		Available Data								Details of Risks / Opportunities				Now				Risk Assessment: 2050s					Risk Assessment: 2080s					Actions			Comments
Threat Type 1	Threat Type 2	Data Source	Data Type	Current	2020s	2050s	2080s	UKCP18 Update	Asset Type	Projected direct or indirect impact	Risks and Opportunities	Consequences	Stakeholder Impacts	Likelihood	Impact	Current Risk	Likelihood	Impact	Medium Term Risk	Likelihood	Impact	Long Term Risk	Status	Details	Timescales (planned & potential actions)		
Extreme Event	Flooding (fluvial)	EA Flooding Plain Maps		Detailed site by site analysis	No future predictions available				Substations	Change in flood plains	Increased area of flood plain	Increased exposure as more sites encapsulated in flood plain.	Loss of substation equipment leading to loss of supplies to customers	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16	In place	Flood defence policy in place in line with ETR138		Northern Powergrid has implemented a flood defence programme in line with the recommendations of ETR138. ETR138 includes provision for climate change. There is currently no flood plain prediction data available for use. Flood defence provision will be reviewed as and when future predictions for flood plains are published.
											Increased frequency/severity of flood events	Flood defences at existing sites no longer adequate	Loss of substation equipment leading to loss of supplies to customers	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16	In place	Flood defence policy in place in line with ETR138			
									Transformers	Change in flood plains	Substation floods as detailed above	Transformer fails due to floodwater (failure likely to be due to cable terminations, cooling fans, secondary wiring or aux switches)	Loss of transformer leading to loss of supplies to customers	3 Unlikely	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16	In place	Flood defence policy in place in line with ETR138			
									Circuit Breakers	Change in flood plains	Substation floods as detailed above	Switchgear fails due to floodwater (failure likely to be due to cable terminations, secondary wiring or aux switches)	Loss of circuit breakers leading to loss of supplies to customers	3 Unlikely	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16	In place	Flood defence policy in place in line with ETR138			
											Increased humidity following flood event	High levels of partial discharge.	Increased maintenance required, potentially shortened asset life.	2 Unlikely	3 Moderate	6				4 Likely	4 Significant	16	In place	Regular condition assessments of breakers carried out to prioritise replacement.			
									Overhead Lines	Change in flood plains	Increased area of flood plain	Clearances potentially reduced during flooding event	Increased risk of third party contact with overhead lines.	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6					
												Fast flowing river water erodes foundations	Additional overhead line faults	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6	4 Likely	2 Minor	8	Potential	Idenfity and relocate / protect at risk structures			
												Increased corrosion of footings leading to instability of poles / towers	Additional overhead line faults Safety risk due to compromised structural integrity	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4					
									Underground Cables	Change in flood plains	Increased area of flood plain	Land surrounding cables is flooded or waterlogged	Additional cable faults occur leading to loss of supplies to customers	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4					
												Fast flowing river water erodes embankments or structures	Cable left in mid air in tension presenting risk of additional faults	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6	4 Likely	2 Minor	8	Potential	Idenfity and relocate / protect at risk structures			
									Protection	Change in flood plains	Substation floods as detailed above	Protection fails due to floodwater	Protection fails to operate during a fault leading to a unsafe conditions on the network.	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16					
									Earthing																			
									Emergency Response & Planning	Change in flood plains	Floodwater blocks site access	Personnel cannot access sites to assess / remedy fault situations	Extended fault durations	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9	4 Likely	3 Moderate	12	Potential	Review of emergency planning procedures	In line with publication of EA/SEPA fluvial flood risk data		
									Vegetation Mgt	Change in flood plains		Tree roots undermined during flooding event.	Additional faults on the network due to vegetation encroachment	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6	4 Likely	2 Minor	8	Potential	Targetted vegetation management of at risk trees			
									Routine Business (Maintenance, R&R, Capital Investment)	Change in flood plains	Increased risk and severity of flooding events	Disruption to routine activities due to re-allocation of resources and access issues	Planned work not delivered on time. Maintenance behind schedule	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9	4 Likely	3 Moderate	12					
									Customer Service	Change in flood plains	Floodwater blocks access to call centres etc	Personnel cannot access sites to take calls and provide customer contact	Lack of communication, unable to report faults leading to extended fault durations	2 Unlikely	1 Limited	2	2 Unlikely	1 Limited	2	2 Unlikely	1 Limited	2	In place	Widespread remote working in place for non operational staff			
	Flooding (pluvial)	EA Flooding Plain Maps		Detailed site by site analysis	No future predictions available				Substations	Change in flood plains	Increased area of flood plain	Increased exposure as more sites encapsulated in flood plain.	Loss of substation equipment leading to loss of supplies to customers	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16	In place	Flood defence policy in place in line with ETR138		Northern Powergrid has implemented a flood defence programme in line with the recommendations of ETR138. ETR138 includes provision for climate change. There is currently no flood plain prediction data available for use. Flood defence provision will be reviewed as and when future predictions for flood plains are published.
											Increased frequency/severity of flood events	Flood defences at existing sites no longer adequate	Loss of substation equipment leading to loss of supplies to customers	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16	In place	Flood defence policy in place in line with ETR138			
									Transformers	Change in flood plains	Substation floods as detailed above	Transformer fails due to floodwater (failure likely to be due to cable terminations, cooling fans, secondary wiring or aux switches)	Loss of transformer leading to loss of supplies to customers	3 Unlikely	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16	In place	Flood defence policy in place in line with ETR138			
									Circuit Breakers	Change in flood plains	Substation floods as detailed above	Switchgear fails due to floodwater (failure likely to be due to cable terminations, secondary wiring or aux switches)	Loss of circuit breakers leading to loss of supplies to customers	3 Unlikely	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16	In place	Flood defence policy in place in line with ETR138			
											Increased humidity following flood event	High levels of partial discharge.	Increased maintenance required, potentially shortened asset life.	2 Unlikely	3 Moderate	6				4 Likely	4 Significant	16	In place	Regular condition assessments of breakers carried out to prioritise replacement.			
									Overhead Lines	Change in flood plains	Increased area of flood plain	Clearances potentially reduced during flooding event	Increased risk of third party contact with overhead lines.	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6					
												Fast flowing river water erodes foundations	Additional overhead line faults	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6	4 Likely	2 Minor	8	Potential	Idenfity and relocate / protect at risk structures			
									Underground Cables	Change in flood plains		Increased corrosion of footings leading to instability of poles / towers	Additional overhead line faults Safety risk due to compromised structural integrity	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4					
											Increased area of flood plain	Land surrounding cables is flooded or waterlogged	Additional cable faults occur leading to loss of supplies to customers	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4					
												Fast flowing river water erodes embankments or structures	Cable left in mid air in tension presenting risk of additional faults	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6	4 Likely	2 Minor	8	Potential	Idenfity and relocate / protect at risk structures			
									Protection	Change in flood plains	Substation floods as detailed above	Protection fails due to floodwater	Protection fails to operate during a fault leading to a unsafe conditions on the network.	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	4 Likely	4 Significant	16					
									Earthing	Change in flood plains																		
									Emergency Response & Planning	Change in flood plains	Floodwater blocks site access	Personnel cannot access sites to assess / remedy fault situations	Extended fault durations	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9	4 Likely	3 Moderate	12	Potential	Review of emergency planning procedures	In line with publication of EA/SEPA fluvial flood risk data		
									Vegetation Mgt	Change in flood plains		Tree roots undermined during flooding event.	Additional faults on the network due to vegetation encroachment	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6	4 Likely	2 Minor	8	Potential	Targetted vegetation management of at risk trees			
									Routine Business (Maintenance, R&R, Capital Investment)	Change in flood plains	Increased risk and severity of flooding events	Disruption to routine activities due to re-allocation of resources and access issues	Planned work not delivered on time. Maintenance behind schedule	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9	4 Likely	3 Moderate	12					
									Customer Service	Change in flood plains	Floodwater blocks access to call centres etc	Personnel cannot access sites to take calls and provide customer contact	Lack of communication, unable to report faults leading to extended fault durations	2 Unlikely	1 Limited	2	2 Unlikely	1 Limited	2	2 Unlikely	1 Limited	2	In place	Widespread remote working in place for non operational staff			
	Heavy Rain	UKCP09	Mean precipitation (central estimate, mm/day)	Annual: 2.2 Winter: 2.4	Annual: All emissions scenarios: 2.2 Winter: All emissions scenarios: 2.5	Annual: All emissions scenarios: 2.2 Winter: Low: 2.6 Med: 2.7 High: 2.7	Annual: All emissions scenarios: 2.2 Winter: Low: 2.7 Med: 2.8 High: 2.9	Changes in precipitation levels across all scenarios are roughly in line with those predicted in UKCP09 for our region. Significant variation can be found across the UK with the driest areas in the SE and the wettest in the west and highlands. In general there is little reduction in seasonal rainfall forecast. Prolonged rainfall events forecast to increase in frequency in the West of the UK (from once per annum to twice per annum by the 2060s) with potential for small reduction in frequency in the East. Events expected to be focussed in the autumn and winter months. Intense short duration rainfall events projected to increase in winter but not summer. Largest increases for hourly precipitation expected to occur in the autumn months. Summer rainfall increases greater in the North of the UK.	Substations	Change in flood plains	Increased area of flood plain	Additional substations flooded leading to loss of supplies	Loss of substation equipment leading to loss of supplies to customers	3 Unlikely	3 Moderate	9	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	Potential	Review of sites with flood defences upon revision of predicted flood plains	In line with publication of EA/SEPA fluvial flood risk data		
											Increased frequency/severity of flood events	Flood defences at existing sites no longer adequate	Loss of substation equipment leading to loss of supplies to customers	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	Potential	Review of adequacy of flood defences at existing sites upon revision of predicted flood plains	In line with publication of EA/SEPA fluvial flood risk data		
									Transformers	Change in flood plains	Substation floods as detailed above	Transformer fails due to floodwater (failure likely to be due to cable terminations, cooling fans, secondary wiring or aux switches)	Loss of transformer leading to loss of supplies to customers	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	3 Possible	3 Moderate	9	Potential	Review of substation flood defence policy as detailed above	In line with publication of EA/SEPA fluvial flood risk data		
									Circuit Breakers	Change in flood plains	Substation floods as detailed above	Switchgear fails due to floodwater (failure likely to be due to cable terminations, secondary wiring or aux switches)	Loss of circuit breakers leading to loss of supplies to customers	3 Unlikely	3 Moderate	9	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9	Potential	Review of substation flood defence policy as detailed above	In line with publication of EA/SEPA fluvial flood risk data		
											Increased humidity following flood event	High levels of partial discharge.	Increased maintenance required, potentially shortened asset life.	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9	In place	Regular condition assessments of breakers carried out to prioritise replacement.			
									Overhead Lines	Change in flood plains	Increased area of flood plain	Clearances potentially reduced during flooding event	Increased risk of third party contact with overhead lines during a flood event	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9					
									Underground Cables	Change in flood plains	Increased area of flood plain	Land surrounding cables is flooded or waterlogged	Additional cable faults occur leading to loss of supplies to customers	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6					
												Prolonged submersion in water causing water ingress	Additional cable faults occur leading to loss of supplies to customers	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6					
												Prolonged submersion in water causing water ingress to link boxes	Link box faults occur leading to loss of supplies to customers	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6					
									Protection	Change in flood plains	Substation floods as detailed above	Protection fails due to floodwater	Safety implications during a flooding event	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9					
									Earthing	Change in flood plains	Increased area of flood plain	Prolonged submersion in water causing corrosion of earth connections	Earthing connections fail leading to increased risk	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6					
									Emergency Response & Planning	Change in flood plains	Increased number of at risk substations and areas	Additional network and customers at risk	Additional faults on the network.	2 Unlikely	3 Moderate	6	2 Unlikely	3 Moderate	6	3 Possible	3 Moderate	9	Potential	Review of emergency planning procedures	In line with publication of EA/SEPA fluvial flood risk data		
									Vegetation Mgt	Change in flood plains		Tree roots undermined during flooding event.	Additional faults on the network due to vegetation encroachment	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6					
									Routine Business (Maintenance, R&R, Capital Investment)	Additional rain leads to increasingly boggy ground conditions	Access limited either by ground conditions or landowners denying permission	Disruption to routine activities due to access issues.	Routine activities delayed. Additional compensation claims for land damage.	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6					
									Customer Service	Change in flood plains	Increased number of at risk substations and areas	Additional network and customers at risk	Additional faults on the network.	2 Unlikely	2 Minor	4	2 Unlikely	2 Minor	4	3 Possible	2 Minor	6	Potential	Review of emergency planning procedures	In line with publication of EA/SEPA fluvial flood risk data		

		Available Data							Details of Risks / Opportunities				Now					Risk Assessment 2050s					Risk Assessment 2080s					Actions			Comments
Threat Type 1	Threat Type 2	Data Source	Data Type	Current	2020s	2050s	2080s	UKCP18 Update	Asset Type	Projected direct or indirect impact	Risks and Opportunities	Consequences	Stakeholder Impacts	Likelihood		Impact		Current Risk	Likelihood		Impact		Medium Term Risk	Likelihood		Impact		Long Term Risk	Status	Details	Timescales (planned & potential actions)	
	Coastal Flooding	DEFRA Flood & Coastal Defence Appraisal Guidance, FCDPAG3	Net sea level rise (mm/yr): NW England, NE England, Scotland (north of Flamborough Head)	2.5 (1990 - 2025)	7 (2025 - 2055)	10 (2055 - 2085)	13 (2085 - 2115)	Sea level currently rising with central projections up to 1m by 2100. No change predicted in storm surge, any changes in extreme sea level are the result of sea level rise as opposed to atmospheric storminess.	Substations	Rise in sea level	EA coastal defences fail	Substations flooded leading to loss of supplies	Loss of substation equipment leading to loss of supplies to customers	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	In place	Sea level rise over life of assets considered when implementing flood defences at site		The area of the Humber estuary currently carries a 6m flood risk. If the sea defences were to fail then the entire area would be under water. It is considered impossible to mitigate against as the cost of defending our assets is considered disproportionate.
											Sea water overtops EA coastal defences	Substations flooded leading to loss of supplies	Loss of substation equipment leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
									Transformers	Rise in sea level	EA coastal defences fail	Transformer fails due to floodwater (failure likely to be due to cable terminations, cooling fans, secondary wiring or aux switches)	Loss of transformer leading to loss of supplies to customers	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	In place	Sea level rise over life of assets considered when implementing flood defences at site		
											Sea water overtops EA coastal defences	Transformer fails due to floodwater (failure likely to be due to cable terminations, cooling fans, secondary wiring or aux switches)	Loss of transformer leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
									Circuit Breakers	Rise in sea level	EA coastal defences fail	Switchgear fails due to floodwater (failure likely to be due to cable terminations, secondary wiring or aux switches)	Loss of circuit breakers leading to loss of supplies to customers	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	In place	Sea level rise over life of assets considered when implementing flood defences at site		
											Sea water overtops EA coastal defences	Switchgear fails due to floodwater (failure likely to be due to cable terminations, secondary wiring or aux switches)	Loss of circuit breakers leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
											Increased humidity following flood event	High levels of partial discharge.	Increased maintenance required, potentially shortened asset life.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Regular condition assessments of breakers carried out to prioritise replacement.		
									Overhead Lines	Rise in sea level	EA coastal defences fail	Clearances potentially reduced during event	Increased risk of third party contact with overhead lines during a flood event	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	In place	Sea level rise over life of assets considered when implementing flood defences at site		
											Sea water overtops EA coastal defences	Clearances potentially reduced during event	Increased risk of third party contact with overhead lines during a flood event	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
									Underground Cables	Rise in sea level	EA coastal defences fail	Prolonged submersion in water causing water ingress	Additional cable faults occur leading to loss of supplies to customers	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	In place	Sea level rise over life of assets considered when implementing flood defences at site		
												Increased risk of corrosion due to salt water	Additional cable faults occur leading to loss of supplies to customers	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	In place	Sea level rise over life of assets considered when implementing flood defences at site		
												Prolonged submersion in water causing water ingress to link boxes	Link box faults occur leading to loss of supplies to customers	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	In place	Sea level rise over life of assets considered when implementing flood defences at site		
												Increased risk of corrosion to link boxes due to salt water	Link box faults occur leading to loss of supplies to customers	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	In place	Sea level rise over life of assets considered when implementing flood defences at site		
											Sea water overtops EA coastal defences	Prolonged submersion in water causing	Additional cable faults occur leading to loss of supplies	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood		
												Increased risk of corrosion due to salt water	Additional cable faults occur leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
												Prolonged submersion in water causing water ingress to link boxes	Link box faults occur leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
												Increased risk of corrosion to link boxes due to salt water	Link box faults occur leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
									Protection	Rise in sea level	EA coastal defences fail	Protection fails due to floodwater	Safety implications during a flooding event	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	In place	Sea level rise over life of assets considered when implementing flood defences at site		
											Sea water overtops EA coastal defences	Protection fails due to floodwater	Safety implications during a flooding event	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
									Earthing	Rise in sea level	EA coastal defences fail	Prolonged submersion in water causing water ingress	Earthing connections fail leading to increased risk	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	In place	Sea level rise over life of assets considered when implementing flood defences at site		
												Increased risk of corrosion due to salt water	Earthing connections fail leading to increased risk	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	In place	Sea level rise over life of assets considered when implementing flood defeaes at site		
											Sea water overtops EA coastal defences	Prolonged submersion in water causing water ingress	Earthing connections fail leading to increased risk	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
												Increased risk of corrosion due to salt water	Earthing connections fail leading to increased risk	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Sea level rise over life of assets considered when implementing flood defences at site		
									Emergency Response & Planning	Rise in sea level	EA coastal defences fail	Roads flooded leading to difficulties in reaching & repairing network faults	Additional faults on the network.	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3	1	Very Unlikely	3	Moderate	3				
											Sea water overtops EA coastal defences	Roads flooded leading to difficulties in reaching & repairing network faults	Additional faults on the network.	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Vegetation Mgt																							
									Routine Business (Maintenance, R&R, Capital Investment)	Rise in sea level	EA coastal defences fail	Roads flooded leading to difficulties in ensuring availability of spares	Routine activities delayed.	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2				
											Sea water overtops EA coastal defences	Roads flooded leading to difficulties in ensuring availability of spares	Routine activities delayed.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Customer Service	Rise in sea level	EA coastal defences fail	Roads flooded leading to difficulties in reaching & repairing network faults	Additional faults on the network.	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Moderate	2	1	Very Unlikely	2	Minor	2				
											Sea water overtops EA coastal defences	Roads flooded leading to difficulties in reaching & repairing network faults	Additional faults on the network.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
	Ice & Wind	UKCP09	Mean winter temperature (central estimate) Wind Speed	3.1°C	All emissions scenarios: 4.4°C No increase forecast in the severity of high wind events Possible increase in frequence of high wind events	L: 5.0°C M: 5.3°C H: 5.6°C No increase forecast in the severity of high wind events Possible increase in frequence of high wind events	L: 5.6°C M: 6.1°C H: 6.7°C No increase forecast in the severity of high wind events Possible increase in frequence of high wind events	Under RCP8.5 and 6.0 scenarios, warming forecast in line with UKCP09 high and medium scenario for our region. Reduced warming forecast under lower scenarios. No trend to forecast increase in wind speeds. 50-80% increase in the days of strong winds over the UK by 2070-2100 compared to 1975-2005 under worst case scenario	Substations	Combination of ice and wind causes damage to substation buildings	Substation equipment becomes damaged or exposed	Failure of equipment due to weather or falling debris	Loss of substation equipment leading to loss of supplies to customers	2	Unlikely	1	Limited	2	2	Unlikely	1	Negligible	2	2	Unlikely	1	Limited	2				
										Ice build up causes access padlocks etc to freeze	Unable to access substations		Increased fault durations.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Transformers	Combination of temperature and wind conditions condusive to ice formation	Ice build up occurs on transformers	Operation of transformer compromised by icing affecting exposed moving parts on equipment in outdoor compounds (E.g. cooling fan operation, blocked radiator fins)	Loss of transformer leading to loss of supplies to customers	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Circuit Breakers	Combination of temperature and wind conditions condusive to ice formation	Ice build up occurs on switchgear	Operation of switchgear moving parts compromised in outdoor compounds	Loss of circuit breakers leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Existing ENATS specifications include test with 10mm of ice on all parts		
									Overhead Lines	Combination of temperature and wind conditions condusive to ice loading	Ice build up occurs on Overhead Lines	Lines and structures compromised by ice loadings	Additional overhead line faults Safety risk due to compromised structural integrity or broken conductors	3	Possible	3	Moderate	9	3	Possible	3	Moderate	9	3	Possible	3	Moderate	9	In place	EU Research COST 727 looked at snow/ice loading of overhead lines. Existing designs have adequate structural strength.		
										Atmospheric conditions not condusive to helicopter flight	Unable to operate helicopters to carry out fault location	Fault location time increased	Fault durations increased due to lengthened location times.	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Underground Cables	Water Ingress	Freezing of water	Terminations fail due to freezing	Termination faults cause loss of supplies	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
												Water separates stress contol components	Failture causes loss of supplies	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
												Freexing within silicon oil terminations causing water to sink to high stress area of terminations	Termination faults cause loss of supplies	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Protection																						
									Earthing																						
									Emergency Response & Planning	Increased frequency of events	MIMP conditions occur on a more regular basis	MIMP begins to become business as usual	Resources re-allocated more regularly leading to impact on business as usual.	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	In place	Emergency plans in place.		
									Vegetation Mgt	Combination of temperature and wind conditions condusive to ice loading	Vegetation suffers due to conditions	Additional faults caused by broken trees	Additional faults due to vegetation encroachment Safety risk due to compromised structural integrity or broken conductors	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Veg Mgt programmes in place.		
									Routine Business (Maintenance, R&R, Capital Investment)	Increased frequency of events	Routine maintenance suffers as a result of additional faults	Fault repairs become a greater part of workload	Regulatory criticism as work planned is not completed due to diversion of funds to elsewhere	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6				
									Customer Service	Combination of temperature and wind conditions condusive to snow build up	General snow & ice build up	Slow response times due to problematic access	Increased fault durations. Safety risk to staff due to weather conditions.	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6				

		Available Data							Details of Risks / Opportunities				Now					Risk Assessment: 2050s					Risk Assessment: 2080s					Actions			Comments
Threat Type 1	Threat Type 2	Data Source	Data Type	Current	2020s	2050s	2080s	UKCP18 Update	Asset Type	Projected direct or indirect impact	Risks and Opportunities	Consequences	Stakeholder Impacts	Likelihood	Impact	Current Risk	Likelihood	Impact	Medium Term Risk	Likelihood	Impact	Long Term Risk	Status	Details	Timescales (planned & potential actions)	
	Heavy Snow	UKCP09 Met Office	Mean winter temperature (central estimate) Wind Speed	3.1°C	All emissions scenarios: 4.4°C No increase forecast in the severity of high wind events Possible increase in frequence of high wind events	L: 5.0°C M: 5.3°C H: 5.6°C No increase forecast in the severity of high wind events Possible increase in frequence of high wind events	L: 5.6°C M: 6.1°C H: 6.7°C No increase forecast in the severity of high wind events Possible increase in frequence of high wind events	Under RCP8.5 and 6.0 scenarios, warming forecast in line with UKCP09 high and medium scenario for our region. Reduced warming forecast under lower scenarios. Downward trend in winter mean snowfall and lying snow through time with almost 100% reduction in lying snow in lowland areas by the end of the century. Events may still occur though. No trend to forecast increase in wind speeds. 50-80% increase in the days of strong winds over the UK by 2070-2100 compared to 1975-2005 under worst case scenario	Substations	Build up of snow on sites and roads	Substation buildings (particularly flat roofed structures) and structures unable to take weight of snow build up	Buildings and structures fail	Falling debris or exposure to snow causes substation equipment to fail leading to loss of supplies.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Transformers	Build up of snow around outdoor equipment	Transformer and/or pumps and fans unable to operate due to snow	Transformer ratings reduced or transformer fails	Unable to meet required demand. Customers off supply.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Circuit Breakers	Build up of snow around outdoor equipment	Switchgear moving parts unable to operate due to snow		Failure of switchgear leads to customers off supply.	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Existing ENATS specifications include test with 10mm of ice on all parts	
									Overhead Lines	Combination of temperature and wind conditions condusive to snow build up	Snow & Ice build up occurs on overhead lines	Lines and structures compromised by ice loadings	Additional overhead line faults Safety risk due to compromised structural integrity or broken conductors	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Moderate	4	In place	EU Research COST 727 looking at we snow/ice loading of overhead lines. Expectations are that existing designs have adequate structural strength.	To be reviewed following completion of EU research COST 727
									Underground Cables	Melt causes excess water	Water ingress to occurrs	Additional cable faults occur due to water ingress	Loss of substation equipment leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
												Additional Link Box failures occur due to water ingress	Loss of substation equipment leading to loss of supplies to customers	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Protection																					
									Earthing	Melt causes excess water	Water ingress to occurrs	Earthing may become less effective	Safety risks	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Emergency Response & Planning	Combination of temperature and wind conditions condusive to snow build up	General snow & ice build up	Additional faults with slow response times due to problematic access	Increased number and duration of faults. Safety risk to staff due to weather conditions.	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	In place	Review of emergency planning procedures	In line with ongoing climate change predictions
									Vegetation Mgt	Combination of temperature and wind conditions condusive to snow build up	Snow & Ice build up occurs on vegetation	Additional faults caused by broken trees	Increased number of faults. Safety risk due to compromised structural integrity or broken conductors	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Veg mgt programmes in place.	
									Routine Business (Maintenance, R&R, Capital Investment)	Combination of temperature and wind conditions condusive to snow build up	General snow & ice build up	Access restricitions and reduced workforce	Unable to carry out business as usual due to access and travel difficulties.	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6				
									Customer Service	Combination of temperature and wind conditions condusive to snow build up	General snow & ice build up	Slow response times due to problematic access	Increased fault durations. Safety risk to staff due to weather conditions.	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	2	Unlikely	3	Moderate	6	In place	Review of business as usual procedures	In line with ongoing climate change predictions
	Hurricane & other high wind events	Met Office	Wind Speed		No increase forecast in the severity of high wind events Possible increase in the frequency of high wind events	No increase forecast in the severity of high wind events Possible increase in the frequency of high wind events	No increase forecast in the severity of high wind events Possible increase in the frequency of high wind events	No trend to forecast increase in wind speeds. 50-80% increase in the days of strong winds over the UK by 2070-2100 compared to 1975-2005 under worst case scenario	Substations	Increased frequency of high wind events weakens or damages substation structure		Damage occurs to substation buildings	Safety risk to staff and public due to falling objects or compromised structures.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Substation inspections to ensure integrity of structures and remedy issues		
									Transformers	High winds cause falling debris		Debris falls onto transformer causing damage and/or flashover	Transformer faults cause loss of supply to customers.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Circuit Breakers	High winds cause falling debris		Debris falls onto switchgear causing damage	Switchgear faults causing loss of supply to customers	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Overhead Lines	Increased frequency of high wind events weakens poles and fittings	More damage occurs to overhead line networks	Additional faults occur on overhead line networks	Increased overhead line faults. Safety risk to public and staff due to falling and fallen poles and conductors	3	Possible	3	Moderate	9	3	Possible	3	Moderate	9	3	Possible	3	Moderate	9	In place	Refurbishment programme to ensure integrity of the overhead network	
																									Potential	Review specification in line with changes in environmental conditions	Ongoing - as changes are observed and firmer data published
									Underground Cables																					
									Protection																					
									Earthing																					
									Emergency Response & Planning	Increased frequency of high wind events	Additional incidents occur	Resources strained in order to meet demand on fault repairs	Duration of faults increased due to limited resources for repairs.	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	Potential	Review thresholds for major incident.	As required in line with observed trends.
									Vegetation Mgt	Increased frequency of high wind events weakens vegetation	More damage occurs to vegetation	Additional faults occur due to vegetation damage to lines	Increased number of faults due to vegetation	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Vegetation management programme in place	
									Routine Business (Maintenance, R&R, Capital Investment)	High winds prevent certain types of routine activity	Routine activity (specifically on overhead lines) delayed as a result of unsuitable weather conditions	Routine activities delayed	Routine activities delayed.	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Additional work coming through Repairs. Annual review of investment plan takes account of these changes.	
										High winds cause additional faults	Routine activity delayed as a result of dealing with additional faults	Work declared as part of regulatory settlements deferred in favour of repairs.	Regulatory criticism as work planned is not completed due to diversion of funds to elsewhere	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Customer Service	Increased frequency of high wind events	Additional faults occur, additional temporary repairs facilitated	Increased repair times due to additional workload	Increased number and duration of faults. Safety risk to staff due to weather conditions.	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
	Extreme prolonged temperature periods (heat wave)	UKCP09	Mean summer temperature (central estimate)	14.2°C	L: 15.6°C M: 15.5°C H: 15.5°C	L: 16.4°C M: 16.5°C H: 16.8°C	L: 16.7°C M: 17.5°C H: 18.4°C	RCP8.5 projects a greater increase in summer mean temperature than the UKCP09 high scenario for our region. RCP6.0 is in line with the UKCP09 medium scenario and RCP4.5 with the low scenario. Analysis has been done on the number of days exceeding 28, 30 and 35 degrees celcius. In the current climate it is relatively rare for a day to exceed 30 degrees celcius in our region. The temperature exceeds 28 degrees for 3 consecutive days on average 4 times per annum. By mid-century, the chance of a hot summer like 2018 will have increased from 10% to 50%. Largest increases in temperature will occur in South East England. By 2060, the hazards from temperature for our region are expected to be equivalent to SE England today.	Substations	Ambient temperature at a sustained high level	Additional load placed on substation due to the connection of air conditioning	Insufficient available capacity for load	Potential load shedding or loss of substation due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Current spec calls for full rating at 30° C ambient temperature		All Northern Powergrid equipment is built to international, European and British standards which incorporate an amount of resilience. Due to the current varied global conditions, all standards currently allow for the equipment to operate in conditions which exceed those forecast to occur in the Northern Powergrid regions over the time period under consideration.
									Transformers	Ambient temperature at a sustained high level	Capacity of transformer reduced due to high ambient temperature	Insufficient available capacity for load	Potential load shedding or loss of transformer due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Annual review of loading of transformers against maximum demands to ensure adequate headroom on the network		
											Overheating of tap changer control mechanism	Tripping of tap changer	Loss of supplies	3	Possible	1	Limited	3	3	Possible	1	Limited	3	3	Possible	1	Limited	3	Potential	Amend specification to include sunscreen for new equipment. Retro fit scheme for existing.		
											Additional load placed on transformer due to connection of air conditioning	Insufficient available capacity for load	Potential load shedding or loss of transformer due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Annual review of loading of transformers against maximum demands to ensure adequate headroom on the network		
									Circuit Breakers	Ambient temperature at a sustained high level	Additional load placed on switchgear due to the connection of air conditioning	Insufficient available capacity for load	Potential load shedding or loss of switchgear due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Overhead Lines	Ambient temperature at a sustained high level	Capacity of overhead line reduced due to high ambient temperature	Insufficient available capacity for load	Potential load shedding or loss of circuit due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review of capacity of overhead lines to ensure fit for purpose in light of climate change predictions. Further explore dynamic load ratings - monitor on-site conditions and calculate real time rating		
											Additional load placed on circuit due to connection of air conditioning	Insufficient available capacity for load	Potential load shedding or loss of circuit due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review of capacity of overhead lines to ensure fit for purpose in light of climate change predictions. Further explore dynamic load ratings - monitor on-site conditions and calculate real time rating		
											Increased sag	Insufficient clearances	Additional risk of third party contact with overhead line	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review of spec for overhead line rebuilds to ensure fit for purpose in light of climate change predictions		
									Underground Cables	Increase in ground temperature	Change in properties of soil	Reduction in capacity of cables due to changes in soil temperature	Potential load shedding or loss of circuit due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review of cable ratings in light of climate change predictions		
												Mechanical movement causes stress on cables and joints	Additional joint / cable failures leading to loss of supplies	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	Planned	Flexibility test for joints to be included in specifications		
												Mechanical movement causes stress on link boxes	Additional link box failures leading to loss of supplies	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Protection																					
									Earthing																					
									Emergency Response & Planning	Ambient temperature at a sustained high level	High staff absence due to sickness	Reduced internal workforce	Staff re-allocation across the business required	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Vegetation Mgt	Ambient temperature at a sustained high level	Extended growing season	Additional encroachement of vegetation into overhead lines	Additional faults due to vegetation encroachment	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Veg Mgt programmes in place. Need to review in light of implication of climate change predictions on the growing season.		
									Routine Business (Maintenance, R&R, Capital Investment)	Ambient temperature at a sustained high level	Raised temperatures mean that current PPE is unsuitable, particularly for live line work.	Routine work delayed due to weather conditions	Planned work not delivered on time. Capital work and maintenance behind schedule	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Customer Service	Ambient temperature at a sustained high level	High staff absence due to sickness	Reduced internal workforce, potentially require additional contractors	Cost of work increases due to need to bring in contractors at raised cost.	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	In place	Plans in place to ensure business as usual during periods of increased absence through staff re-deployment		

		Available Data								Details of Risks / Opportunities				Now					Risk Assessment 2050s								2080s					Actions			Comments
Threat Type 1	Threat Type 2	Data Source	Data Type	Current	2020s	2050s	2080s	UKCP18 Update	Asset Type	Projected direct or indirect impact	Risks and Opportunities	Consequences	Stakeholder Impacts	Likelihood		Impact		Current Risk	Likelihood		Impact		Medium Term Risk	Likelihood		Impact		Long Term Risk	Status	Details	Timescales (planned & potential actions)		
	Extreme prolonged temperature periods (cold spell)	UKCP09	Mean winter temperature (central estimate)	3.1°C	All emissions scenarios: 4.4°C	L: 5.0°C M: 5.3°C H: 5.6°C	L: 5.6°C M: 6.1°C H: 6.7°C	Under RCP8.5 and 6.0 scenarios, warming forecast in line with UKCP09 high and medium scenario for our region. Reduced warming forecast under lower scenarios.	Substations	Ambient temperature at a sustained low level	Increased loading on substations due to additional heating and electrical appliances in use	Insufficient available capacity for load	Potential load shedding or loss of substation due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				All Northern Powergrid equipment is built to international, European and British standards which incorporate an amount of resilience. Due to the current varied global conditions, all standards currently allow for the equipment to operate in conditions which exceed those forecast to occur in the Northern Powergrid regions over the time period under consideration.
									Transformers	Ambient temperature at a sustained low level	Increased loading on networks due to additional heating and electrical appliances in use	Insufficient available capacity for load	Potential load shedding or loss of transformer due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Annual review of loading of transformers against maximum demands to ensure adequate headroom on the network		
									Circuit Breakers	Ambient temperature at a sustained low level	Increased loading on networks due to additional heating and electrical appliances in use	Insufficient available capacity for load	Potential load shedding or loss of circuit breaker due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Overhead Lines	Ambient temperature at a sustained low level	Increased loading on networks due to additional heating and electrical appliances in use	Insufficient available capacity for load	Potential load shedding or loss of circuit due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review of specification & capacity of overhead lines to ensure fit for purpose in light of climate change predictions		
											Higher mechanical tension in lines	Vibration and accelerated ageing of conductors	Asset life reduced leading to early replacement of conductors.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Regular inspections carried out to assess condition of lines and prioritise replacement.		
									Underground Cables	Ambient temperature at a sustained low level	Increased loading on networks due to additional heating and electrical appliances in use	Insufficient available capacity for load	Potential load shedding or loss of circuit due to overload	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review of specification & capacity of cables to ensure fit for purpose in light of climate change predictions		
									Protection																								
									Earthing																								
									Emergency Response & Planning	Ambient temperature at a sustained low level	Increased loading on networks due to additional heating and electrical appliances in use	Additional faults occur	Resources re-allocated more regularly leading to impact on business as usual.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2				
									Vegetation Mgt																								
									Routine Business (Maintenance, R&R, Capital Investment)																								
									Customer Service	Ambient temperature at a sustained low level	Loss of supplies to vulnerable customers become a greater issue	Need to reconnect any vulnerable customers as priority	Potential impact on customer service indicators	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Vulnerable customer identified on network		
	Lightning	No predictions currently available						Future predictions are uncertain. Cautious approach to assume a small increase in lightning days until further research is presented.	Substations	Increased lightning storms	Increased number of lightning strikes	Additional faults occur	Customers off supply	2	Unlikely	1	Limited	2														Lightning protection is provided extensively on our network, with attention focussed on known lightning hotspots. Provision includes Arc Suppression Coils and Triggered Spark Gaps. Network performance is continually assessed and any new initiatives which are considered to provide adequate cost-benefit will be implemented on the network at appropriate locations.
									Transformers	Increased lightning storms	Increased number of lightning strikes	Additional faults occur	Customers off supply	2	Unlikely	1	Limited	2											In place	Lightning protection provided across the network, targetted at known lightning hotspots		
									Circuit Breakers	Increased lightning storms	Increased number of lightning strikes	Additional faults occur	Customers off supply	2	Unlikely	1	Limited	2											In place	Lightning protection provided across the network, targetted at known lightning hotspots		
																												Potential	Utilise I2T monitoring to give a better understanding of condition		
									Overhead Lines	Increased lightning storms	Increased number of lightning strikes	Additional faults occur	Customers off supply	2	Unlikely	2	Minor	4											In place	Lightning protection provided across the overhead network.		
									Underground Cables																								
									Protection																								
									Earthing																								
									Emergency Response & Planning																								
									Vegetation Mgt	Increased lightning storms	Increased number of lightning strikes	Additional damage to vegetation	Additional faults occur due to falling / contact with vegetation	2	Unlikely	1	Limited	2														
									Routine Business (Maintenance, R&R, Capital Investment)																								
									Customer Service																								
Gradual Warming	Temperature Increase	UKCP09	Mean summer temperature (central estimate)	14.2°C	L: 15.6°C M: 15.5°C H: 15.5°C	L: 16.4°C M: 16.5°C H: 16.8°C	L: 16.7°C M: 17.5°C H: 18.4°C	RCP8.5 projects a greater increase in summer mean temperature than the UKCP09 high scenarion for our region. RCP6.0 is in line with the UKCP09 medium scenario and RCP4.5 with the low scenario. Analysis has been done on the number of days exceeding 28, 30 and 35 degrees celcius. In the current climate it is relatively rare for a day to exceed 30 degrees celcius in our region. By mid century, the chance of a hot summer like 2018 will have increased from 10% to 50%. Largest increases in temperature will occur in South East England. By 2060, the hazards from temperature for our region are expected to be equivalent to SE England today.	Substations																																
									Transformers	Temperature rise	Reduction in ratings	Capacity of transformers reduced	Network capabilities reduced leading to need for additional reinforcement.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Network capabilities & loadings regularly reviewed to identify any potential reinforcement requirements		
									Circuit Breakers	Temperature rise	Reduction in ratings	Capabilities of switchgear reduced	Network capabilities reduced leading to need for additional reinforcement.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Network capabilities & loadings regularly reviewed to identify any potential reinforcement requirements		
									Overhead Lines	Temperature rise	Reduction in ratings	Capabilities of overhead line network reduced	Summer maintenance window reduced. Network capabilities reduced leading to need for additional reinforcement.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Network capabilities & loadings regularly reviewed to identify any potential reinforcement requirements		
																												Potential	Review specification for overhead conductors at regular intervals to ensure sufficiency for standard loadings		
											Reduction in ground clearance	Safety clearances infringed, leading to increased risk of third party contact	Risk of prosecution for infringement of clearances. Additional faults occur due to increased third party contact	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Condition & sag of overhead lines inspected and reported at regular intervals.		
																												Potential	Review specification for poles at regular intervals to ensure that height is sufficient		
									Underground Cables	Temperature rise	Change in soil properties	Reduction in rating of cables due to change in soil resistivity	Network capabilities reduced.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review specification for cables to ensure sufficiency for standard loadings		
									Protection																								
									Earthing																								
									Emergency Response & Planning																								
									Vegetation Mgt	Temperature rise	Extended growing season	Additional encroachement of vegetation into overhead lines	Negative impact on customer service indicators	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Veg Mgt programmes in place. Need to review in light of implication of climate change predictions on the growing season.		
									Routine Business (Maintenance, R&R, Capital Investment)																								
									Customer Service																								
	Drought (soil drying & movement)	UKCP09	Mean summer temperature (central estimate) (A 1°C increase in air temp is reflected by a 0.75°C increase in soil temp at depths of between 0.45 & 1.2m) Mean summer precipitation (central estimate, mm/day)	14.2°C 2.1	L: 15.6°C M: 15.5°C H: 15.5°C L: 2.0 M: 1.9 H: 2.0	L: 16.4°C M: 16.5°C H: 16.8°C L: 1.8 M: 1.7 H: 1.7	L: 16.7°C M: 17.5°C H: 18.4°C L: 1.7 M: 1.6 H: 1.5	Changes in precipitation levels across all scenarios are roughly in line with those predicted in UKCP09 for our region. Significant variation can be found across the UK with the driest areas in the SE and the wettest in the west and highlands. In general there is little reduction in seasonal rainfall forecast. Summer rainfall increases greater in the North of the UK. RCP8.5 projects a greater increase in summer mean temperature than the UKCP09 high scenario for our region. RCP6.0 is in line with the UKCP09 medium scenario and RCP4.5 with the low scenario. Analysis has been done on the number of days exceeding 28, 30 and 35 degrees celcius. In the current climate it is relatively rare for a day to exceed 30 degrees celcius in our region. The temperature exceeds 28 degrees for 3 consecutive days on average 4 times per annum. By mid century, the chance of a hot summer like 2018 will have increased from 10% to 50%. Largest increases in temperature will occur in South East England. By 2060, the hazards from temperature for our region are expected to be equivalent to SE England today.	Substations	Change in soil condition of foundations	Subsidence	Substation subject to instability.	Risk to staff and public should the building become unsafe	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Existing substations subjected to inspections to ensure integrity. Ensure soil type and suitability is considered in locating new substations.		
									Transformers	Change in soil condition of foundations	Subsidence	Transformer subject to instability	Risk to staff should the transformer footings become unsafe	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Existing substations subjected to inspections to ensure integrity. Ensure soil type and suitability is considered in locating new substations.		
									Circuit Breakers	Change in soil condition of foundations	Subsidence	Switchgear mountings subject to instability	Risk to staff should the switchgear mountings become unsafe	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Existing substations subjected to inspections to ensure integrity. Ensure soil type and suitability is considered in locating new substations.		
									Overhead Lines	Change in soil condition of foundations	Subsidence	Poles / towers become unstable	Risk to staff and public should the pole/tower become unsafe	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	In place	Existing poles/towers subjected to inspections to ensure integrity.		
									Underground Cables	Change in water content of soil	Adverse effect on soil resitivity	Reduction in rating of cables due to change in soil resistivity	Insufficient capacity on the network	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review of cable ratings in light of climate change predictions		
												Mechanical movement causes stress on cables and joints	Additional joint / cable failures leading to loss of supplies	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	Planned	Flexibility test for joints to be included in specifications		
												Mechanical movement causes stress on link boxes	Additional link box failures leading to loss of supplies	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4				
									Protection																								
									Earthing	Change in water content of soil	Adverse effect on soil resitivity	Earthing may become less effective	Risk to safety if equipment not adequately earthed	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	2	Unlikely	2	Minor	4	Potential	Review of earthing policy in light of climate change predictions		
									Emergency Response & Planning																								
									Vegetation Mgt	Change in water content of soil	Change in natural habitats of different species	Type of vegetation in an area changes. Location of habitats change	Vegetation mgt targeted in incorrect areas.	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	2	Unlikely	1	Limited	2	Potential	Review of vegetation management programmes in light of changes to habitat	As required in line with observed trends.	
									Routine Business (Maintenance, R&R, Capital Investment)																								
									Customer Service																								
Wildfire		Not considered						Increasing risk of wildfire in future climates. Increased severity and frequency of fire weather conditions, increased fuel loading and flammability hazard of vegetation result in increased risk of wildfire. Can be exacerbated by extreme temperatures, drought and wind.	Substations																															
									Transformers	Fire occurs	Transformers catch fire	If filled with oil this could ignite	Loss of supplies	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	Potential	Look to utilise synthetic esther in place of oil in at risk areas		
									Circuit Breakers																								
									Overhead Lines	Fire occurs	Damage to ohl and ohl equipment	Poles damaged by fire	Failures leading to customers off supply	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	In place	Use of preservative on wood poles helps to prevent fire damage		
									Underground Cables	Fire occurs	Damage to cable and cable equipment	Cable terminations damaged by fire	Additional failures occur leading to loss of supply	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2				
												Disruptive Failure of cable terminations occurs	Additional failures occur leading to loss of supply	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2				
											Intense heat in vicinity of cables	De-rating occurs due to the heat of the fire	Network capabilities reduced	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2				
											Damage to link box	Link box damaged by fire	Additional failures occur leading to loss of supply	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2				
												Disruptive failure of link box occurs	Additional failures occur leading to loss of supply	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2	1	Very Unlikely	2	Minor	2				
									Protection																								
									Earthing																								
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