, switchgear and transformers are not as steep as for overhead lines showing these assets are less sensitive to changes at higher temperatures.
- For underground cables and transformers there is more variability between different CML levels with variability emerging at lower temperatures for CML values of 40,000 compared to 20,000 indicating secondary factors are having more of an effect than changes in temperature alone.
- Switchgear and transformers start to become more vulnerable at slightly higher temperatures than overhead lines and underground cables indicating that they can tolerate higher temperatures before their performance starts degrading. This is also true for high-probability incidents where the temperature thresholds are higher for switchgear and transformers compared to OHLs and UG cables.
- The analysis supports the development of adaptation pathways for heat-related climate risks to identify the tipping points and thresholds at which existing mitigation and adaptation measures may no longer provide an acceptable level of resilience, together with the alternative actions that would be implemented should these thresholds be exceeded.

- The analysis suggests that resilience investment should be prioritised for overhead lines and underground cables over switchgear and transformers.

Temperature Return Periods

SHEPD:

- For underground cables, transformers and overhead lines extreme heat thresholds that are not exceeded today become events occurring every 5-10 years by 2050-2080.
- Switchgear is less exposed to heat-related risk with a 16-year return period. Although return periods shrink rapidly between present day and 2021-2050, exceedance of heat thresholds is still rare in the 2021-2050 period and return periods are beyond the typical life span of assets.
- The analysis suggests that resilience investments to address heat related risks could be delayed and that there could be merit in assessing factors beyond high temperature such as temperature differential.

SEPD:

- Extreme heat thresholds that are rarely exceeded today become annual events by 2050-2080 for all asset types assessed.
- The middle of the century is the critical tipping period where heat-related risks dramatically increase with return periods shrinking by 70-85%.
- The analysis suggests that resilience investment in network reinforcement and cooling techniques should be prioritised and that this investment should be front-loaded.

Wind Fragility Curves

- Incident probabilities rise slowly at first then accelerate rapidly beyond 26ms-1 for LV, HV and EHV OH lines indicating that performance degrades quickly with more extreme winds.
- The analysis supports the development of adaptation pathways for wind-related climate risks to identify the tipping points and thresholds at which existing mitigation and adaptation measures may no longer provide an acceptable level of resilience, together with the alternative actions that would be implemented should these thresholds be exceeded.
- The analysis suggests that resilience investment in hardening overhead line corridors (vegetation removal, reconductoring, undergrounding) should be prioritised.

Wind Return Periods

- For SHEPD and SEPD overhead lines, wind related extreme events show almost no material increase in frequency with climate change; they are already occurring annually at the present day.
- The analysis suggests that existing wind design standards are likely to remain adequate and resilience measures should focus on storm response processes, or assess other factors beyond wind speed such as wind direction.

Ofgem has confirmed that climate resilience stress testing will continue to be developed through a modular approach. We're committed to working with Ofgem and other DNOs through the CCRWG to further strengthen and refine this methodology over time and have included aspects of this work in our ED3 commitments and targets, detailed in ***Section 3.5***.

2.3.2 REGIONAL EXPOSURE & VULNERABILITY ASSESSMENT

Figure 2.7 Regional exposure and vulnerability assessment key conclusions

Key Conclusions

- Regional risk profiles vary according to local exposure and asset characteristics, with Embedded Generation particularly vulnerable to coastal flooding and erosion, and SEPD regions to windstorms and vegetation-related impacts supporting regional adaptation planning and targeted interventions.
- Flooding and wind-related hazards are the most significant climate risks across all regions and under all scenarios, suggesting a high priority for resilience investment.
- Organisational risks are projected to remain medium or high across all regions, with the most significant vulnerabilities relating to access issues, supply chain and communications, requiring greater collaboration with interdependent infrastructure operators as well as workforce welfare and asset location vulnerabilities requiring specific interventions.
- Resilience investment must combine immediate adaptation measures with improved long-term climate modelling and forecasting capabilities.

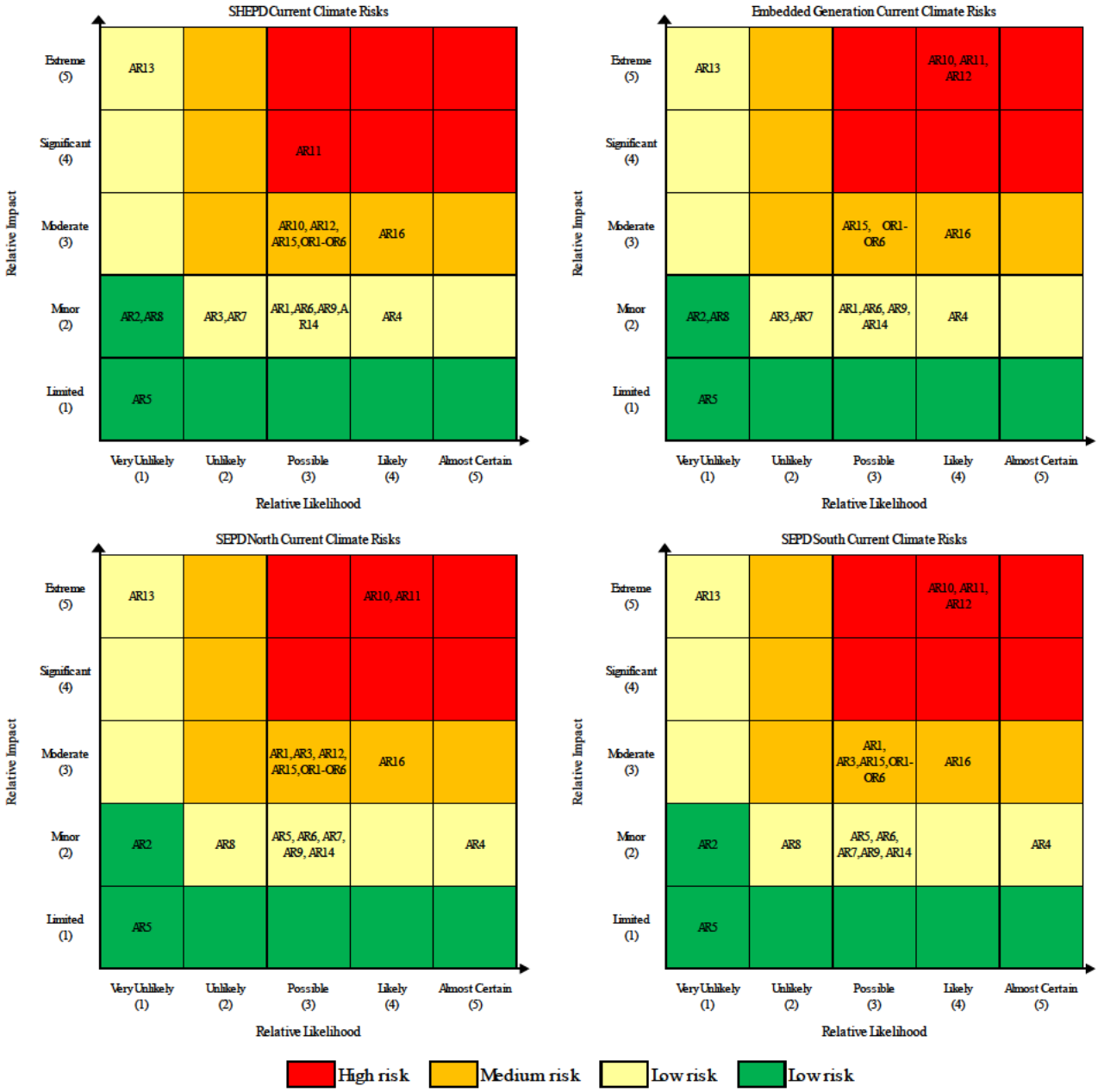
To enhance our understanding of location-specific climate risk, we have undertaken climate change risk assessments for all our operational regions across our licence areas and developed Regional Climate Ready Plans to account for geographical differences in network configuration, asset location and local climate conditions. Regional assessments complement network-wide climate risk assessments, providing greater insight into local risk profiles and supporting targeted investment decisions. Assessments are based on UKCP RCP8.5 regional projections, supplemented by network and asset data and operational experience. The output of our regional climate risk assessment is summarised in ***Figure 8 to Figure 10***. Our assessment shows that the future risk is not uniform across hazards, asset classes or geography.

The 2050 and 2100 assessments show a consistent risk profile for network asset risks (AR1-16), with flooding and wind remaining the dominant climate risks across the network. Substation flooding from river, pluvial and coastal sources remains the most material risk, particularly for Embedded Generation and SEPD South, while pluvial flooding affects all licence areas. Overhead line risks also remain material, driven by high winds and, in SEPD North and South, vegetation interference linked to longer growing seasons. The main material difference by 2100 is the escalation of wind-related climate risk (AR16), which moves from medium to high risk in SEPD North and SEPD South, strengthening the case for targeted overhead line resilience measures. Overall, the assessment suggests the focus should be on flood resilience for substations, storm resilience for overhead lines, enhanced vegetation management, and targeted interventions in areas where risks are highest or increasing over time.

For Organisational Risks (OR1-6), the assessment shows they have all been classified as either medium or high risk in 2050, remaining within the same category or moving to high risk for 2100. For SHEPD and SEPD South all organisational risks were classified as medium risk in 2050. For Embedded Generation, damage to depots or offices (OR1), access issues for people, goods and services (OR4) and loss of land or assets from erosion (OR6) were classified as high risk reflecting the coastal proximity of sites. Whilst for SEPD North, disruption of logistics and supply chains (OR3), access issues for people, goods or services (OR4), and health and wellbeing impacts on employees and contractors (OR5) were classified as high risk reflecting the increased frequency of storms. By 2100, the risk profile intensifies for some risks and regions. In SHEPD, loss of land or assets from erosion (OR6) increases from medium to high risk. For Embedded Generation, loss of power and communications (OR2) and disruption of logistics and supply chains (OR3) increase from medium to high risk reflecting the isolated nature of the islands. Similarly, in SEPD North, loss of power and communications (OR2) increases from medium to high risk as does loss of land or assets. Whilst for SEPD South, loss of power and communications (OR2), access issues for people, goods or services (OR4), and loss of land or assets from erosion (OR6) all increase from medium to high risk reflecting the increased frequency of storms. Overall, the assessment suggests the focus should be on expanding flood resilience intervention for Embedded Generation, targeted assessments of coastal erosion and landslide risks in SEPD South, strengthening collaboration with interdependent infrastructure operators to improve overall system resilience and enhancing severe weather preparedness.

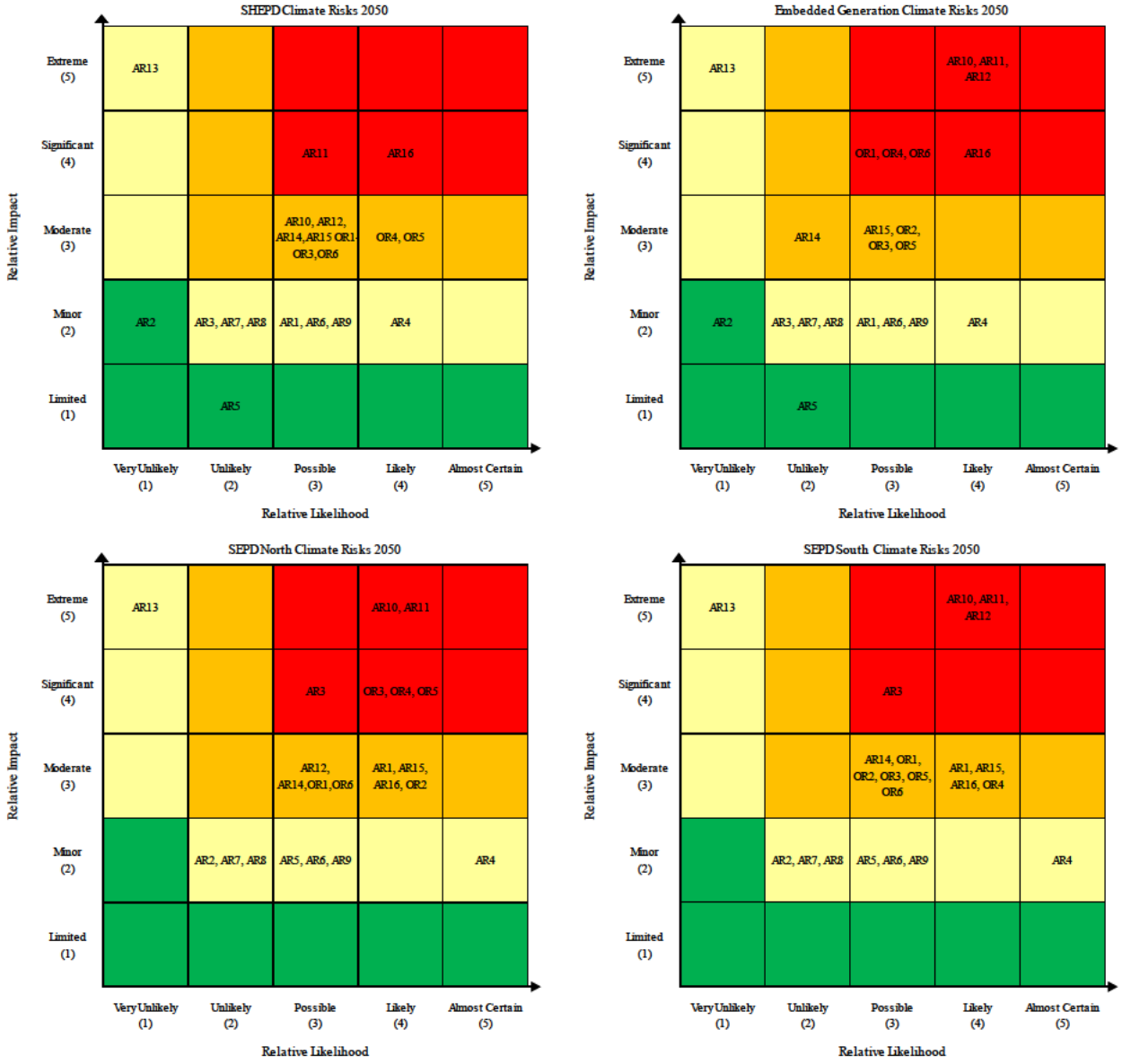
Exposure can also vary over the long term due to changes in network configuration driven by load growth, electrification and network development requirements identified through the transitional Regional Energy Strategic Plan (tRESP) and company forecasting processes altering the location of assets and potentially criticality too. Our proposed ED3 climate resilience investments discussed in ***Section 3*** are focused on addressing where we are already exposed to improve network resilience but we recognise that further work is required to develop a fully traceable line from future energy system need → future network/asset configuration → future climate exposure → ED4 and beyond resilience intervention. We therefore propose to enhance our capabilities during ED3 through targeted climate modelling, data and resource investments, enabling a more systematic and granular assessment of future climate exposure and adaptation requirements across the network, with further detail provided in ***Section 3.4***.

Figure 2.8: Regional Climate Change Risk Assessment - Current Climate Conditions



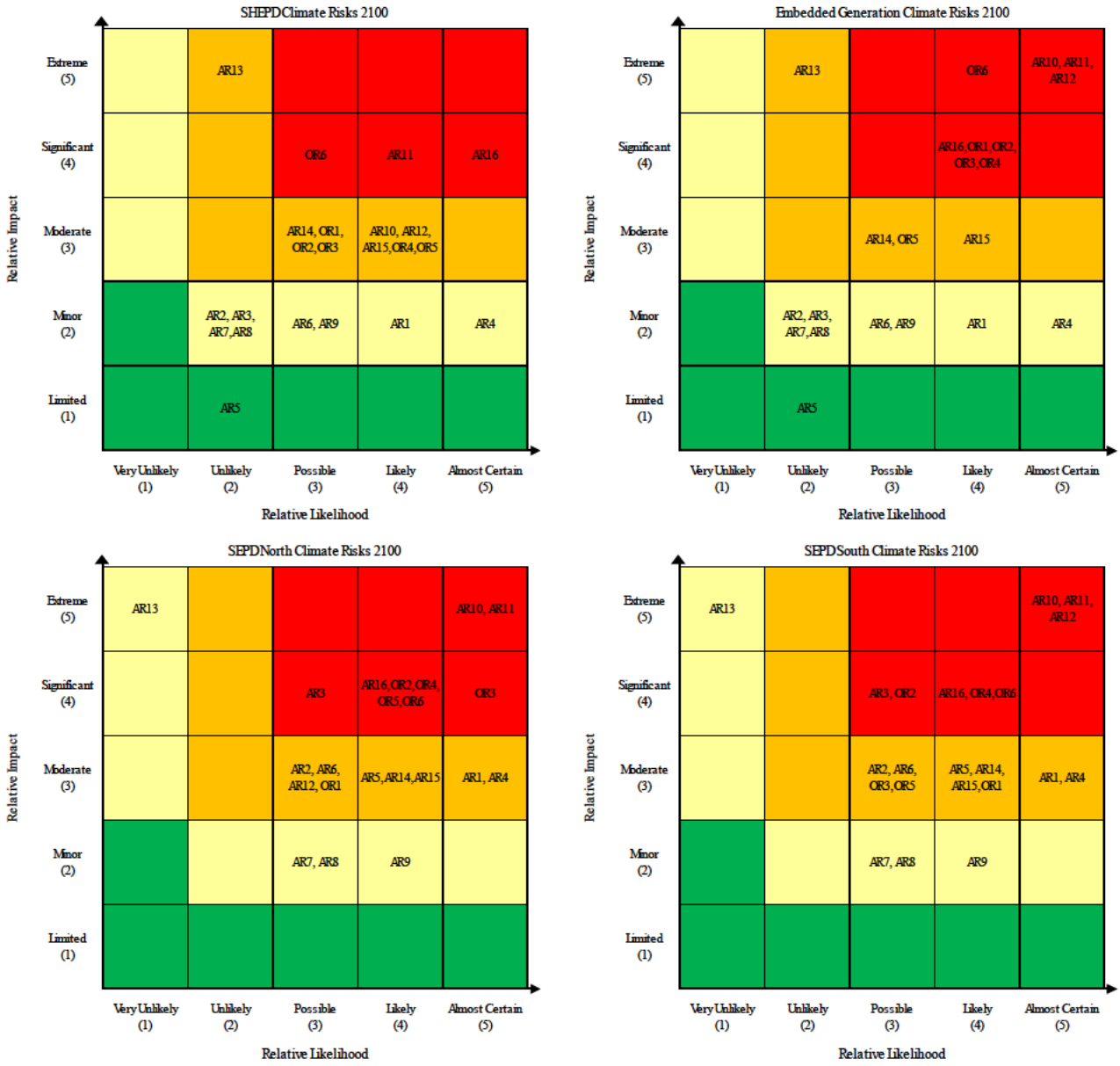
AR1	Overhead line conductors affected by temperature rise, reducing rating and ground clearance
AR2	Overhead line structures affected by summer drought and consequent ground movement
AR3	Overhead lines affected by interference from vegetation due to prolonged growing season
AR4	Underground cable systems affected by increase in ground temperature, reducing ratings
AR5	Underground cable systems affected by summer drought and consequent ground movement, leading to mechanical damage
AR6	Substation and network earthing systems adversely affected by summer drought conditions, reducing effectiveness of the earthing systems
AR7	Transformers affected by temperature rise, reducing rating
AR8	Transformers affected by urban heat islands and coincident air conditioning demand leading to overloading in summer months
AR9	Switchgear affected by temperature rise, reducing rating
AR10	Substations affected by river flooding due to increased winter rainfall
AR11	Substations affected by pluvial (flash) flooding due to increased rainstorms in summer and winter
AR12	Substations affected by sea flooding due to increased sea levels and/or tidal surge
AR13	Substations affected by water flood wave from dam burst
AR14	Overhead lines and transformers affected by increasing lightning activity
AR15	Overhead lines and underground cables affected by extreme heat and fire smoke damage
AR16	Overhead lines affected by increased intensity and frequency of high winds
OR1	Damage to depots/offices from changes to weather events such as intense rainfall, flooding and storms.
OR2	Loss of power and communications including mobile communications from changes to weather events such as flooding and storms.
OR3	Disruption to logistics and supply chain from changes to weather events.
OR4	Access issues for people, goods and services to our sites/network from changes to weather events such as flooding and storms
OR5	Health and wellbeing impacts on employees and contract partners from changes to weather events.
OR6	Loss of land/assets from river/sea erosion due to changes to weather events such as rainfall, flooding and storms.

Figure 2.9: Regional Climate Change Risk Assessment - Future Climate Scenario RCP8.5 2050



AR1	Overhead line conductors affected by temperature rise, reducing rating and ground clearance
AR2	Overhead line structures affected by summer drought and consequent ground movement
AR3	Overhead lines affected by interference from vegetation due to prolonged growing season
AR4	Underground cable systems affected by increase in ground temperature, reducing ratings
AR5	Underground cable systems affected by summer drought and consequent ground movement, leading to mechanical damage
AR6	Substation and network earthing systems adversely affected by summer drought conditions, reducing the effectiveness of earthing systems
AR7	Transformers affected by temperature rise, reducing rating
AR8	Transformers affected by urban heat islands and coincident air conditioning demand leading to overloading in summer months
AR9	Switchgear affected by temperature rise, reducing rating
AR10	Substations affected by river flooding due to increased winter rainfall
AR11	Substations affected by pluvial (flash) flooding due to increased rainstorms in summer and winter
AR12	Substations affected by sea flooding due to increased sea levels and/or tidal surge
AR13	Substations affected by water flood wave from dam burst
AR14	Overhead lines and transformers affected by increasing lightning activity
AR15	Overhead lines and underground cables affected by extreme heat and fire smoke damage
AR16	Overhead lines affected by increased intensity and frequency of high winds
OR1	Damage to depots/offices from changes to weather events such as intense rainfall, flooding and storms.
OR2	Loss of power and communications including mobile communications from changes to weather events such as flooding and storms.
OR3	Disruption to logistics and supply chain from changes to weather events.
OR4	Access issues for people, goods and services to our sites/network from changes to weather events such as flooding and storms
OR5	Health and wellbeing impacts to employees and contract partners from changes to weather events.
OR6	Loss of land/assets from river/sea erosion due to changes to weather events such as rainfall, flooding and storms.

Figure 2.10: Regional Climate Change Risk Assessment - Future Climate Scenario RCP8.5 2100



AR1	Overhead line conductors affected by temperature rise, reducing rating and ground clearance
AR2	Overhead line structures affected by summer drought and consequent ground movement
AR3	Overhead lines affected by interference from vegetation due to prolonged growing season
AR4	Underground cable systems affected by increase in ground temperature, reducing ratings
AR5	Underground cable systems affected by summer drought and consequent ground movement, leading to mechanical damage
AR6	Substation and network earthing systems adversely affected by summer drought conditions, reducing the effectiveness of earthing systems
AR7	Transformers affected by temperature rise, reducing rating
AR8	Transformers affected by urban heat islands and coincident air conditioning demand leading to overloading in summer months
AR9	Switchgear affected by temperature rise, reducing rating
AR10	Substations affected by river flooding due to increased winter rainfall
AR11	Substations affected by pluvial (flash) flooding due to increased rainstorms in summer and winter
AR12	Substations affected by sea flooding due to increased sea levels and/or tidal surge
AR13	Substations affected by water flood wave from dam burst
AR14	Overhead lines and transformers affected by increasing lightning activity
AR15	Overhead lines and underground cables affected by extreme heat and fire smoke damage
AR16	Overhead lines affected by increased intensity and frequency of high winds
OR1	Damage to depots/offices from changes to weather events such as intense rainfall, flooding and storms.
OR2	Loss of power and communications including mobile communications from changes to weather events such as flooding and storms.
OR3	Disruption to logistics and supply chain from changes to weather events.
OR4	Access issues for people, goods and services to our sites/network from changes to weather events such as flooding and storms
OR5	Health and wellbeing impacts to employees and contract partners from changes to weather events.
OR6	Loss of land/assets from river/sea erosion due to changes to weather events such as rainfall, flooding and storms.

2.3.3 ORGANISATIONAL EXPOSURE ASSESSMENT AND INTERDEPENDENCY RISK

Figure 2.11 Organisation exposure assessment and interdependency risk key conclusions



We have also considered wider organisational climate risks as previously noted in ***Section 2.2***, which as a reminder include:

- Increased rainfall, flooding, storms and sea level rise causing damage to buildings and potentially resulting in the loss of assets or land.
- Increased storms, flooding and wildfires disrupting access routes, logistics, telecommunications and the wider supply chain.
- Increased storm events, extreme heat and flooding leading to health, safety and wellbeing impacts for employees and contract partners.

These organisational climate risks have all been assessed as medium under current climate conditions. ***Section 2.3.2*** provides further detail on how these risks change for our operational regions under future climate conditions. In summary:

- **SHEPD:** For 2050, all organisational risks remain as medium risk whilst for 2100 loss of land or assets from flooding or erosion increases from medium to high risk reflecting growing exposure to flooding and coastal erosion processes.
- **Embedded Generation:** For 2050, damage to buildings, access issues and loss of assets increase from medium to high risk, reflecting the coastal location and isolated nature of island-based infrastructure. Whilst for 2100, the risk profile intensifies further, with telecommunications, disruption to logistics and the wider supply chain increasing from medium to high risk.
- **SEPD North:** For 2050, disruption to access routes, logistics and the wider supply chain, as well as workforce health, safety and wellbeing impacts increase from medium to high risk, reflecting increased exposure to severe weather and storm events. Whilst for 2100, the risk profile intensifies further, with telecommunications and loss of assets from flooding and erosion increasing from medium to high risk.
- **SEPD South:** For 2050, all organisational risks remain as medium risk. Whilst for 2100 disruption to access routes, telecommunications and loss of assets from flooding and erosion increase from medium to high risk, reflecting the growing impacts of storms and coastal processes.

The assessment suggests that priority adaptation measures include a continued focus on flood resilience, expanding flood resilience activities to Embedded Generation assets, undertaking targeted coastal erosion and landslide assessments in SEPD South, strengthening collaboration with interdependent infrastructure operators, and enhancing severe weather preparedness and workforce welfare arrangements.

2.3.4 CONCLUSIONS

The strategic conclusion from our various climate change risk assessments is that ED3 should not be a single package of generic climate investment. It should be a targeted portfolio that distinguishes between existing controls, BAU activity, incremental climate-driven uplift and direct climate interventions. This distinction is essential to demonstrate additionality, avoid double-counting with other strategies and create a clear line of sight between risk evidence, funding route, customer value and pathway decision.

3. CLIMATE RESILIENCE INTERVENTIONS

3.1 INTRODUCTION

This section sets out our proposed ED3 Climate Resilience investments and the investment justification framework applied to ensure proposals comply with Ofgem's Business Plan Guidance.

Our assessment follows a structured approach that considers climate hazards; exposure of assets and operations to those hazards; asset and network vulnerability; current and future climate risk; existing interventions and adaptation activities; and the need for additional resilience measures during ED3 that would not otherwise be required as part of BAU activities.

This approach provides a clear line of sight between climate risk and proposed investment and ensures that resilience interventions are proportionate, practical, represent value for customers and support long-term resilience outcomes. For each proposal we demonstrate how it meets the following principles:

Figure 3.1 Climate risk and proposed investment principles



We have considered the materiality, complexity and uncertainty of our ED3 climate resilience proposals to determine the requirements for the Engineering Justification Papers (EJPs) using the criteria below:

Figure 3.2 Proposals materiality, complexity and uncertainty criteria

Low-value / Low-materiality (£0m-£2m cost)	Medium-value / Medium-materiality (£2m-<£4m cost)	High-value / High materiality / High complexity (>£4m cost)
justified via a concise EJP focused on hazard linkage, need case, and proportionate option selection.	justified via a EJP including a clear engineering rationale, options assessment and relevant supporting evidence.	justified via a full technical justification EJP, cost analysis, and alignment with Adaptation Pathways.

We are not proposing any direct load-driven ED3 climate resilience proposals; however, some of our ED3 climate resilience proposals may require load considerations which will be evaluated through the project governance process. All capex projects are subject to our internal governance investment frameworks which require completion of various technical assessments including consideration of changes to future climate risk exposure at the detailed design phase. And all projects are required to comply with our asset policies, standards and specifications which incorporate climate resilience considerations and consider the ability of materials, components and parts to withstand more extreme weather conditions.

Incremental climate-driven costs have not been quantified due to the current lack of a robust and consistent industry methodology. We will continue to collaborate with Ofgem and other DNOs as we move towards ED3 to develop a common approach for quantifying these costs across the sector. However, these investments have been reconciled against other areas of the plan to ensure they are included only once and there is no double counting.

3.2 HAZARD AND NEEDS CASE

Table 3.1 summarises the principal climate risks, the potential impacts on our assets and operations, and the resilience measures proposed to address these risks during ED3 and beyond. The proposed interventions have been grouped into strategic adaptation themes, focusing on the areas where future climate change is expected to have the greatest effect on network performance, operational resilience and customer outcomes. Together, these measures form a proportionate and adaptive response to the risks identified through our climate risk assessment and support the long-term resilience of the network under a range of future climate scenarios.

Table 3.1. Summary of our principal climate risks and ED3 resilience response

Adaptation Theme	Hazard (Acute / Chronic)	Key Risks Addressed	Needs Case / Hazard Linkage	Climate Change Assessment	ED3 Resilience Response
Flood Resilience	**Acute:** Increased rainfall and extreme rainfall events **Chronic:** Sea level rise and increasing long-term flood exposure	AR10, AR11, AR12, OR1	Fluvial (river), pluvial (surface water) and coastal flooding threaten substations, overhead lines, underground assets and embedded generation. Increased sea levels and tidal surges increase exposure of coastal infrastructure.	River, surface water and coastal flooding remain among the highest risks across all scenarios, regions and timeframes. Exposure assessments identify substations and operational sites as particularly vulnerable.	Extend the ED2 flood resilience programme beyond Grid and Primary substations to additional asset classes; undertake enhanced flood risk assessments; increase deployment of flood protection equipment and associated training.
Vegetation and Wildfire Management	**Acute:** Increased windstorms **Chronic:** Higher temperatures and changing rainfall patterns	AR3, AR15	Overhead lines are increasingly affected by vegetation growth, longer growing seasons, and the spread of pests and diseases, increasing network disruption risk.	Longer growing seasons, changing vegetation patterns and increased wildfire risk create additional threats to network reliability and asset condition.	Develop enhanced vegetation resilience and condition modelling; improve understanding of wildfire impacts; investigate climate modelling tools to support future network management and investment decisions.
Storm and Network Resilience	**Acute:** Increased storms	AR16	High impact storm events threaten overhead and underground infrastructure, causing outages, asset failure and widespread customer interruptions.	Increased storm frequency and severity represent a material risk to network performance and asset integrity across all regions	Deliver targeted overhead line hardening using BLL and contact spacers, selective undergrounding, targeted LV resilience measures and improve access to specialist equipment to improve storm resilience
Heat Resilience and Asset Performance	**Acute:** Extreme heat **Chronic:** Sustained increases in average temperatures	AR6, AR7, AR8, AR9	Rising temperatures may reduce the performance and lifespan of transformers, switchgear, cables and earthing systems.	Higher temperatures may increasingly affect substations, transformers, switchgear, cables and earthing systems, particularly within SEPD regions.	Deploy environmental monitoring at major substations to improve understanding of thermal risks, inform adaptation pathways and support evidence-based resilience investment decisions.
Underground Cable Resilience	**Chronic:** Long-term changes in rainfall patterns	AR10-11	Increased rainfall in clay soil areas leads to greater rates of underground cable deterioration and failure.	Future climate conditions indicate increasing asset degradation risks associated with soil movement and moisture changes.	Targeted monitoring and intervention programmes to identify vulnerabilities and improve underground cable resilience.
Landslide Resilience	**Acute:** Increased rainfall	OR6	Increased rainfall raises the likelihood of landslips resulting in asset deterioration, network failures and access constraints.	Higher rainfall intensity is expected to increase the likelihood and consequence of slope instability in vulnerable locations.	Undertake targeted landslide risk assessments and mitigation measures at identified vulnerable sites to improve landslide resilience.
Organisational and Interdependency Resilience	**Acute:** Increased storms **Chronic:** Long-term climate change impacts	OR2-OR5	Severe weather events can disrupt communications, transport, supply chains, workforce welfare and critical infrastructure dependencies, creating cascading impacts across sectors.	Climate change increases risks to workforce welfare, communications, logistics, supply chains, access and coastal assets, with risks increasing across all regions toward 2100.	Strengthen resilience planning with interdependent critical infrastructure operators, develop co-funded resilience initiatives and improve workforce welfare to improve organisational and interdependency resilience.

3.3 CURRENT INTERVENTION AND RESIDUAL GAPS

Table 3.2 presents the outcome of our review of our current climate resilience interventions. We have reviewed our existing adaptation actions, detailed in our ARP4 Report, to address ARs 1-15, alongside our asset policies, operational resilience arrangements and ED2 climate-resilience activity to establish the baseline against which ED3 additionality should be assessed.

This assessment considered and identified:

- Whether work is already underway or planned to address the identified risk;
- Whether existing actions remain appropriate under future climate conditions; and
- Whether a new long-term resilience need exists requiring intervention during ED3.

This review identifies three decision states. First, some risks are already adequately managed by existing controls and should continue through adaptation pathways. Second, some risks require additional evidence, monitoring or capability in ED3 before future physical intervention can be justified. Third, some risks present a material residual gap now and require ED3 intervention because existing activity does not fully address the climate-related need.

Table 3.2. Review of current interventions

Climate Risk	Risk Codes	Review of Intervention Position
Flooding, Sea Level Rise & Erosion	AR10-AR13, OR1, OR6	Existing ED2 flood resilience programme in place to meet ETR138 requirements at Grid and Primary substations. Future climate conditions confirm this as a high risk under all scenarios and timeframes; therefore, **a new long-term need exists that must be addressed in ED3**.
Heat Related Impacts, Vegetation Management & Wildfire	AR1-AR9, AR15,	**AR1, AR2, AR4, AR5** - we have determined that our **existing actions remain appropriate**. Please refer to our SSEN Distribution ARP4 Report for further details. We have developed adaptation pathways to ensure we adequately manage changes to these risks. **AR3** - Future climate conditions confirm this as a medium risk. Our regional exposure and vulnerability assessment in ***Section 2.3.2*** demonstrates changes in growth patterns and increased presence of pests and diseases. This evidence confirms that **a new long-term need exists that must be addressed in ED3** to expand vegetation modelling & monitoring to determine future resilience investment decisions. **AR6-AR9** - Network stress testing analysis detailed in ***Section 2.3.1*** indicates that for SEPD heat resilience investment should be prioritised and front loaded whilst for SHEPD it could be delayed but there could be merit in assessing heat differential. This evidence has confirmed that **a new long-term need exists that must be addressed in ED3** to implement environmental monitoring to allow us to develop our understanding of this impact and determine future resilience investment decisions. **AR15 -** Future climate conditions confirm this as a medium risk under all scenarios and timeframes also supported by our organisational exposure and interdependency assessment in ***Section 2.3.3***. This evidence has confirmed that **a new long-term need exists that must be addressed in ED3** to investigate and implement climate modelling and determine future resilience investment decisions.
Storm-Related Impacts	AR16, OR1, OR6	**AR 16 -** Future climate conditions confirm this as a high risk under all scenarios and timeframes. Network stress testing analysis detailed in ***Section 2.3.1*** indicates that investment in overhead line hardening should be prioritised. Our regional exposure and vulnerability assessment in Section 2.3.2 confirmed exposure to this risk as medium or high across all regions. This evidence has confirmed that **a new long-term need exists that must be addressed in ED3** to implement targeted storm hardening, climate modelling and improve customer restoration times. **OR1-OR6 -** Future climate conditions confirm this as a high risk under all scenarios and timeframes. Our regional exposure and vulnerability assessment in ***Section 2.3.2*** scored this risk as medium or high risk across all our regions. This evidence has confirmed that **a new long-term need exists that must be addressed in ED3** to implement climate modelling, interdependencies funding pot and landslide assessment and mitigation.
Lightning, Snow & Ice	AR14, NA	We have determined that our **existing actions remain appropriate**. Please refer to our SSEN Distribution ARP4 Report for further details. We have developed adaptation pathways to ensure we adequately manage changes to these risks.
Organisational & Interdependency Risks	OR2-OR5	**OR2-OR5 -** Future climate conditions confirm this as a high risk under all scenarios and timeframes. Our regional exposure and vulnerability assessment in ***Section 2.3.2*** scored this risk as medium or high risk across all our regions. This evidence confirms that **a new long-term need exists that must be addressed in ED3** to allow us to strengthen collaboration with interdependent infrastructure operators, develop co-funded resilience initiatives, improve staff welfare facilities and enhance storm recovery capabilities.

3.4 PORTFOLIO PRIORITISATION

Table 3.3 presents our consolidated ED3 climate resilience intervention portfolio which has been developed from a structured assessment of climate-related risks across our network, assets and operations, drawing on climate projections, exposure and vulnerability assessments, operational experience, stress testing and lessons learned from recent severe weather events. The portfolio has been designed to deliver targeted and proportionate action where climate risks are greatest, while maintaining flexibility to respond as evidence, climate science and operational requirements evolve. Interventions range from physical resilience measures and network hardening investments through to improved climate intelligence, workforce capability, emergency preparedness and collaborative resilience initiatives.

To ensure that proposed investments represent an efficient and evidence-based response to climate risks, each intervention has been assessed against three prioritisation tests: confidence, consequence and proportionality. The confidence test considers whether the proposal remains justified across a range of plausible climate futures and continues to deliver value under uncertainty. The consequence test assesses whether the intervention could inadvertently increase vulnerability to other climate hazards or create long-term lock-in that may constrain future adaptation options. The proportionality test evaluates whether the scale, timing and funding route of the proposal are aligned with the residual climate-related need and represent an appropriate response to the level of risk identified. Together, these tests have enabled us to prioritise a portfolio of low-regret, adaptive investments that deliver benefits under current climate conditions while strengthening resilience to future climate change impacts. We will continue to support the development of a common approach with Ofgem to better understand and assess the influence of climate variability on resilience planning and investment decisions.

We have produced EJPs based on the Atypical Investment EJP template for all our ED3 climate resilience intervention proposals which provide supporting evidence on the materiality of the identified risks, the consequences of inaction, and the proportionality, timing, cost-effectiveness and deliverability of the proposed intervention. The EJPs have been structured in line with the classification methodology described in ***Section 3.1.*** Table 3.3 sets out how our proposed ED3 climate resilience interventions align with the BPG EJP assessment criteria and the BPDT Structure. Further detail on how these interventions contribute to a pathway for delivering climate resilience improvements throughout ED3, into ED4 and over the longer term is provided in ***Figure 4.1*** in ***Section 4.3***. To ensure that the level of justification remains proportionate to the scale and materiality of the proposed expenditure, we have combined a number of low-value, low-materiality climate resilience interventions into a single EJP. This approach avoids unnecessary administrative burden while maintaining transparency and providing sufficient evidence to demonstrate that the proposed investments represent an efficient and evidence-based response to climate risks.

Table 3.3. How our ED3 Intervention Portfolio maps to Ofgem BPG EJP requirements and BPDT Structure

EJP Criteria	Summary of investment	EJP Reference number	BPDT	Total Cost (£m)	Year on Year Cost (£m)				
					2029	2030	2031	2032	2033
Low-value/low-materiality (£0m-£2m cost)	Vegetation management growth & resilience modelling and condition monitoring, Isle of Wight landslip mitigation, enhanced climate modelling and building resource. **Each component activity is low value or low materiality and has been combined within a bundled EJP**	CR_6 SSEN_ED3_CR_LowMaterialityInvestments	CV16b – Storm Resilience	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Medium-value/medium-materiality (£2m-<£4m cost)	Interdependencies fund to co-fund activities directly related to improving storm resilience with interdependent infrastructure operators.	CR_8 SSEN_ED3_CR_MediumMaterialityInvestments	CV16b – Storm Resilience	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
High value/high materiality/high complexity (>£4m cost)	Continuation of flood mitigation investment to meet ETR 138 requirements at Grid and Primary substations.	CR_2 SSEN_ED3_CR_FloodMitigation	CV16a – Flood Mitigation (Surveys and Schemes)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Expand flood response equipment and training and undertake Flood Risk Assessments (FRAs) of additional network assets.	CR_7 SSEN_ED3_CR_EnhancedFloodResilience	CV16a – Flood Mitigation (Non Site Specific Costs)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Install environmental monitoring at major substations across our licence areas	CR_5 SSEN_ED3_CR_Monitoring & Technology for Climate	CV16c – Extreme Heat	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Overhead line rebuild to incorporate BLL and contact spacers across our licence areas and underground targeted OHLs in SHEPD to improve storm resilience.	CR_1 SSEN_ED3_CR_OHL_StormResilience	CV16b – Storm Resilience	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Installation of pillars on the LV network across our licence areas and expansion of storm response equipment to reduce restoration times.	CR_3 SSEN_ED3_CR_RestorationTimes	CV16b – Storm Resilience	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Improving welfare provisions for our workforce and customers across our licence areas to support the response to and recovery from storms.	CR_4 SSEN_ED3_CR_Welfare Provision	CV16b – Storm Resilience	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 3.4. ED3 Portfolio prioritisation assessment

Portfolio area	Proposal	Confidence Assessment	Consequence Assessment	Proportionality Assessment
Flood resilience	Additional flood-risk assessment, mobile flood protection, deployment training and embedded generation mitigation works.	Future climate projections identify flooding as a high risk across all scenarios, timeframes and operational regions, confirming a clear long-term need for investment in ED3. To address this risk, we propose a low-regret package of measures focused on improving risk understanding, enhancing resilience and strengthening preparedness. Flood risk assessments will provide a cost-effective means of identifying vulnerabilities across our network, including embedded generation sites in coastal locations, supporting improved decision-making and future investment planning. Funding for remedial works will enable the implementation of priority resilience measures identified through these assessments, allowing us to begin reducing flood risk during ED3 while delivering benefits under both current and future climate conditions. In addition, the provision of flood barriers will improve preparedness and help mitigate the impacts of flooding at vulnerable sites at relatively low cost, while offering significant value should flooding events become more frequent or severe. We are confident that these measures are deliverable, as they build on the flood resilience activities successfully delivered through our ED2 business-as-usual programme and can be supported through established supply chain relationships.	Our climate driven flood mitigation proposals focus on expanding our ED2 flood resilience work to incorporate flood risk assessment of additional network assets as well as reactively protecting assets in advance of flood warnings; therefore, we do not envisage that the proposals will inadvertently increase asset/network vulnerability to other climate hazards.	The methodology applied through ED2 ETR138 flood mitigation has successfully delivered a phased approach to improving flood resilience at grid and primary substations. Extending this proven, risk-based approach to additional network assets, including embedded generation stations, represents a proportionate response to a principal climate risk and provides value under uncertainty, given the increasing frequency and projected escalation of flooding events. Our proposals include funding for priority remedial works at embedded generation sites, enabling the implementation of proven resilience measures during ED3 while informing the development of more complex interventions for ED4. In addition, investment in additional mobile flood barriers will enhance our ability to reactively protect vulnerable assets during flood events, delivering a cost-effective and flexible resilience measure that offers benefits under both current and future climate conditions.

Portfolio area	Proposal	Confidence Assessment	Consequence Assessment	Proportionality Assessment
Vegetation resilience	Vegetation growth, resilience and condition modelling to improve targeting of vegetation activity under changing climate conditions.	Future climate projections identify vegetation-related impacts, including changes in growing seasons and the increasing prevalence of pests and diseases, as a medium climate risk. Combined with operational evidence demonstrating these trends are already affecting our network, this confirms a long-term need for investment in ED3. We consider the proposed measures to be low regret, as they focus on enhancing our understanding of emerging vegetation risks through targeted, relatively low-cost activities that will strengthen decision-making, improve the effectiveness of vegetation management practices, and support more informed future investment decisions. We are confident that these measures are deliverable as they build on the vegetation management modelling activities delivered during ED2 and can be supported through established supply chain relationships.	Our climate driven vegetation management proposals focus on enhancing our knowledge and understanding of the impacts of climate change on our vegetation management practices; therefore, we do not envisage that the proposals will inadvertently increase asset/network vulnerability to other climate hazards.	Our proposal represents a proportionate response to the threat of overhead lines being impacted by interference from vegetation due to increased windstorms, prolonged growing season and spread of pests and diseases as it is relatively low cost and may represent immediate value as we are already experiencing changes as a result of climate change; therefore, this approach provides value under uncertainty and will support better investment decisions over time.
Storm hardening	Targeted overhead-line rebuild using BLL and limited-contact spacers in selected high-risk areas.	Future climate projections identify severe weather impacts on overhead line networks as a high risk across all scenarios and timeframes; stress testing confirms that targeted overhead line hardening should be prioritised. Our exposure assessment also identified medium to high risk levels across all operational regions, demonstrating a clear long-term need for investment in ED3. These proposals are low regret as they utilise proven technologies that already deliver resilience benefits under current conditions. The approach is also flexible, enabling targeted deployment in the most vulnerable areas and adaption over time as new evidence and climate risk information become available. We are confident that these measures are deliverable, as they utilise proven technologies successfully deployed through established delivery programmes in ED2.	Our OHL rebuild proposals utilise a proven technology that is already in use; therefore, we are confident that they do not inadvertently increase asset/network vulnerability to other climate hazards.	Our proposals demonstrate a proportional response to high impact wind events causing overhead line failures and widespread outages as they use a proven technology that is currently delivering value in reducing the number of faults caused by windblown debris impacting OHL. This technology is used extensively in our SEPD area; therefore, to ensure proportionality we have focused our proposal in our SHEPD licence area where the technology is used less extensively and have focused on vulnerable circuits to ensure it provides value under uncertainty.

Portfolio area	Proposal	Confidence Assessment	Consequence Assessment	Proportionality Assessment
SHEPD undergrounding	Underground selected overhead lines in wind-impacted areas of SHEPD.	Future climate projections identify severe weather impacts on overhead line networks as a high risk across all scenarios and timeframes, with stress testing confirming the need to prioritise targeted network hardening. Exposure assessments also indicate medium to high levels of risk across all operational regions, demonstrating a clear long-term need for investment in ED3. We consider these proposals to be low regret as they build on established business-as-usual practices that already deliver value under current conditions, including resilience improvements and enhanced visual amenity. Extending this approach to vulnerable overhead line circuits will further reduce exposure to future climate risks, while its flexible and scalable nature allows deployment priorities to be adapted as new evidence and climate risk information emerge. We are confident that these measures are deliverable, as undergrounding has been successfully deployed during multiple previous price controls and can be implemented through the continuation of established delivery programmes.	Our SHEPD undergrounding proposals utilise a proven approach that is already in use in BAU therefore we are confident that they do not inadvertently increase asset/network vulnerability to other climate hazards. We are proposing to deploy this approach in SHEPD where the impact of wind is more acute than increased ground temperatures.	Our proposals demonstrate a proportional response to high impact wind events causing overhead line failures and widespread outages as it is a proven approach that is currently delivering value in reducing the number of faults caused by wind events causing OHL failures. We are already seeing impacts from increasing wind events therefore this proposal provides value under uncertainty.
Heat resilience intelligence	Environmental monitoring at major substations to understand internal and external heat conditions and inform future interventions.	Network stress testing indicates that heat resilience investment should be prioritised and front-loaded in SEPD, while a more measured approach may be appropriate in SHEPD, although further assessment of temperature differentials is warranted. This confirms a long-term need for investment in ED3 to improve our understanding of heat-related risks and inform future resilience interventions. We consider these proposals to be low regret, as operational experience already demonstrates that temperature extremes within substation buildings can affect the performance and longevity of transformers, switchgear, earthing systems and associated components. The	Our climate driven monitoring & technology proposals focus on enhancing our knowledge and understanding of the impacts of extreme heat on our substations therefore we do not envisage that the proposals will inadvertently increase asset/network vulnerability to other climate hazards.	Our proposal represents a proportionate response to the threat of temperature extremes in substation buildings affecting performance of transformers, switchgear and network earthing systems. It is relatively low cost and may represent immediate value as we are already experiencing increased temperatures as a result of climate change therefore this approach provides value under uncertainty and will support better investment decisions over time.

Portfolio area	Proposal	Confidence Assessment	Consequence Assessment	Proportionality Assessment
		proposed relatively low-cost investigations and monitoring activities will strengthen our understanding of these impacts, enhance decision-making, and support the development of targeted, evidence-based heat resilience investments over time. We are confident that this measure is deliverable. Our environmental monitoring solution is supported by framework contracts which extend to the end of ED3, with wireless sensor technology allowing high-speed installation. The experience we are currently gaining in deployment during ED2 gives us confidence we will be able to maintain these installations at the same rate going forward.		
Place-based landslip resilience	[redacted]	Future climate projections identify increased rainfall and associated landslip risk as a significant resilience challenge, with exposure particularly high on the Isle of Wight. This confirms a clear long-term need for investment in ED3 to improve our understanding of landslip vulnerabilities and enhance network resilience. The proposed measures are low regret, as landslip risk assessments represent a relatively low-cost means of identifying vulnerabilities and strengthening future investment and decision-making processes. In addition, funding for priority remedial works will enable resilience improvements to be implemented during ED3, delivering benefits under current conditions while reducing the potential impact of more frequent and severe landslip events associated with future increases in rainfall. We are confident that these measures are deliverable, as they can be supported through established supply chain relationships.	Our climate driven landslide mitigation proposals focus on generating information, learning and evidence that supports better future investment decisions therefore we do not envisage that the proposals will inadvertently increase asset/network vulnerability to other climate hazards.	Undertaking landslip risk assessments at known vulnerable locations represents a proportionate response to the increasing risk of landslips driven by higher rainfall levels. As landslip events are already being experienced at these sites and precipitation is projected to increase under a range of climate scenarios, these assessments will improve our understanding of vulnerabilities and support targeted resilience planning. Funding for priority remedial works identified through the assessments will enable resilience improvements to be delivered during ED3, reducing current risks while informing the design of more complex interventions for ED4. This phased approach provides value under uncertainty by delivering near-term resilience benefits while maintaining flexibility as future evidence and requirements emerge.

Portfolio area	Proposal	Confidence Assessment	Consequence Assessment	Proportionality Assessment
Restoration resilience	LV pillars and expanded storm-response equipment to reduce restoration time during severe weather.	Future climate projections identify severe weather impacts as a high risk across all scenarios and timeframes, with exposure assessments indicating consistently high levels of risk across all operational regions. This confirms a clear long-term need for investment in ED3. We consider these proposals to be low regret as they build on proven technologies and operational practices that already deliver value under current conditions while enhancing resilience to future climate risks through deployment in vulnerable areas. The proposals are also flexible, allowing implementation to be adapted as new evidence emerges. In addition, investment in storm response equipment will improve preparedness and help reduce fault restoration times during severe weather events, providing immediate operational benefits while delivering significant value should storm frequency and intensity increase in the future. We are confident that these measures are deliverable, as they utilise proven technologies and equipment that have been successfully deployed during ED2 and can be implemented through the continuation of established delivery programmes and supply chain relationships.	Our proposals to improve restoration times utilise proven technology that is already in use therefore we are confident that they do not inadvertently increase asset/network vulnerability to other climate hazards.	Our proposals to improve restoration times to faults caused by high impact storm events threatening substations, overhead and underground infrastructure represent a proportionate response to this climate risk as they utilise proven technology that is currently delivering value in reducing the number of customers impacted by faults. We are already seeing increased issues in accessing the network in storm situations due to bespoke equipment being required therefore this proposal provides value under uncertainty.
Workforce welfare	Welfare provision to support colleagues responding to severe weather events.	Future climate projections identify severe weather as a high risk across all scenarios and timeframes, with exposure assessments indicating consistently high levels of risk across most of our operational regions. This confirms a clear long-term need for investment in ED3. We consider these proposals to be low regret, as increasing storm frequency is already affecting workforce welfare and has the potential to impact the efficiency and effectiveness of our response to severe weather events. The proposed measures will enhance preparedness, support the safety and	Our proposals seek to improve welfare provisions for our workforce to assist with responding to severe weather events therefore we do not envisage that the proposals will inadvertently increase asset/network vulnerability to other climate hazards.	Our proposals to improve welfare provisions for our workforce to use when responding to widespread outages caused by high impact storm events represent a proportionate response to this climate risk because we are already seeing an increase in the frequency of storm events therefore it is important that our resilience proposals mitigate risks to our workforce as well as the network.

Portfolio area	Proposal	Confidence Assessment	Consequence Assessment	Proportionality Assessment
		resilience of our workforce, and deliver benefits under current conditions while providing significant additional value should future climate impacts intensify. We are confident that these measures are deliverable as they utilise equipment used during ED2. The substation welfare measures involve upgrading existing welfare facilities or installing new facilities at existing substations, with delivery phased through realistic programmes to ensure efficient implementation		
Climate modelling	Climate modelling and forecasting tools to improve regional hazard mapping, evidence interpretation and investment decisions.	Future climate conditions confirm that our climate will change and that these impacts will be varied across our operational regions with some impacts felt more acutely in some areas compared to others. This is particularly relevant to SSEN as our licence areas are at opposite ends of the country. We determine this proposal to be low regret because our operational experience demonstrates that we are already seeing the effects of climate change impacting on the resilience of our network. Our proposals include relatively low-cost measures which will enhance our knowledge of these impacts and provide us with information to strengthen our decision-making processes and support better management investment decisions over time. We are confident that this measure is deliverable as there are several modelling software options available in the marketplace and we will assess these and determine the option that works best for our business in cooperation with SSE Group.	Our climate modelling proposals focus on enhancing our knowledge and understanding of the impacts of climate change on our network therefore we do not envisage that the proposals will inadvertently increase asset/network vulnerability to other climate hazards.	Our proposal represents a proportionate response to the threat of climate change impacts on our network. It is relatively low cost and may represent immediate value as we are already experiencing climate change impacts therefore this approach provides value under uncertainty and will support better investment decisions over time.

Portfolio area	Proposal	Confidence Assessment	Consequence Assessment	Proportionality Assessment
Interdependencies	Collaborative work pot for tactical resilience action with other critical infrastructure operators.	Future climate projections confirm that climate impacts will vary across our operational regions, with some hazards affecting areas more severely than others. This is particularly relevant to SSEN given the geographic diversity of our licence areas. Effective adaptation therefore requires a whole-system approach that considers interdependencies and is developed in collaboration with other critical infrastructure operators. We consider this proposal to be low regret, as it requires relatively modest upfront investment while offering significant long-term benefits through improved coordination, enhanced understanding of cross-sector vulnerabilities, and more resilient adaptation planning. We are confident that this measure is deliverable as we have developed strong relationships with other infrastructure operators through climate resilience forums and have already started the processes of commissioning an interdependencies project during ED2 and will continue to build on this approach to ensure we can achieve the desired outcomes.	Interdependencies work will be undertaken in collaboration with other infrastructure operators via established resilience forums and any work will be carefully considered before progressing therefore we do not envisage that the proposals will inadvertently increase asset/network vulnerability to other climate hazards.	Our proposal represents a proportionate response to the threat of climate change impacts on our network. It is relatively low cost and may represent immediate value as we are already experiencing cascading risks caused by climate change impacts that have highlighted vulnerabilities across the whole system. This approach provides value under uncertainty and will support better investment decisions over time.
Internal capability	Dedicated resource to coordinate adaptation action, develop climate modelling capability and embed decision processes.	Future climate conditions confirm that our climate will change and that these impacts will be varied across our operational regions with some impacts felt more acutely in some areas compared to others. To ensure that we can coordinate adaptation action and support use of enhanced climate modelling & forecasting tools our proposals include funding internal resources to build capability to achieve this.	Our proposals focus on human resources therefore we do not envisage that the proposals will inadvertently increase asset/network vulnerability to other climate hazards.	Our proposal represents a proportionate response to ensure the effective coordination of our strategic aims. They are relatively low cost and may represent immediate value as we continue to build capability in this area. This approach provides value under uncertainty and will support better investment decisions over time.

3.5 STRATEGIC COMMITMENTS

We've translated our strategic choices discussed in ***Section 1.2*** into a focused set of ED3 strategic pillars and have developed commitments, targets and investment proposals under each pillar to ensure we can deliver our long-term climate resilience ambition. These are presented in Table 3.5 below alongside the benefits for consumers.

Figure 3.3. Our ED3 strategic pillars



Strategic pillar 1, **Continuity, transparency & capability** and 2, **Effective stress testing, measurement and forecasting** establish the governance, capability, data and evidence needed to manage climate risks proactively and consistently across our network. Strategic pillar 3, **Improved resilience through adaptation**, addresses how to manage uncertainty and interdependent risks. Whilst strategic pillar 4, **Improved asset resilience and design standards** and 5, **preparedness, planning & emergency response** focus on translating climate resilience intelligence into practical actions that strengthen the network and improve our ability to respond to severe weather events. Collectively, our commitments support the delivery of the ED3 consumer outcome of resilient networks, ensuring the network remains reliable and resilient in the face of future challenges.

Table 3.5. Our ED3 outputs, targets and benefits for consumers

Strategic Pillar 1: Continuity, Transparency & Capability			
Output	**Target**	**Consumer benefit**	**Investments/Cost included in our baseline plan**
Build climate resilience into the way we plan, manage and operate our network so that it remains resilient to the projected 2080 climate conditions across both licence areas. This will help us maintain a safe and dependable service for customers by reducing the risk of outages and sustaining network performance as extreme weather becomes more frequent and severe.	• Maintain ISO 14001 certification during ED3. • Transition to ISO14001:2026 by April 2029. • Produce CRS update annually during ED3. • Fulfil annual TCFD and IFRS reporting requirements. • Fulfil ARP5 reporting requirements by the end of Y1 of ED3.	• Ensures we manage our climate risks consistently and responsibly, reduce risks and inefficiencies, and deliver long-term value to our customers • Ensures credible and transparent reporting	[redacted]
Establish and report a robust set of climate resilience metrics and indicators that can improve our performance for customers, developed in line with Ofgem's latest Climate Resilience Metrics and Indicators (CRMI) framework, in order to systematically track our progress in adapting to climate risks and to demonstrate transparency, accountability, and alignment with regulatory expectations.	• Embed finalised Ofgem Climate Resilience Metrics and Indicators into our EMS and use to improve our performance for customers.	• Ensures credible and transparent reporting. • Reduced risk of power interruptions and customer disruptions by using resilience metrics to prioritise investment where climate-related risks are greatest.	

Build capability and capacity to continually improve our climate resilience strategy and network and organisational resilience.	• All operational and engineering teams trained in climate-risk awareness and adaptive planning by Y2 of ED3. • Develop and embed climate-resilience competencies into engineering standards, design reviews and investment planning processes by end of Y2 of ED3. • Secure internal resource to assist with delivering climate resilience work by end of Y2 of ED3.	• Improved network reliability through a workforce that is better equipped to identify, assess and respond to climate-related risks before they impact customers.	
Strategic Pillar 2: Effective Stress Testing, Measurement and Forecasting			
Output	**Target**	**Consumer benefit**	**Investments/Cost included in our baseline plan**
Deliver effective, evidence-based climate risk assessment across our network by integrating weather scenarios, timelines and RCPs into a climate-modelling and stress-testing tool that quantifies exposure, vulnerability and performance impacts of our network by Year 3 of ED3.	• Develop Climate Resilience Modelling Tool which reference the CMIP6 ensemble and Global Warming Level data sets to explore thresholds or tipping points by Year 3 ED3. • 100% of SHE Critical and Priority asset classes (transformers, switchgear, cables, poles/structures, substations) included in climate-risk modelling by Year 2 of ED3. • Full integration of RCP4.5 and RCP8.5 scenarios into network stress testing by end of Y3 of ED3. • High-resolution weather hazard layers (wind, flood, heat, lightning, drought) mapped across 100% of licence area by end of Y3 of ED3. • Addition of environmental monitoring to all major substations to monitor climate conditions and determine future climate resilience investments by Y3 of ED3.	• Improved network reliability through a stronger understanding of how climate hazards could affect network assets and performance, enabling proactive action before customers experience disruptions. • Enhanced long-term affordability by supporting anticipatory investment where justified, reducing the need for more costly emergency repairs, asset replacements and reactive interventions in the future.	[redacted]
Strategic Pillar 3: Improved Resilience through Adaptation			
Output	**Target**	**Consumer benefit**	**Investments/Cost included in our baseline plan**
Establish an adaptation-planning framework that links climate-hazard projections to asset failure modes, condition data and criticality, enabling us to prioritise interventions that reduce climate-related risk by Year 1 of ED3 supporting improved network performance for customers as climate risks evolve.	• Develop adaptation pathways for all asset classes, integrating climate thresholds into asset strategies and ensure resilience measures evolve as climate projections and network conditions change by Y1 of ED3. • Review, maintain and continually improve adaptation commitments/pathways ensuring alignment with industry best practice reflecting evolution of climate risks as identified in our vulnerability stress testing throughout ED3. • Work collaboratively with Ofgem and other DNOs to further enhance the stress testing methodology and deploy into operational processes by the end of ED3.	• Supports more targeted and efficient investment decisions, ensuring customer funding is directed towards the assets and locations where resilience improvements deliver the greatest reduction in climate-related risk. • Improves network reliability by enabling earlier identification and prioritisation of climate-related risks, reducing the likelihood of weather-driven faults and interruptions before they affect customers.	[redacted]
Commit to a whole-system network resilience approach by collaborating across sectors and relevant forums including CRIS, IOAF, ENA CCRWG to	• Complete a Whole System Resilience interdependency map covering electricity, gas, water, telecoms, transport and local resilience partners by Y1 of ED3.	• Improves the resilience of electricity supplies by identifying and addressing	

identify interdependencies, manage cascading risks, to strengthen resilience for customers and communities.	• Identify the top 10 cross-sector interdependency hotspots (e.g., substations dependent on telecoms, flood-linked transport corridors) by the end of Y3 of ED3. • Co-develop shared adaptation pathways for at least three critical interdependent sites (e.g., substations reliant on telecoms, transport or water infrastructure) and or joint research activity by the end of Y4 of ED3. • Develop cascading-risk pathways for at least four major hazard types (flooding, heat, wind, drought, compounding asset failure) by the end of Y2 of ED3. • Establish a SSEN Climate Resilience Centre of Excellence working group to oversee modelling, metrics and adaptation by the end of Y1 of ED3. • Take learning from academic partnerships & integrate cross-sector interdependency insights into SSEN climate risk assessments throughout ED3.	dependencies between energy, telecommunications, transport, water and other critical infrastructure, reducing the likelihood of widespread service disruption during extreme weather events. • Enables more effective resilience planning and investment by developing a whole-system understanding of climate risks, ensuring customer-funded investments target areas that deliver the greatest overall resilience benefit.	
Strategic Pillar 4: Improved Asset resilience and design standards			
Output	**Target**	**Consumer benefit**	**Investments/Cost included in our baseline plan**
Embed real-life operational learning from storms, faults and field conditions into our asset strategies, design standards and resilience planning to better prioritise risks and target interventions.	• Maintain our Regional Climate Plans for every operational region throughout ED3, to reflect new operational learnings, updated climate projections and emerging risks. • Integrate operational learning into quarterly resilience reviews at regional and system levels throughout ED3.	• Improved network reliability by ensuring lessons from storms, faults and operational events are systematically incorporated into asset strategies and resilience planning, reducing the likelihood of repeat failures.	[redacted]
Ensure our asset specifications and design standards embed climate-hazard thresholds, emerging technologies and adaptive engineering principles. To ensure both existing and new assets are resilient to evolving climate risks and future operating conditions.	• Complete a full review and update all relevant asset specifications and design standards to incorporate climate-hazard thresholds, as set by adaptation pathways by Y2 of ED3. • Embed future climate scenarios (RCP4.5 and RCP8.5 for 2050 and 2100) into 100% of revised design standards by Yr 1-ED3. • Publish annual reporting on progress against climate-resilient design standards and asset-resilience improvements throughout ED3. • Develop methodology to link climate-risk thresholds to investment prioritisation for both existing and new assets by end of ED3 in time for ED4 planning.	• Improved network reliability by ensuring new and existing assets are designed and managed to withstand future climate conditions, reducing the likelihood of climate-related failures and customer interruptions.	
Strengthen flood resilience of our assets across our network and improve operational preparedness	• Assess all substations against ETR138 using climate-adjusted flood-risk data and deliver targeted resilience measures at all 27 high-risk sites by the end of ED3.	• Reduce exposure to flood-related asset damage, outages and prolonged restoration associated with flooding across a	

	• Ensure all new and replacement substations meet flood-resilience standards by Y1 ED3. • Integrate flood-risk scoring into 100% of asset strategy documents by mid-ED3. • Achieve a material reduction in flood-related failure modes, evidenced through event reporting and asset performance data by the end of Y3 of ED3. • Publish an annual flood-resilience progress report demonstrating compliance with ETR138 and delivery of climate-aligned improvements throughout ED3. • Procure 2 additional portable flood barrier sets with deployment training for operational staff by the end of Y3 of ED3. • Undertake 20 flood risk assessments for high-risk network assets by the end of ED3 to determine future resilience investment. • Undertake flood risk assessments for 8 embedded generation sites by the end of Y3 of ED3 and implement mitigation by the end of ED3.	wider part of the network. • Supports more targeted and efficient investment by using climate-adjusted flood risk assessments to identify the highest-risk locations.	
Implement a programme of targeted interventions that directly address climate-related risks identified through modelling, stress testing and exposure and vulnerability assessments, ensuring investment is focused where it delivers the greatest resilience benefit for customers and reduces the likelihood and impact of climate-driven failures.	• Deliver targeted interventions for 100% of high-priority issues as identified in regional plans by end of ED3, with clear evidence of risk reduction. • Rebuild 303km of OHL to incorporate BLL to improve network resilience by the end of ED3 • Implement 400 number of contact spacers in OHL in high risk areas for wind to improve network resilience by the end of ED3 • Undertake landslide mitigation assessments at 3 high risk locations on the Isle of Wight by end of Y1 of ED3 and implement initial mitigation works by the end of ED3. • Underground 39.5 km of OHL in SHEPD in wind imacted areas to improve network resilience by the end of ED3. • Accelerate the replacement of 280km of Consac cable in clay soil areas to reduce faults caused by increased rainfall, ground movement and climate-related asset deterioration by the end of ED3.	• Reduces the likelihood of climate-related power outages by proactively strengthening network assets exposed to increasing wind and severe weather risks. • Delivers better value for money by prioritising investments where they achieve the greatest reduction in customer risk and network disruption • Strengthens network resilience at locations where climate risks are already materialising, delivering tangible reductions in customer risk. • Delivers proactive investment now to avoid more disruptive and costly emergency interventions in the future.	
Strategic Pillar 5: Preparedness, Planning & Emergency Response			
Output	**Target**	**Consumer benefit**	**Investments/Cost included in our baseline plan**
Maintain a resilient and reliable network by understanding and then strengthening our preparedness, planning and	• Develop a Storm Readiness Index (SRI) a composite metric that tracks how prepared the network is before a major weather event. To be used	• Improved fault restoration performance by ensuring network	[redacted]

emergency response capabilities	on operational dashboards by the end of Y2 of ED3 and publish performance annually. • Achieve a 5% reduction in weather-related interruption minutes (CMLs) by end of ED3 through targeted, model-informed interventions. • Provide proactive communications to customers in advance of severe weather events, with 100% coverage for high-risk areas by the end of Y3 of ED3. • Develop community-level resilience plans for the most climate-vulnerable locations identified through modelling by the end of Y3 of ED3. • Ensure Priority Services Register (PSR) customers receive enhanced support during climate-related events, with 100% attempted contact success for those in affected zones by the end of Y3 of ED3. With clear escalation routes for when contact cannot be made. • Publish climate-risk and resilience updates to enable whole system planning throughout ED3.	operators have better visibility of network vulnerabilities and preparedness levels before storms and other climate-related events occur.	
Enhanced our resilience to vegetation-related climate risks	• Undertake vegetation growth, resilience and condition modelling to improve targeting of vegetation management activity under changing climate conditions by the end of Y4 of ED3.	• Improved network reliability by enhancing our understanding of how changing climate conditions influence vegetation growth, reducing the risk of weather and vegetation-related power interruptions.	
Climate Resilience Investment to Improve Restoration Times	• Install 200 pillars on our LV network to assist with reducing fault restoration times by the end of ED3. • Ensure all operational teams have access to sufficient specialist equipment to assist with reducing fault restoration times by the end of Y1 of ED3. • Ensure 100% of emergency response plans incorporate climate-related scenarios and updated hazard thresholds by the end of Y3 of ED3.	• Minimised customer disruption during outages by allowing operational teams to restore supplies to larger numbers of customers more quickly and efficiently.	
Workforce and customer welfare provision to assist with business response to severe weather events	• Implement enhanced customer welfare storm support covering welfare provisions, reimbursement and resilience hubs by the end of ED3. • Implement enhanced workforce welfare storm support covering welfare vans and enhanced substation welfare facilities for staff responding to severe weather events in remote locations by the end of ED3.	• Strengthens confidence that both customer welfare needs and operational response capabilities are being enhanced to address increasing climate and severe weather risks.	

Together, these interventions provide a targeted and proportionate response to the climate risks identified across our network and organisation, while establishing the foundations for the longer-term adaptation journey described in ***Section 4***.

4. LONG-TERM LINKAGES

4.1 CLIMATE RESILIENCE AS BUSINESS-AS-USUAL

In order to maintain today's level of network resilience under 2080 climate conditions it is imperative that we take action to adapt our network and business activities to mitigate against the impacts of climate change. This will take place across multiple price control periods therefore it is important that our climate resilience strategy is integrated with our long-term planning activities. We will use this strategy to inform asset lifecycle decisions, design standards, regional development plans, load-related planning, operational resilience, customer support and whole-system infrastructure planning with the purpose of translating strategic direction into location specific and time sequenced portfolios to ensure that investment timing is efficient, avoids stranded assets and supports coherent system development.

The purpose is to translate strategic direction into location-specific and time-sequenced decisions, so that investment timing is efficient, future options are preserved and assets are not locked into designs that become unsuitable under later climate conditions. Table 4.1 summarises the main planning interfaces between our CRS and the wider business plan. Each interface will receive climate-risk inputs and provide decisions, constraints or opportunities back into the adaptation pathways.

Table 4.1. Climate Resilience Strategy Business Plan Interfaces

ED3 Business Plan Document	Responsible Team	Climate Resilience Interfaces	Key Risks	Mitigation
(ED3-S14) ED3 Environmental Action Plan (EAP)	Strategic Planning & Sustainability	Climate mitigation vs adaptation and support of nature-based and low-carbon resilience options.	Climate resilience is not sufficiently considered in decision-making, potentially limiting the adoption of nature-based and low-carbon resilience solutions.	The EAP and CR Strategy are both managed by the Strategic Planning & Sustainability Team, enabling efficient collaboration and alignment across programmes.
(ED3-S12) ED3 Network Asset Management Strategy (NAMS)	Strategic Planning & Sustainability	Ensures climate resilience is considered in asset health, standards and lifecycle decisions	Climate resilience is not adequately considered in asset health strategies, engineering standards, and asset lifecycle decisions, increasing the risk of network vulnerability to future climate impacts.	The NAMS and CR Strategy are both managed by the Strategic Planning & Sustainability Team, enabling efficient collaboration and alignment across programmes.
(ED3-S06) ED3 Vulnerability Strategy	Customer Vulnerability and Communities	Ensures measures are implemented for vulnerable customers who are disproportionally affected by climate change impacts.	Vulnerability arrangements do not sufficiently consider future climate change risks, increasing the likelihood of adverse impacts on customer service levels.	Establish SSEN Climate Resilience Centre of Excellence working group to facilitate collaboration between teams.
(ED3-S04) ED3 Reliability Strategy	Strategic Planning & Sustainability	Ensures measures are implemented to allow for adequate preparation and recovery from severe weather.	Reliability arrangements do not sufficiently consider future climate change risks, increasing the likelihood of adverse impacts on preparation and recovery from severe weather.	The Reliability and CR Strategies are both managed by the Strategic Planning & Sustainability Team, enabling efficient collaboration and alignment across programmes.
(ED3-S05) ED3 Delivery Strategy	Delivery Team	Ensures a credible strategy is in place for ED3 delivery including workforce and supply chain required to delivery climate resilience commitments.	Inadequate workforce and supply chain planning could result in insufficient resources, delivery delays and reduced confidence in our ability to implement climate resilience investments efficiently and effectively.	Establish SSEN Climate Resilience Centre of Excellence working group to facilitate collaboration between teams.
(ED3-S10) ED3 DSO Strategy	Future Networks	Ensures there is network flexibility for constraints caused by severe weather events.	Network flexibility may be insufficient to manage constraints arising from severe weather events.	Establish SSEN Climate Resilience Centre of Excellence working group to facilitate collaboration between teams.

(ED3-O05) ED3 Stakeholder Engagement & Decision Log	Stakeholder Engagement	Ensures stakeholder challenge shapes our strategic approach	Climate resilience strategic approach may not being sufficiently informed by stakeholder challenge and external perspectives.	Establish SSEN Climate Resilience Centre of Excellence working group to facilitate collaboration between teams and undertake regular stakeholder engagement and challenge processes to ensure the climate resilience strategy remains robust, evidence-based, and aligned with stakeholder expectations.
(ED3-F02) ED3 Cost Assessment & Benchmarking Approach	Finance	Ensures climate resilience investments are assessed individually, non-benchmarked	ED3 climate resilience investments are not developed in accordance with business plan guidance and risk rejection resulting in insufficient funds to improve network resilience.	Ensure climate resilience investments are developed in accordance with ED3 Business Plan Guidance.
(ED3-S02) ED3 Long-term Integrated Network Plan (LINP)	Future Networks	Provides a regional and time-sequenced network development view on how we will work towards building a progressively climate adapted network	Lack of regional and time-sequenced adaptation pathway may lead to inefficient investment decisions and slower progress towards a climate-adapted network.	Establish SSEN Climate Resilience Centre of Excellence working group to facilitate collaboration between teams.

The (ED3-S02) ED3 Long-term Integrated Network Plan (LINP) and relevant network development plans provide the route for converting the climate-resilience strategy into location-specific and time-sequenced investment choices progressively building towards a climate adapted network using evolving climate data, resilience standards and targeted interventions as risks continue to emerge. Our established Regional Climate Ready Plans will continue to identify local climate hazards, exposed assets, vulnerable customer groups and interdependencies. The LINP will then test how those risks interact with future demand, reinforcement needs, asset replacement opportunities and whole-system constraints. This means climate resilience can be considered at the same time as load growth, net-zero enablement and asset renewal, reducing the risk of inefficient timing or stranded investment.

4.2 WHOLE SYSTEM CLIMATE RESILIENCE AND NET ZERO

The transition to net-zero will increase the electrification of society which in turn increase dependence on the electricity distribution network, making resilience more important to the success of decarbonisation. Climate resilience and net-zero delivery must be co-optimised with resilience choices avoiding unnecessary carbon impacts and should consider nature-based, digital or operational alternatives where they can deliver equivalent customer and system benefits.

Whole-system interdependencies are also critical, underestimating these will affect both our own and our stakeholders resilience. Storm Éowyn highlighted that restoration can be constrained by telecommunications, transport, access and other critical infrastructure. We will therefore treat interdependency planning as part of the long-term pathway, not as a standalone ED3 activity. Our proposals recognise the importance of cross-sector interdependencies that support network operation, emergency response and restoration during severe weather events. Through our proposed Interdependencies Fund, we will strengthen engagement with partner organisations, improve our understanding of shared vulnerabilities and dependencies, and support the development of coordinated, whole-system approaches to climate resilience and risk management. Further detail on the proposed interdependencies fund and how it will provide a continuous, adaptive long-term resilience pathway rather than a discrete ED3 package is outlined in the supporting EJP – (CR_8) SSEN_ED3_CR_MEDMATERIALITYINVESTMENTS.

As well as building resilience against the impacts of climate change which are already impacting our network and our service to customers it's imperative that we continue to drive down business greenhouse gas emissions to meet net zero, and we deliver this in a transparent and credible way through our Science-Based Targets (SBTs) and associated actions detailed in our (ED3-S14) ED3 Environmental Action Plan.

Nature-based Solutions (NbS) complement traditional engineering measures by improving the resilience, reliability and sustainability of electricity networks while addressing climate-related risks. Examples include habitat restoration, floodplain and wetland management, vegetation management, woodland creation and coastal habitat enhancement to reduce risks from flooding, erosion, overheating, high winds and storm surges. Beyond direct asset protection, NbS

can deliver wider ecosystem benefits that support long-term climate resilience. Through our (ED3-S14) ED3 Environmental Action Plan, investments in peatland restoration, woodland creation and seagrass planting will deliver carbon removal alongside resilience benefits, including natural flood management, wind attenuation, temperature regulation and coastal protection. Early investment in these measures will enable benefits to accrue over multiple price control periods, supporting both network resilience and broader environmental objectives. Our Nature4Networks (N4N) innovation project is identifying NbS that can provide direct protection to network assets from climate impacts. We are seeking sufficient flexibility within ED3 to deploy these solutions where innovation trials demonstrate they provide an effective and evidence-based alternative to traditional engineering interventions.

Given the evolving levels of uncertainty surrounding future climate risks, innovation, research, new technologies and partnerships will be crucial to identify, test and deploy the solutions needed to maintain network resilience over the longer term. Innovation has played a central role in developing SSEN Distribution's climate resilience capability. During ED2, innovation projects helped establish new approaches to climate adaptation, weather resilience, vulnerability assessment, environmental stewardship and nature-based solutions, creating capabilities that are now informing operational and investment decisions. During ED3, we will build on this proven track record by continuing to develop, trial and deploy innovative solutions that improve our ability to anticipate, withstand and recover from climate-related impacts. Innovation will therefore remain an important mechanism for strengthening network resilience, reducing long-term costs and ensuring we can continue to deliver a safe, reliable and sustainable service as climate risks evolve. Further detail is provided in the (ED3-S09) ED3 Innovation Strategy. Examples of innovation include:

- LiDAR-enabled vegetation management: during ED2 we increased the use of LiDAR data to improve visibility of vegetation proximity to overhead lines. In ED3 this will remain a core business as usual activity, supporting more targeted tree cutting, better identification of high-risk spans, reduced reliance on broad foot patrols where remote evidence is sufficient, and more efficient planning of compliance and resilience cutting.
- Transition & Exposure Modelling for Planning & Energy Resilience (TEMPER) climate and asset risk modelling is developing data and modelling capability to understand how climate change may alter network failure behaviour, starting with poles and overhead-line conductors.

4.3 ED3 CLIMATE RESILIENCE PROPOSALS AND ALIGNMENT WITH LONG TERM GOAL

Our strategic approach is to be prepared for 2°C of warming by 2050 at a minimum and consider 4°C degrees of warming by 2100 as part of effective adaptation planning. This aligns with Ofgem’s long term resilience goal of maintaining at least current levels of network resilience under future 2080 climate conditions.

Our ED3 proposals focus on targeted interventions that address current and emerging acute climate-related risks, while improving our understanding of future vulnerabilities through enhanced monitoring, modelling and capability development. These investments will establish the evidence base required to support proportionate and risk-based adaptation decisions. Evidence and learning generated throughout ED3 will inform future investment decisions and the evolution of engineering standards, operational practices and resilience strategies throughout ED4 and beyond, ensuring our approach remains adaptive, proportionate and responsive to changing climate risks rather than being a discrete ED3 investment package.

Interventions will be aligned with asset replacement, network reinforcement and low-carbon network development activities wherever practicable, ensuring that assets supporting the energy transition are designed and operated to remain resilient under future climate conditions while delivering value for customers. Section 9 of our (ED3-S02) LINP Strategy provides further information on our proposals to develop an area-based view of ED3 network interventions which helps to translate our strategic direction into location-specific portfolios.

Figure 4.1 sets out our proposed pathway for delivering climate resilience improvements over the ED3 period, through ED4 and into the longer term.

These long-term linkages ensure that climate resilience is embedded within wider network planning and investment decisions, providing a clear pathway to the adaptive decision-making framework set out in ***Section 5***.

Figure 4.1. ED3 Climate Resilience Strategy Proposals Alignment with Long-Term Goal

Climate Resilience Proposals	ED3	ED4 Direction of Travel	2038 Onwards
Enhanced Flood Mitigation	Expand our flood resilience activities to incorporate additional network assets and purchase flood defence equipment.	Monitor the success of the ED3 approach and expand ETR138 BAU flood mitigation approach to incorporate additional network assets, adapting standards as required.	Use climate models to explore extreme tail risks to determine risks and adapt approach as required.
Vegetation Management	Develop understanding of climate change impacts on vegetation management through growth & resilience modelling and condition monitoring.	Expand ED2 BAU vegetation management activities to account for the climate change impacts identified through ED3 modelling & monitoring to ensure management practices are effective & efficient.	Continued use of growth & resilience modelling and condition monitoring to ensure modelling & monitoring to ensure management practices are effective & efficient.
Overhead Line (OHL) Storm Resilience	Rebuild sections of OHL in exposed areas to incorporate BLL, BLX and contact spacers and underground exposed sections of OHL in our SHEPD licence area.	Use climate models to explore extreme tail risks to determine risks and adapt OHL standards as required.	Continue use of climate models to explore extreme tail risks to determine risks and adapt OHL standards as required.
Monitoring & Technology	Addition of environmental monitoring to all major substations to monitor climate conditions and determine future climate resilience investments.	Use monitoring data to inform cooling, ventilation, or design-standard changes.	Use climate models to explore extreme tail risks to determine risks and adapt OHL standards as required.
Isle of Wight Landslide Mitigation	Undertake landslide mitigation assessment at 3 high risk locations and undertake initial remedial works	Use climate models to identify high risk locations across network and undertake mitigation assessments to determine mitigation options and work with interdependent organisations to implement as required.	Use climate models to explore extreme tail risks to determine risks and adapt standards as required.
Restoration Times	Improve switching capability and access to specialist equipment to assist our operations teams to access faults to improve restoration times.	Monitor the success of the measures through climate resilience metrics and indicators and consider other opportunities via Regional Climate Ready Plans.	Use climate models to explore extreme tail risks to determine risks and adapt standards as required.
Welfare Provision	Enhanced welfare provision for workforce responding to severe weather events.	Monitor the success of the measures through climate resilience metrics and indicators and consider other opportunities via Regional Climate Ready Plans.	Use climate models to explore extreme tail risks to determine risks and adapt standards as required.
Climate Modelling	Investigate and implement climate modelling options that will assist with network control and future network configuration and investment.	Model risks through multiple climate models to explore extreme tail risks and adapt standards as required.	Continue to model risks through multiple climate models to explore extreme tail risks and adapt standards as required.
Resource	Develop internal capability to support the delivery of our climate resilience work.	Maintain internal capability to support the delivery of our climate resilience work.	Maintain internal capability to support the delivery of our climate resilience work.
Interdependencies Fund	Fund to enable co-funding of activities directly related to improving storm resilience with interdependent infrastructure operators	Build on knowledge and understanding gleaned from ED3 interdependencies work and continue to explore and deliver opportunities to improve whole system resilience.	Build on knowledge and understanding gleaned from ED3 interdependencies work to continue to improve whole system resilience.

5. ADAPTATION PATHWAYS

5.1 PATHWAYS AS DECISION ARCHITECTURE

Due to the uncertainty of future climate change scenarios it can be difficult to factor potential risks and opportunities to our network and business into decision making for future adaptation purposes. More than one sequence of adaptation actions might need to be considered in response to climate change at different time frames and in different climate change scenarios. Adaptation pathways convert uncertainty into structured decision-making rather than deferring decisions indefinitely.

5.2 SCOPE

In accordance with the requirements of 'BS8631:2021 – Adaptation to Climate Change – Using Adaptation Pathways for Decision Making' we have developed adaptation pathways to show how climate related risks, needs and interventions evolve over time and how our ED3 proposals align with long-term climate resilience objectives.

This section presents our adaptation pathways for the three climate hazards identified as posing the greatest risk to our network:

1. Increased rainfall and rainstorms
2. Sea level rise and tidal surges
3. Increased windstorm frequency and severity

It also sets out our adaptation pathways for lower-risk climate hazards where no specific ED3 investment is proposed, but where ongoing monitoring and risk management will be required throughout ED3 and beyond:

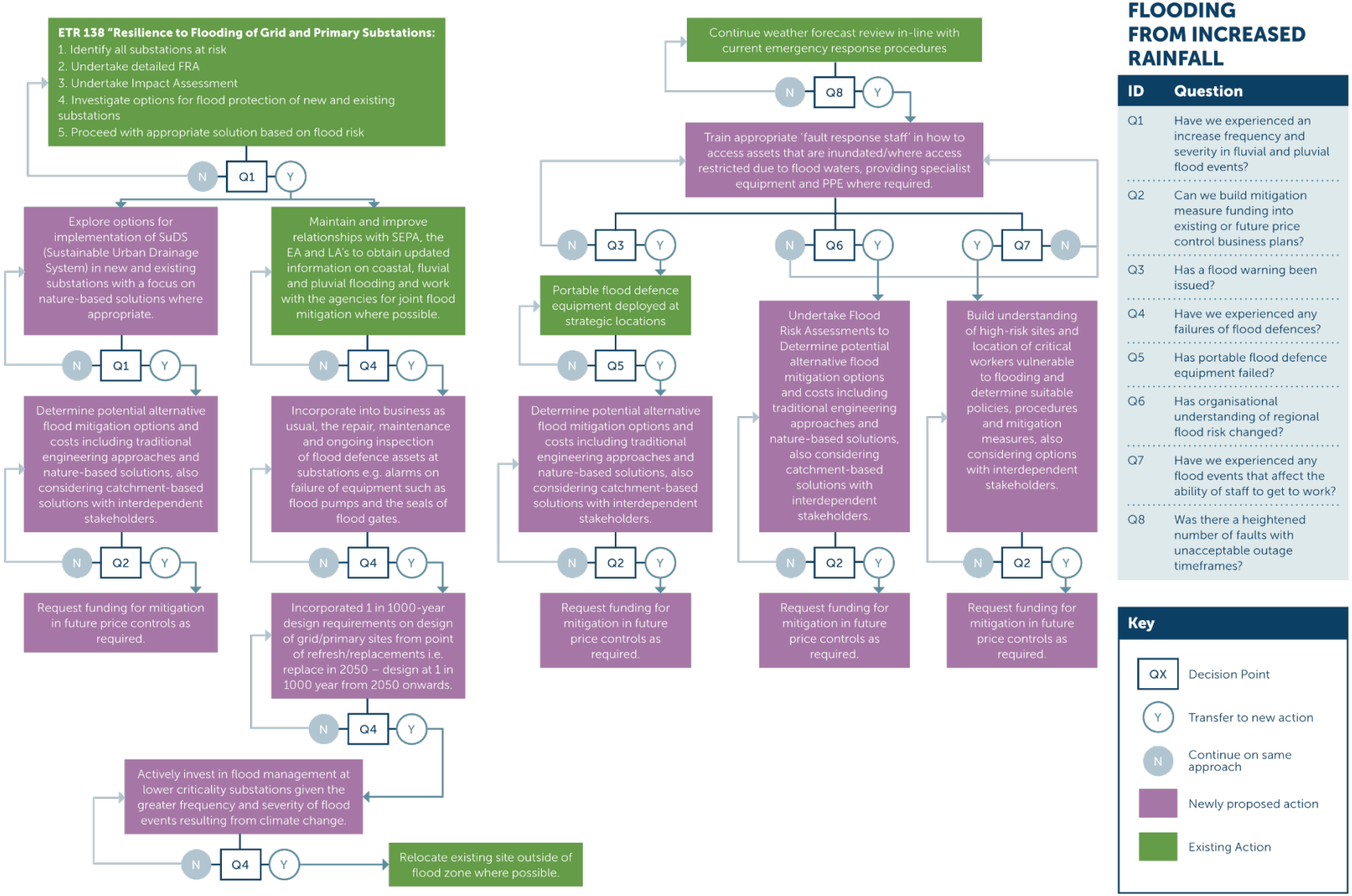
1. Rainfall leading to dam-burst risk
2. Lightning
3. Snow and ice
4. High air and ground temperatures

BS 8631:2021 does not prescribe a specific format for adaptation pathways. We have chosen to present our adaptation pathways as flow diagrams that are response-led, outcome-focused and structured around key decision questions. Each adaptation pathway identifies the tipping points and thresholds at which existing mitigation and adaptation measures may no longer provide an acceptable level of resilience, together with the alternative actions that would be implemented should these thresholds be exceeded. The pathways build on the actions established through our ED2 Climate Resilience Strategy and subsequent Regional Climate Ready Plans, which were developed collaboratively with colleagues across asset management, engineering and operations. Together, these pathways provide a structured framework for monitoring climate risk, adapting to changing conditions, and ensuring that resilience interventions remain proportionate, evidence-based and responsive to evolving climate projections throughout ED3 and beyond.

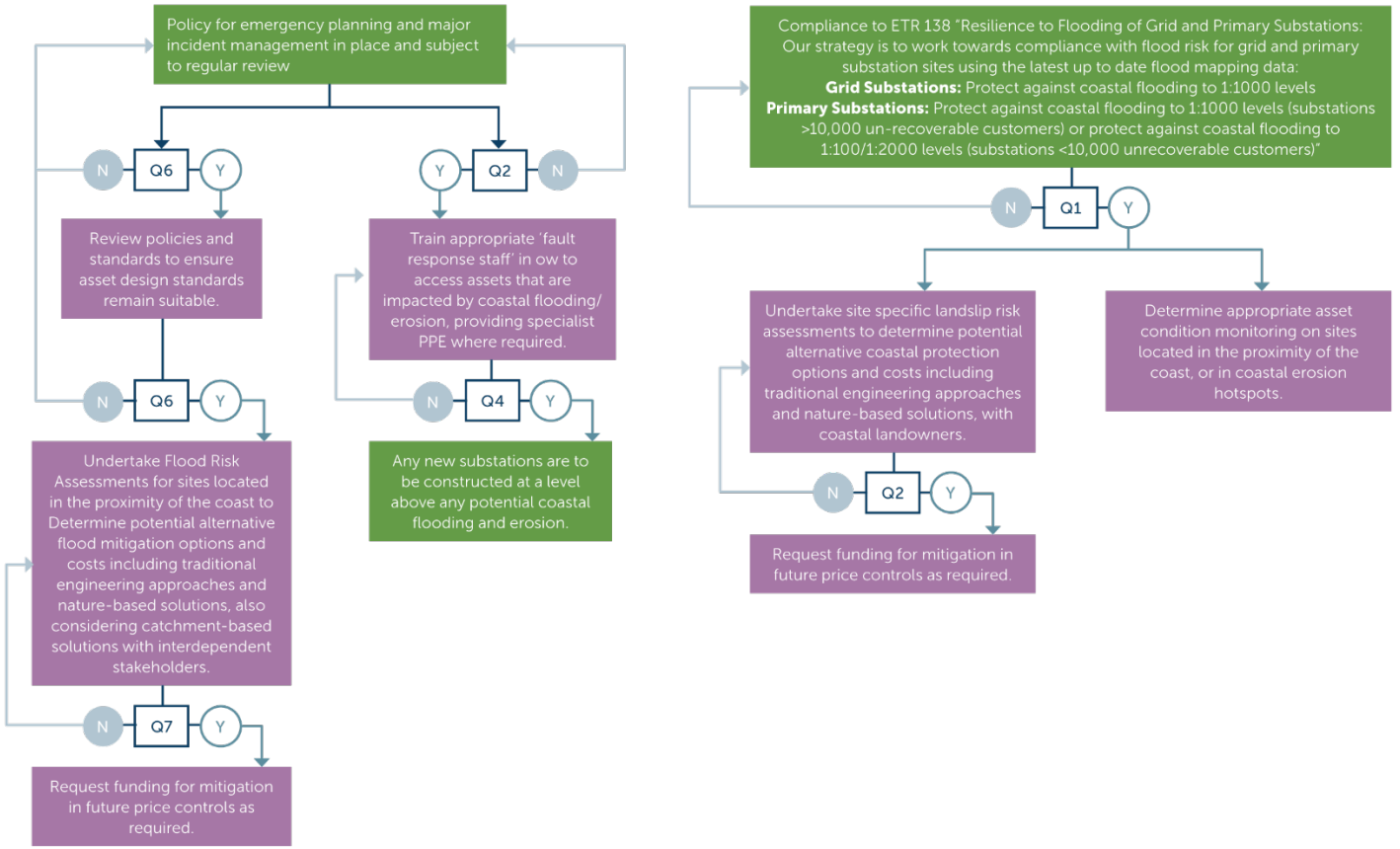
Climate resilience and associated decision-making are embedded within our Environmental Management System (EMS) and are therefore integrated into our policies, plans and procedures. These are subject to regular review to ensure our approach remains aligned with evolving climate risks, emerging evidence, new methodologies and innovative solutions. Our adaptation pathways form part of this wider framework and are designed to be iterative, supporting continuous improvement as new information becomes available and as our climate modelling and risk assessment capabilities mature. The proposed climate resilience strategic investments and commitments set out within our ED3 plan will further enhance our understanding of climate thresholds, vulnerabilities and potential tipping points. Insights gained through this work will be used to refine and strengthen future iterations of our adaptation pathways, ensuring they remain robust, evidence-based and responsive to changing conditions.

Collectively, these adaptation pathways provide a structured approach to managing uncertainty, helping ensure future resilience decisions remain proportionate, evidence-led and supported by the organisational capabilities described in ***Section 6***.

5.3 ADAPTATION PATHWAY FOR INCREASED RAINFALL & RAINSTORMS



5.4 ADAPTATION PATHWAY FOR INCREASED SEA LEVELS & TIDAL SURGES



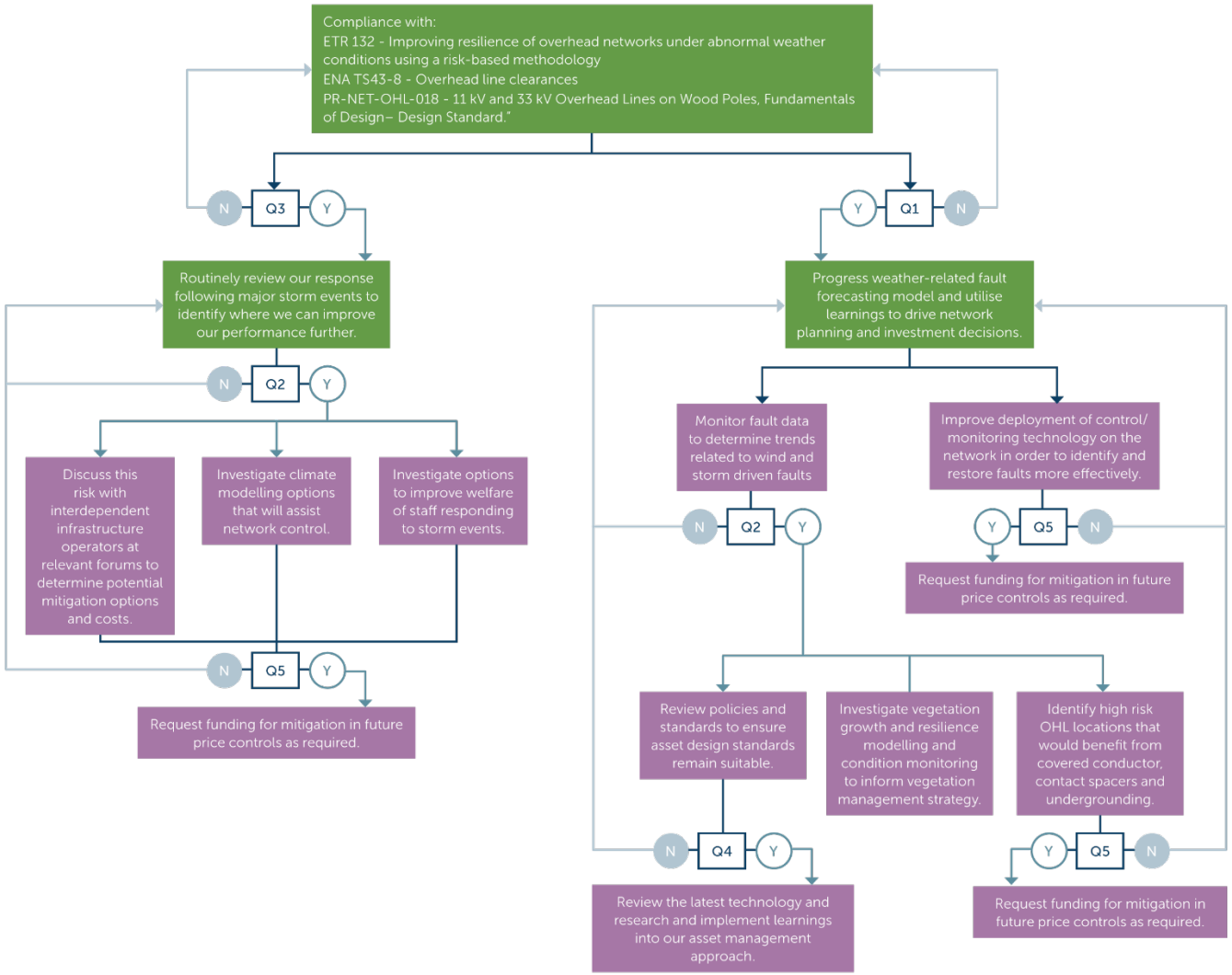
SEA LEVEL RISE

ID	Question
Q1	Have we experienced an increased rate of coastal erosion?
Q2	Was there a heightened number of faults with unacceptable outage times?
Q3	Has there been an increased amount of falling trees during a coastal flood event?
Q4	Are sea levels exceeding the current coastal defences?
Q5	Can we build mitigation measure funding into existing or future price control business plans?
Q6	Has organisational understanding of regional flood risk changed?
Q7	Can we build mitigation measure funding into existing or future price control business plans?

Key

- QX — Decision Point
- Y — Transfer to new action
- N — Continue on same approach
- Newly proposed action
- Existing Action

5.5 ADAPTATION PATHWAY FOR INCREASED WIND



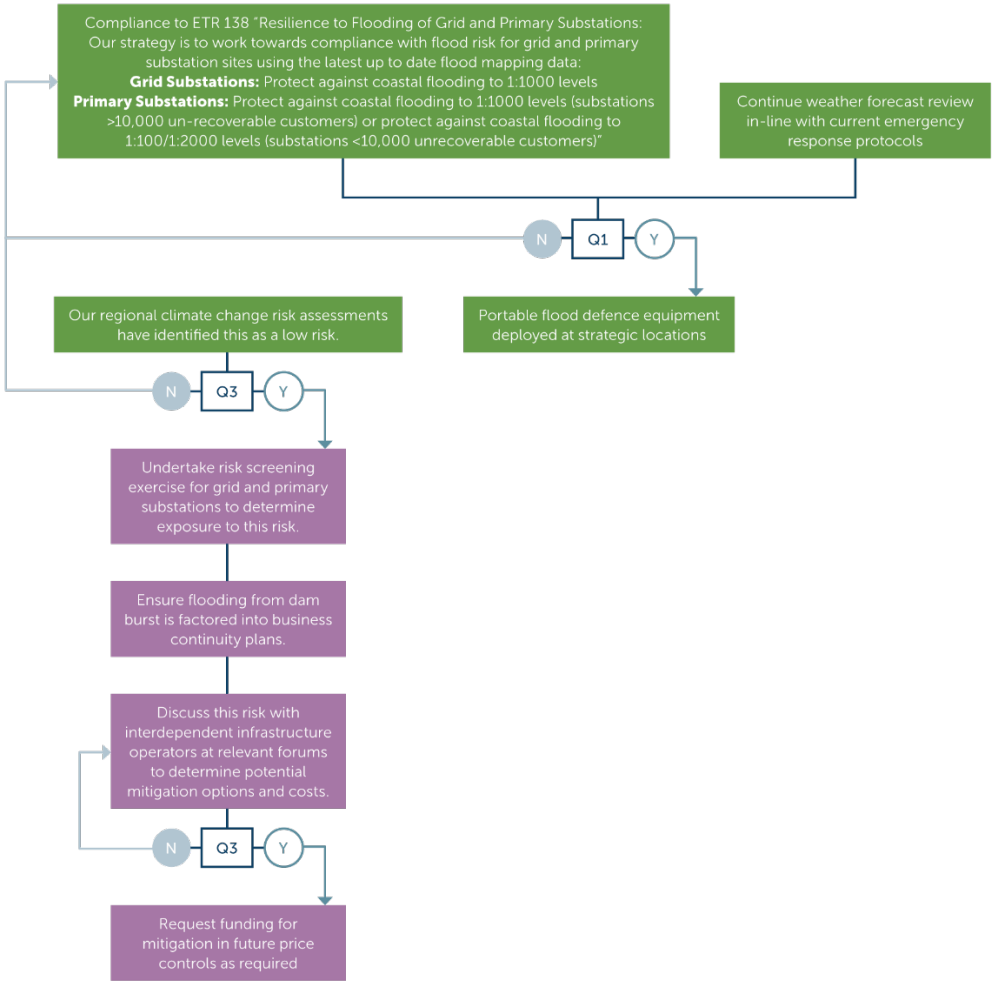
HIGH WINDS & STORMS

ID	Question
Q1	Have IIS impacts been negatively affected by wind driven faults as defined by the Ofgem Climate Resilience Metrics & Indicators?
Q2	Has frequency of damage from high winds and storms increased?
Q3	Was there a heightened number of faults with unacceptable outage timeframes?
Q4	Are other countries/DNO's experiencing increased impacts from faults caused by high winds and storms?
Q5	Can we build mitigation measure funding into existing or future price control business plans?

Key

- QX — Decision Point
- Y — Transfer to new action
- N — Continue on same approach
- Newly proposed action
- Existing Action

5.6 ADAPTATION PATHWAY FOR INCREASED RAINFALL CAUSING DAM BURST



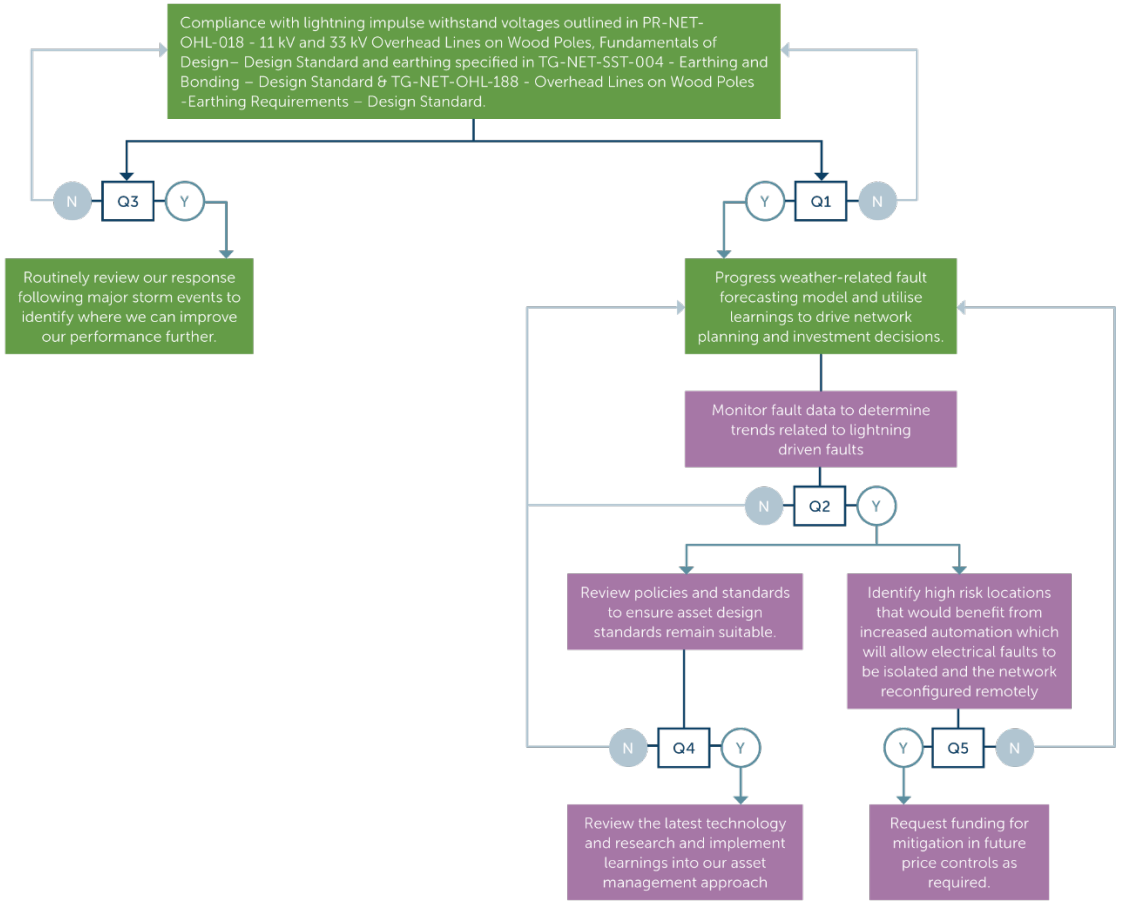
INCREASED RAINSTORMS CAUSING DAM BURST

ID	Question
Q1	Has a flood warning been issued?
Q2	Have SSEN or other DNO experienced business & network impacts caused by dam burst flood event?
Q3	Can we build mitigation measure funding into existing or future price control business plans?

Key

- QX — Decision Point
- Y — Transfer to new action
- N — Continue on same approach
- Newly proposed action
- Existing Action

5.7 ADAPTATION PATHWAY FOR LIGHTNING



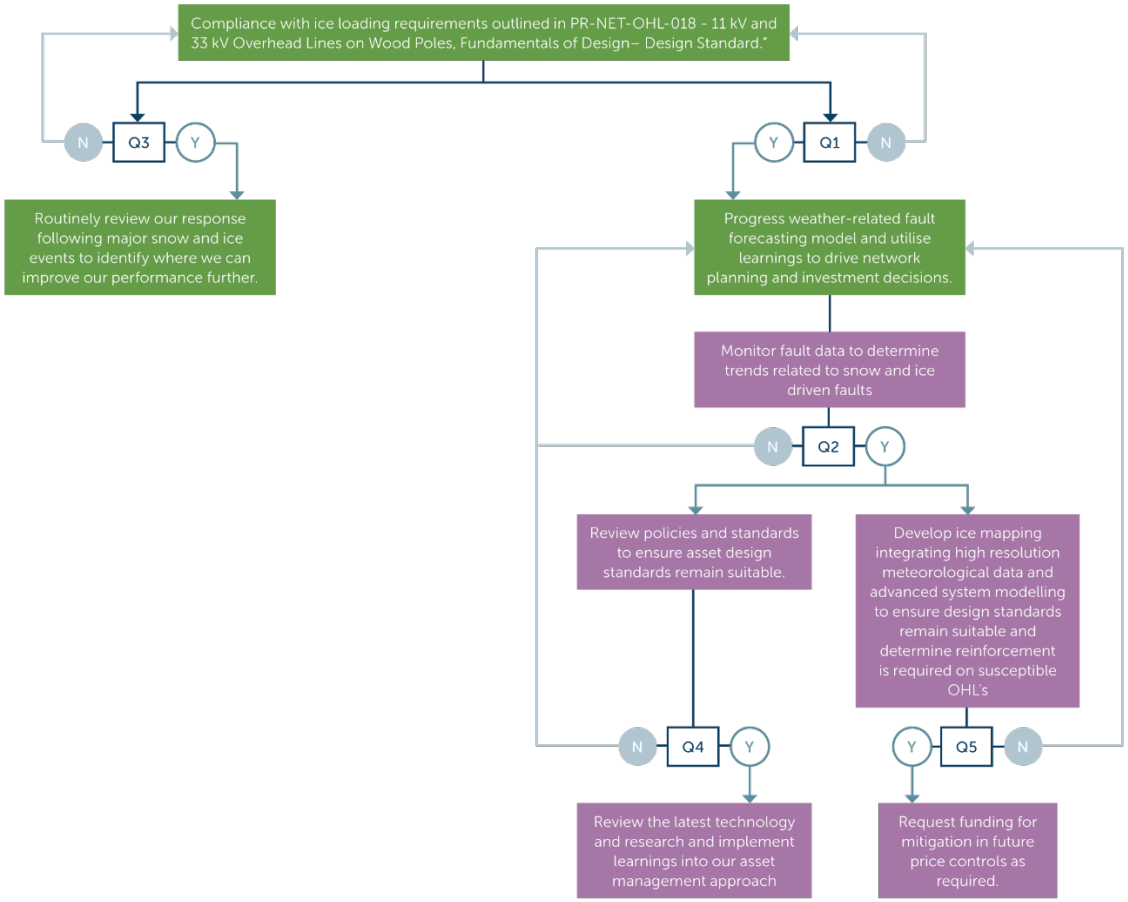
LIGHTNING

ID	Question
Q1	Have IIS impacts been negatively affected by lightning driven faults as defined by the Ofgem Climate Resilience Metrics & Indicators?
Q2	Has frequency of lightning strikes increased?
Q3	Was there a heightened number of faults with unacceptable outage timeframes?
Q4	Are other countries/DNO's experiencing increased impacts from lightning driven fault events?
Q5	Can we build mitigation measure funding into existing or future price control business plans?

Key

- QX — Decision Point
- Y — Transfer to new action
- N — Continue on same approach
- Newly proposed action
- Existing Action

5.8 ADAPTATION PATHWAY FOR SNOW AND ICE



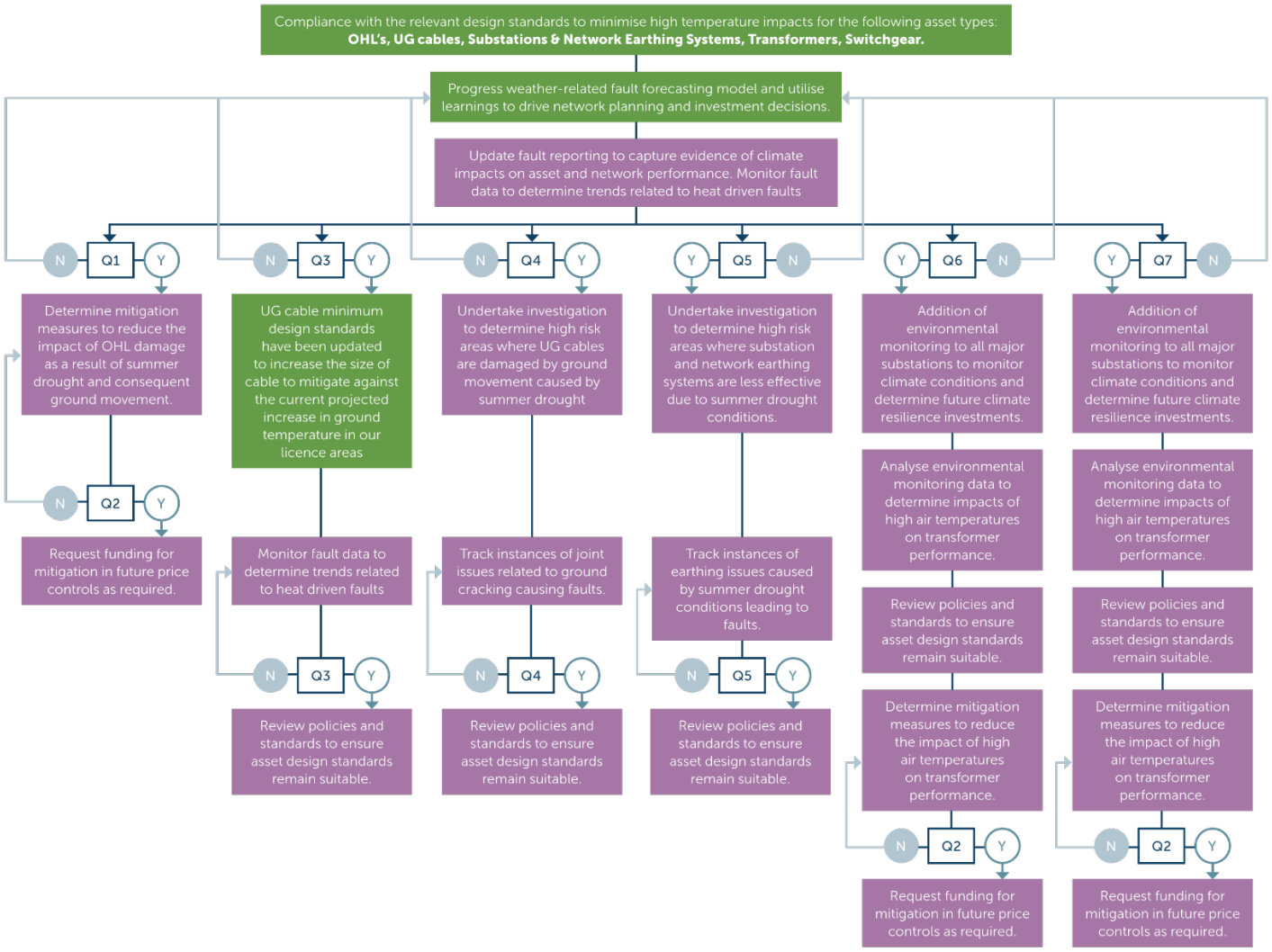
SNOW AND ICE

ID	Question
Q1	Have IIS impacts been negatively affected by snow and ice driven faults as defined by the Ofgem Climate Resilience Metrics & Indicators?
Q2	Has frequency of snow and ice accretion increased?
Q3	Was there a heightened number of faults with unacceptable outage timeframes?
Q4	Are other countries/DNO's experiencing increased impacts from snow and ice driven fault events?
Q5	Can we build mitigation measure funding into existing or future price control business plans?

Key

- QX — Decision Point
- Y — Transfer to new action
- N — Continue on same approach
- Newly proposed action
- Existing Action

5.9 ADAPTATION PATHWAY FOR INCREASED AIR AND GROUND TEMPERATURES



HIGH AIR & GROUND TEMPERATURES

ID	Question
Q1	Have IIS impacts been negatively affected by faults driven by damaged OHL's from summer drought and consequent ground movement as defined by the Ofgem Climate Resilience Metrics & Indicators?
Q2	Can we build mitigation measure funding into existing or future price control business plans?
Q3	Have IIS impacts been negatively affected by faults driven by reduced ratings of underground cable systems caused by increased ground temperatures as defined by the Ofgem Climate Resilience Metrics & Indicators?
Q4	Have IIS impacts been negatively affected by faults driven by damaged underground cable systems caused by ground movement caused by summer drought as defined by the Ofgem Climate Resilience Metrics & Indicators?
Q5	Have IIS impacts been negatively affected by faults driven by ineffective substation and network earthing systems caused by summer drought conditions as defined by the Ofgem Climate Resilience Metrics & Indicators?
Q6	Have IIS impacts been negatively affected by faults driven by reduced ratings and/or overloading of transformers caused by high air temperatures as defined by the Ofgem Climate Resilience Metrics & Indicators?
Q7	Have IIS impacts been negatively affected by faults driven by reduced ratings switchgear caused by high air temperatures as defined by the Ofgem Climate Resilience Metrics & Indicators?

Key

- QX — Decision Point
- Y — Transfer to new action
- N — Continue on same approach
- Newly proposed action
- Existing Action

6. CAPABILITY BUILDING

6.1 REVIEW OF EXISTING CAPABILITIES

To deliver a safe, smart, resilient business and system in a changing world we not only need to invest in our network infrastructure but also in our organisational capability. For climate resilience this means improving our understanding of how climate change will impact our network and organisation and using these insights to make informed decisions, integrating climate resilience into our organisational culture and being sufficiently resourced, actively implementing and monitoring our adaptation actions, flexing them where required, and effectively collaborating with external stakeholders. The key internal skills and knowledge required to deliver our climate resilience priorities include climate risk assessment, modelling and adaptation planning, asset/network vulnerability and criticality assessment, stress testing and scenario analysis, engineering design for climate adaptation, adaptation valuation, emergency preparedness and response and investment appraisal under uncertainty. In addition, colleagues across all functions require a strong level of climate literacy to ensure climate risks, adaptation opportunities and long-term resilience considerations are consistently incorporated into decision-making processes.

Our current capability maturity is evolving and provides a strong foundation for ED3 delivery. Climate risk and resilience is increasingly embedded within our business as usual strategic, tactical, operational decision-making processes supported by established governance arrangements and cross-functional collaboration. We have developed an adaptation strategy and action plan and implemented an effective monitoring process to track our progress and are progressing our capability to continually assess and adjust our plan to manage the long-term and uncertain nature of climate change impacts. We have expanded our stakeholder engagement to work together with key partners to achieve shared adaptation outcomes such as the Climate Ready Infrastructure Scotland (CRIS) Forum to co-deliver tactical climate adaptation and resilience initiatives to address interdependencies between infrastructure systems and manage cascading risks. We recognise there remains some reliance on external expertise for advanced climate modelling and scenario interpretation, resilience metrics and adaptation valuation and have made climate resilience proposals to address these areas for ED3.

6.2 FUTURE CAPABILITY REQUIREMENTS AND PROPOSALS

During ED3, we will strengthen and embed internal capability through a structured programme of training, knowledge transfer, organisational learning and investment in new tools and resources. A dedicated commitment to build climate resilience capability and capacity will ensure all operational and engineering teams receive climate risk awareness and adaptation planning training. Funding for climate modelling and dedicated internal resource to develop modelling and critical evaluation expertise will increase our organisational capability and reduce our reliance on external support. Funding to expand environmental monitoring of climate conditions at major substations will improve our understanding of climate impacts and informing future investment needs. The development of climate resilience metrics and indicators, aligned with Ofgem's requirements and embedded within our Environmental Management System, will strengthen our ability to measure performance, monitor outcomes and support evidence-based decision-making. Together, these initiatives will strengthen our ability to forecast, quantify and manage climate risks and help create a workforce that is better equipped to understand climate risks, identify adaptation opportunities and make informed decisions that protect customers and improve network performance.

6.3 COLLABORATION AND INTERDEPENDENCIES

Collaboration will remain a critical component of our approach to capability development and climate resilience delivery. Internally, SSE Group have recently employed a climate adaptation manager and reconvened an adaptation working group covering all business units, with Distribution playing an integral role. The group will review existing climate adaptation activity, build a robust evidence base and shared understanding of adaptation needs, and develop a consistent group-wide framework, targets and governance approach to embed climate resilience and adaptation into future decision-making.

Externally, we will continue to engage with regulators, government bodies, academic institutions, industry groups, infrastructure operators and resilience partnerships to access emerging research, best practice, climate data and lessons learned from across the sector. We are proud members of the Climate Ready Infrastructure Scotland (CRIS) Forum and the Infrastructure Operators Adaptation Forum (IOAF) which has facilitated the establishment of excellent working relationships with fellow infrastructure operators as a result. During ED3, we will continue to strengthen these relationships through collaborative research projects, knowledge-sharing forums, sector working groups, benchmarking exercises and data-sharing initiatives.

We have requested funding specifically to deliver tactical climate adaptation initiatives in response to storm hazards to address interdependencies between infrastructure systems, manage cascading risks and improve overall system resilience. Any externally commissioned studies and specialist advisory work will now include specific knowledge-transfer requirements to ensure expertise is retained within the business. Through a combination of strengthened internal capability and effective external collaboration, we will improve organisational resilience, enhance decision quality and support the delivery of long-term climate resilience outcomes that protect customers, communities and network performance.

7. GOVERNANCE, MONITORING AND REPORTING

Climate resilience is embedded within our existing business governance, risk management and environmental management arrangements.

Climate risks and adaptation actions are managed through our Climate Resilience Strategy which is supported by our Adaptation Action Plan, Implementation and Improvement Plan and our Regional Climate Ready Plans with delivery and performance overseen by annual review and reporting processes and progress is monitored through our ISO 14001-certified Environmental Management System and established business governance structures.

The Distribution Executive Committee (DEC) retains overall accountability for delivery, supported by the Distribution Strategic Environment, Social, Governance Subcommittee (DESG), the Distribution SHE Committee and Distribution Asset Management Steering Group (DAMSG).

Progress against commitments, investment delivery and performance indicators is monitored through regular governance forums and reported publicly through our Annual Environmental Report and Climate Change Adaptation Reporting submissions.

Recognising the importance of whole-system resilience, we also continue to work collaboratively with government, regulators, customers and other critical infrastructure operators to understand and manage interdependent climate risks, ensuring that adaptation measures support the resilience of both our network and the wider systems on which society depends.

APPENDIX A: CLIMATE RESILIENCE DEFINITIONS

Term	Definition
Acute Impacts	Immediate adverse effects, such as disruption, damage, and stress to assets, people, infrastructure, and systems caused by short-term exposure to climate-related hazards. Examples include widespread customer interruptions and asset damage caused by a severe storm, or equipment failures and service disruption during an extreme heatwave.
Adaptation Pathways	A decision-making approach that sets out how actions may be sequenced over time in response to climate risks, allowing future decisions to change as climate impacts, system conditions or evidence evolve. They are used to retain flexibility under uncertainty, rather than committing to a single fixed response.
AR 1-16	Adaptation Risks - 16 potential direct impacts of climate change to our assets and operation which were identified as part of our involvement in the ENA (Energy Networks Association) Climate Change Resilience Working Group. These 16 risks describe how temperature, drought, flooding, lightning, and wildfires can directly impact our overhead lines, underground cable systems, substations, network earthing systems, switchgears, and overall demand on our system.
Chronic Impacts	Adverse impacts from long-term, gradual climate that accumulate over years or decades. Examples include sustained increases in average temperatures leading to progressive asset derating, gradual sea-level rise, increasing long-term flood exposure, or long-term changes in rainfall patterns accelerating asset deterioration.
Climate Hazard	A meteorological or climate phenomenon capable of negatively impacting the physical or operational aspects of energy networks. Hazards may be characterised by attributes such as their probability of occurrence, magnitude intensity, and spatial extent, depending on the context of assessment. Examples include extreme temperatures, high winds, or periods of intense rainfall.
Climate impact	Adverse consequence resulting from a climate hazard e.g. damage to a physical asset or customer interruptions. This can include both acute and chronic impacts.
Climate Resilient Network	A company where the physical network assets and company procedures have the measurable capacity to withstand impacts of current and future foreseeable climate hazards. This is to provide a continuation of the primary service in line with defined standards of performance, or to facilitate a rapid service recovery from a climate hazard.
Climate Risk	The potential for a climate hazard to adversely impact network infrastructure, systems or operations. This risk arises from the exposure and vulnerability of assets and operations to climate hazards.
Climate Risk Assessment	A structured assessment undertaken to characterise and prioritise climate risks by considering climate hazards, exposure, and vulnerability, and how these may change over time. This process is intended to inform adaptation planning and decision-making, alongside other strategic, operational and proportionality considerations, in line with the Adaptation Reporting Power.
Climate Risk Matrix	A structured analytical tool used to assess and compare climate risks by evaluating the likelihood and consequence of climate hazards, exposures, and vulnerabilities, supporting transparent and consistent prioritisation. This is a part of climate risk assessment and adaptation planning, in line with the Adaptation Reporting Power.
CMIP6	Coupled Model Intercomparison Project Phase 6 is the latest internationally coordinated suite of climate model projections, providing a consistent evidence base for assessing future climate risks under a range of emissions and socioeconomic pathways.
Direct Climate Resilience Investment	Refers to actions or projects where climate risk is the primary driver for the investment, rather than one of several secondary considerations. These are interventions that exist specifically to address acute climate impacts from hazards. Examples include strengthening overhead lines specifically to reduce damage from severe windstorms.
Exposure	The presence of infrastructure assets, livelihoods, services, resources and people in locations which could be adversely affected by a climate hazard.
Fragility Curve	The probability of failure or unwanted outcomes of a structure or structural component.
Low Regret	Low regret climate resilience investments can take various forms: • Activities or interventions that are expected to deliver value under current conditions and that also provide benefits in addressing future climate risks. These investments often include relatively low-cost measures with benefits that may be difficult to monetise, such as improved capability, enhanced climate information, strengthened decision-making processes, or increased preparedness. They can also include actions that are undertaken now to generate information, learning or evidence that supports better investment decisions over time. • Measures where upfront costs are low but potential future benefits are high. They may deliver limited immediate benefits but offer the potential for significant value if future climate impacts emerge or intensify. This can include interventions that perform well across most, but not necessarily all, plausible future climate scenarios, where low cost mean there is little downside risk. • Options that are robust (i.e. they perform adequately across a wide range of possible future climate conditions rather than being tailored to a single/limited range of predicted outcome(s)). Options can also be flexible/adaptive (i.e. allowing plans, designs or future investment decisions to be adjusted as new information, evidence or understanding of climate risks becomes available).
Operational Resilience	The ability of the network operator to maintain or rapidly restore critical organisational functions after a climate hazard through organisational measures such as increasing resilience of organisational buildings, communications, logistics and supply chain, health and wellbeing impacts of employees and contractors etc.
OR 1-6	Organisational Risks – 6 potential direct impacts of climate change to our wider organisational functions. These 6 risks describe how temperature, drought, flooding, lightning, and wildfires can directly impact our organisational functions including buildings, communications, logistics, supply chain, network access, workforce health & wellbeing and loss of land/assets.

RCP	Representative Concentration Pathways (RCPs) are a method for capturing assumptions about economic, social and physical changes to our environment that will influence climate change within a set of scenarios which are used to model possible future climate evolution. RCPs specify concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to pre-industrial levels. RCP pathways represent a different range of global mean temperature increases over the 21st century and range from RCP2.6 to RCP8.5 and include a wide range of assumptions regarding population growth, economic development, technological innovation and attitudes to social and environmental sustainability. Our strategy utilises: • RCP 4.5 which is regarded as an intermediate greenhouse gas concentration scenario that assumes global emissions peak and decline over the century, resulting in an increase in average global mean surface temperature of 2.4°C by 2081-2100 representing a future with moderate climate change. • RCP8.5 which is regarded as a high-emissions climate scenario that assumes continued growth in greenhouse gas emissions throughout the 21st century, resulting in an increase in average global mean surface temperature of 4.3°C by 2081-2100 representing a future of high climate change.
Return period	An estimate of the likelihood of an event to occur, often presented as years, e.g. 1 in 100 years. This could also be referred to as the expected frequency of an occurrence or event. Return periods will be affected by climate change.
Vulnerability Threshold	A specific threshold value of the hazard parameter beyond which a defined level of service is reduced.

APPENDIX B: STAKEHOLDER ENGAGEMENT

Table 0.1. Summary of stakeholder feedback, impact on business plan and intended benefits

Policy Area (theme)	Type of Engagement Undertaken	Stakeholder Groups	Summary Feedback	Impact on Business Plan
Continuity, Transparency & Capability	Research (SSEN ED3 Consumer Priorities Research, ENA Climate Resilience Consumer Research, Ofgem ED3 Consumer Panel Deliberative Research) Reports (Shaping the Framework to Deliver Clean Power Report, Extreme Heat Impacts Report, Birmingham University Resilience Standards Study), Online Engagement Events (Reliability, Climate Resilience and Network Integrity Webinar, (Future-Proofing Power Webinar), Climate Adaptation Leadership Training (Sniffer).	Domestic Customers, SMEs, Future Consumers, Supply Chain Partners, Contractors, DNOs, Industry Representatives, Consultants, Academia, Local & Combined Authorities, Water Companies, UK Government, DEFRA, Ofgem, Internal Senior Leaders	Consumer Priorities Research identified reliability, resilience, transparency and communication as priority outcomes, with reliability remaining the highest customer priority and resilience closely linked to maintaining a dependable service. Deliberative research undertaken for Ofgem's ED3 Consumer Panel reinforced these findings, highlighting expectations for clear customer benefits from resilience investment and greater transparency regarding how funding is used to deliver outcomes. Insights from the ENA Climate Resilience Consumer Research, Reliability, Climate Resilience and Network Integrity Webinar, and wider climate resilience stakeholder engagement highlighted climate change and adaptation as growing operational and strategic challenges. Stakeholders emphasised the importance of proactive resilience planning, effective communication and clear accountability for delivery, alongside expectations that SSEN should play a leading role in maintaining network resilience. While stakeholder engagement demonstrated broad support for resilience investment, a significant minority remained uncertain about the benefits, highlighting the need for clearer communication and evidence of value for money. The Shaping the Framework to Deliver Clean Power Report similarly found that support for investment is closely linked to tangible customer outcomes, including reliability, energy security and resilience.	Climate resilience will be embedded within SSEN's Environmental Management System, including transition to ISO 14001:2026 by April 2029. Feedback on transparency, accountability and restoration performance informed the development of climate resilience metrics and indicators, including the integration of Ofgem's resilience metrics into the Environmental Management System. This will strengthen performance monitoring for customers. Stakeholder and expert engagement also highlighted the need to build organisational capability in climate adaptation. As a result, SSEN has committed to training operational and engineering teams in climate-risk awareness and adaptive planning by Year 2 of ED3. While some stakeholders expressed uncertainty regarding the value of resilience investment, feedback consistently supported long-term resilience planning. Consequently, SSEN will continue to assess climate risks against 2080 climate conditions, supported by annual Climate Resilience Strategy updates and ongoing TCFD, IFRS and Adaptation Reporting Programme reporting.
Preparedness, Planning & Emergency Response	Research (SSEN ED3 Consumer Priorities Research, ENA Climate Resilience Consumer Research), Online Engagement Events (Reliability, Climate Resilience and Network Integrity Webinar, Climate Resilience Stakeholder Webinar), ED3 Stakeholder Engagement Workshops, March 2026 (Perth, Reading & online): Session 4 - Driving reliability and resilience; Deliberative Research (Fair Future Panel Workshop 2);	Domestic Customers, SMEs, DNOs, Academia, Consultants, Water Companies, Critical Infrastructure Operators, Trade Associations, Local & Combined Authorities	Consumer Priorities Research highlighted strong support for proactive planning, resilience investment and reducing the impacts of severe weather events, particularly where this helps avoid future disruption and costs and the Fair Future Panel participants indicated they would accept a 20-30% increase in planned interruptions where this enabled longer-term resilience improvements and was clearly communicated. Stakeholders participating in the Reliability, Climate Resilience and Network Integrity Webinar similarly supported anticipatory, evidence-led investment, with 92% accepting planned interruptions where clearly justified and communicated and 81% prioritising community preparedness and support measures. The Shaping the Framework to Deliver Clean Power Report reinforced the need for early action, better coordination and investment decisions informed by robust evidence. Across stakeholder engagement, there was a clear preference for proactive rather than reactive approaches to resilience, alongside expectations for stronger collaboration and planning across sectors and infrastructure providers. Insights from the Evidencing the Cascading Impacts of Natural Hazards on Critical National Infrastructure Report,	Stakeholder feedback strengthened the focus on preparedness, planning and response through a more proactive and evidence-led approach to resilience. In response, SSEN will introduce a Storm Readiness Index to monitor preparedness ahead of severe weather events and provide proactive communications to customers in advance of severe weather events, with 100% coverage for high-risk areas. Feedback on community resilience, customer support and communication has informed plans to expand proactive customer communications, develop local resilience plans for climate-vulnerable communities and enhance support for Priority Services Register customers. Annual climate risk reporting will further strengthen transparency and customer protection. Stakeholder and expert engagement also highlighted the need for improved operational readiness. As a result, SSEN will enhance vegetation management, expand environmental monitoring across substations and update emergency response arrangements to incorporate climate-related scenarios and thresholds. These

	Reports (Evidencing the Cascading Impacts of Natural Hazards on Critical National Infrastructure Report, Shaping the Framework to Deliver Clean Power, Storm Éowyn Lessons Learned).		developed through the Climate Ready Infrastructure Scotland Forum, highlighted the growing interdependencies between electricity, water, telecommunications and transport networks during severe weather events. Stakeholders emphasised the importance of flood mitigation, vegetation management, climate-ready asset design, supply chain resilience and cross-utility coordination. Communication was consistently identified as a critical component of resilience, with expectations for clear, timely and accessible updates before, during and after disruption events.	measures will support earlier intervention, improved coordination and more consistent response during severe weather events.
Improved Asset Resilience and Design Standard	In-person Engagement Events (Sustainable Supplier Events); Online Engagement Events (Reliability, Climate Resilience and Network Integrity Webinar, Greener Horizons EAP webinar, Circular Asset Management Webinar); Deliberative Research (Ofgem ED3 Consumer Panel); ENA; Climate Adaptation Leadership Training (Sniffer); Reports (Enhancing Resilience in UK Energy Networks Report, Impacts on Energy Assets from Extreme Heat and Heatwaves Report, Evidencing the Cascading Impacts of Natural Hazards on Critical National Infrastructure Report, Nature and Human Rights Value Chain Report).	Domestic Customers, SMEs, DNOs, Academia, Research Bodies, Consultants, Local & Combined Authorities, Community Interest Groups, Landowners, Supply Chain Partners	Research into climate resilience and future energy system risks highlighted the growing importance of climate-ready asset design and adaptation to manage increasing heat risks and support long-term network resilience, with 52% of suppliers identified intense rainfall and changing storm patterns as the most significant climate risks facing their organisations at our Sustainable Supplier Events. The Enhancing Resilience in UK Energy Networks Report and the Impacts on Energy Assets from Extreme Heat and Heatwaves Report identified a range of complementary measures, including selective undergrounding, enhanced cooling systems, improved insulation and ventilation, asset shading and the deployment of higher temperature-tolerant technologies to maintain asset performance under increasingly extreme conditions. Insights from the Evidencing the Cascading Impacts of Natural Hazards on Critical National Infrastructure Report, alongside wider climate resilience engagement, reinforced the need for resilient assets and climate-ready design standards as core resilience priorities. Stakeholders highlighted the increasing dependence on reliable electricity infrastructure as transport, heating and wider infrastructure systems become increasingly electrified, while recognising extreme heat as an emerging and material risk requiring proactive adaptation. Consumer deliberative research undertaken for Ofgem's ED3 Consumer Panel demonstrated strong support for network upgrades that deliver both near-term value and long-term resilience, reinforcing the importance of investment approaches that balance affordability with future system needs.	Stakeholder feedback has strengthened the integration of climate resilience within asset management and engineering decision-making. In response, climate considerations will be embedded within asset strategies and engineering standards, including the integration of climate hazard thresholds, future climate scenarios and adaptive design principles into revised specifications and investment planning processes. Research and stakeholder engagement also highlighted the need to prioritise investment where climate risks are already emerging. As a result, targeted interventions, including line rebuilds, selective undergrounding, spacer deployment and replacement of vulnerable assets, will be focused on locations where they deliver the greatest resilience benefit and support more reliable network performance. Feedback on climate-related risks, particularly flooding and extreme weather, has informed a more proactive and risk-based approach to asset resilience. Climate-adjusted vulnerability assessments, flood resilience measures aligned to ETR138, and ongoing modelling of high-priority risks will guide future investment decisions and support annual reporting on resilience outcomes. This will help ensure infrastructure is better prepared for future climate conditions while supporting increasing demands on the electricity network.
Effective Stress Testing, Measurement and Forecasting	Research (ENA Climate Resilience Consumer Research, Informing Standards for Electricity Distribution Report), Online Engagement Events (Reliability, Climate Resilience and Network Integrity Webinar); Industry Engagement (DNO Collaboration), In person engagement events (Sustainable Supplier Engagement Days); Reports	Domestic Customers, SMEs, DNOs, Academia, Consultants, Industry Strategic Group Members, Supply Chain Partners, Water Companies, Local & Combined Authorities, UK Government, DEFRA, Ofgem	Supplier engagement through the Sustainable Supplier Engagement Days highlighted gaps in climate resilience metrics, forecasting and modelling capability, alongside a need for greater awareness and understanding of resilience measures across the supply chain. Stakeholders identified opportunities to strengthen resilience reporting, capability and consistency across the wider delivery network. The Reliability, Climate Resilience and Network Integrity Webinar and discussions with the Independent Stakeholder Group highlighted the importance of enhanced scenario planning and forecasting, including the use of CReDo, future weather scenarios and historical event data to support more informed resilience planning. Stakeholders also identified opportunities to improve understanding of emerging risks, including material availability, subsea infrastructure impacts and broader climate-related vulnerabilities. Academic research, including the Informing Standards for Electricity Distribution	Stakeholder feedback strengthened SSEN's approach to climate risk assessment, forecasting and resilience planning. In response, SSEN will develop a climate risk modelling tool by incorporating recognised climate datasets, global warming scenarios and high-resolution hazard mapping to improve understanding of future network risks. Feedback on forecasting and scenario planning has informed the integration of climate scenarios into stress testing processes, including the use of long-term climate projections to assess network exposure, vulnerability and performance impacts. This will support more targeted, evidence-based investment decisions and improve visibility of future risks. Stakeholders and expert engagement also highlighted the need for improved resilience monitoring and predictive capability. As a result, SSEN will expand environmental monitoring and automation across major

	(CS-N0W Project, Birmingham University Resilience Standards Study, Informing Standards for Electricity Distribution Report, Extreme Heat Impacts Report);Double Materiality Assessment.		Report, reinforced the need for more predictive, data-driven approaches to resilience planning and performance measurement. This aligns with findings from Ofgem's ED3 Consumer Panel Deliberative Research and wider consumer engagement, which highlighted increasing expectations that networks should anticipate and prepare for climate-related risks, rather than respond once disruption has occurred. Stakeholders consistently supported improved forecasting, resilience metrics and evidence-based decision-making to strengthen long-term network resilience.	substations, strengthening real-time understanding of climate conditions and supporting a shift from reactive to anticipatory resilience planning. This will improve preparedness for emerging risks and support long-term network resilience.
Improved resilience through Adaptation	Research (ENA Climate Resilience Consumer Research, ENA Value of Lost Load Research); Online Engagement Events (Reliability, Climate Resilience and Network Integrity Webinar); ED3 Stakeholder Engagement Workshops – Session 4: Driving Reliability and Resilience); In Person Engagement Events (Sustainable Supplier Events); Deliberative Research (Fair Future Panel Workshop 2, Ofgem ED3 Consumer Panel Deliberative Research); Reports (Evidencing the Cascading Impacts of Natural Hazards on Critical National Infrastructure Report, Storm Éowyn Lessons Learned, Nature and Human Rights Value Chain Report)	Domestic Customers, SMEs, Supply Chain Partners, Contractors, DNOs, Industry Representatives, Consultants, Academia, Water Companies, Critical Infrastructure Operators, Local & Combined Authorities, UK Government, DEFRA, Ofgem	Climate resilience engagement highlighted climate risk, system vulnerability and infrastructure interdependencies as key resilience challenges. Discussions at the Sustainable Supplier Engagement Days identified intense rainfall and changing storm patterns as the most significant climate risks facing suppliers, alongside concerns about the impact of adaptation requirements on smaller businesses and the need for a proportionate approach to implementation. The Independent Stakeholder Group emphasised the importance of locally tailored resilience planning, cross-sector collaboration and targeted support for vulnerable communities. Findings from the ENA Value of Lost Load Research and ENA Climate Resilience Consumer Research reinforced that the impacts of severe weather are not experienced equally, with vulnerable households facing heightened health and wellbeing risks and SMEs experiencing outages as immediate financial losses. The Evidencing the Cascading Impacts of Natural Hazards on Critical National Infrastructure Report highlighted the growing interdependencies between electricity, water, telecommunications and transport networks, demonstrating how disruption in one sector can rapidly affect others. Similar themes emerged through Session 4 of SSEN's ED3 Stakeholder Engagement Workshops ('Driving Reliability and Resilience'), where participants supported proactive adaptation, prioritisation of vulnerable customers and critical services, and resilience planning that reflects the differing needs of rural, coastal and urban communities. Fair Future Panel deliberative research reinforced these findings, highlighting growing awareness of climate risks while emphasising the importance of demonstrating clear customer benefits and value from resilience investment.	Stakeholder feedback informed the development of a structured adaptation framework that links climate hazards to asset conditions, criticality and failure modes, enabling a more targeted and risk-based approach to resilience investment in ED3. Adaptive pathways will be developed for all asset classes and key climate hazards, with climate thresholds embedded within asset strategies and investment decisions. Feedback highlighting the importance of interdependencies and cross-sector resilience has strengthened SSEN's whole-system approach to adaptation. In response, SSEN will develop an interdependency map, identify cross-sector risk hotspots and work with partners to establish shared adaptation pathways for critical infrastructure sites. Stakeholder priorities around proactive planning, vulnerable customer support and long-term resilience have also informed ongoing stress testing, climate scenario assessment and resilience governance arrangements. Stakeholder priorities around proactive planning, vulnerable customer support and long-term resilience have also informed ongoing stress testing, climate scenario assessment and resilience governance arrangements. Deliberative research highlighted the importance of demonstrating clear customer benefits from adaptation investment, which has reinforced SSEN's commitment to prioritising interventions using climate risk, vulnerability and criticality assessments. Together, these measures will support coordinated adaptation planning, improve preparedness for future climate risks and strengthen resilience across the wider energy system. Together, these measures will support coordinated adaptation planning, improve preparedness for future climate risks and strengthen resilience across the wider energy system