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Weather Resilience **Climate Cho** Adaptation Plan **Control Period** 2024-2029

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Document Control

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FINAL	11/04/2024	Final version for publication			

Submitted as part of Network Rail Wales and Western CP7 Strategic Business Plan.

This plan (contents of this document, including proposed actions) has been updated based on:

- draft (June 2023) and final (November 2023) determinations from ORR;
- the Network Rail Third Adaptation Report (2021);
- the Network Rail Third Adaptation Report: Appendix A Integrated ARP3 Climate Risk Assessment;
- the Network Rail Environmental Sustainability Strategy 2020 2050 (2020);
- The Wales and Western Strategic Business Plan (2023)

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Purpose of this document

This document; defines the W&W Region Weather Resilience and Climate Change Adaptation (WRCCA) Plan for CP7, against the backdrop of the WRCCA Plan published for CP6. This is supported by an evaluation of the resilience of rail infrastructure to historical weather events and an awareness of potential impacts from regional climate change projections. The resilience of the rolling stock and passengers within the Region is not specifically assessed.





Executive Summary

Climate change poses a significant and escalating threat to the operational integrity of the Wales and Western (W&W) railway network. Severe weather events, such as intense rainfall and strong winds from the Southwest, are increasing in frequency, demanding urgent action. The W&W region is committed to addressing this challenge through a comprehensive plan extending into Control Period 7 (CP7) and beyond, focusing on safeguarding assets, embedding resilience into daily operations, and adapting to climate change impacts.

As climate change continues to present unprecedented risks, this plan focuses on becoming resilient, mitigating vulnerabilities in our network, and ensuring the long-term sustainability and reliability of rail operations and services.

Key components of the CP7 plan include:

- 1. The plan begins with a thorough assessment of climate-related risks to Wales & Western regions infrastructure, including extreme weather events, rising temperatures, and changing precipitation patterns.
- 2. Investment in infrastructure with capital investment in pure resilience schemes along with BAU work bank activities with primary resilience to climate impacts. This includes measures such as improving earthworks, improving drainage systems, and making embankments more resilient to withstand extreme weather events and prolonged exposure to changing environmental conditions.
- 3. Wales and Western is committed in this WRCCA plan to creating an operationally resilient railway which will allow key decision to be made at the right time which will improve the reliability for our passengers.
- 4. The success of the CP7 plan relies on collaboration with stakeholders, including local communities, government agencies, and industry partners. Engaging stakeholders in the planning and implementation process fosters cooperation and ensures that adaptation measures are tailored to local needs and priorities. There will be a focus on working outside of the railway boundary where possible with a focus on Nature based solutions and whole catchment works to be planned.
- 5. The plan emphasizes the importance of research and innovation in developing cutting-edge solutions to climate-related challenges. Network Rail will invest in research initiatives to advance understanding of climate impacts on rail infrastructure and explore innovative technologies and materials to enhance resilience and sustainability.
- 6. Remote condition monitoring of at risk assets will be implemented in order to enable better decision making for asset renewals into CP7 and beyond.
- 7. Adaptation Pathways planning will start in CP7 to ensure that the climate threats that we are facing are being dealt with now and into the future with key thresholds decided for our most vulnerable sections of railway.

Overall, the Wales and Western Weather Resilience and Climate Change Adaptation CP7 plan demonstrates the Wales and Western regions commitment to addressing the urgent challenges posed by climate change. We support the Simpler, Better, Greener initiative that Network Rail are proposing. By implementing proactive adaptation strategies and investing in resilient infrastructure, Network Rail aims to ensure the continued reliability and safety of rail services in the face of a changing climate. A view of the Conwy Valley with flooding affecting the Llandudno Junction to Blaenau Ffestiniog line in 2020 showing the flooding extents in Llanrwst.

Chapter 1: Introduction to the Weather Resilience and Climate Change Adaption (WRCCA) Plan

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Wales and Western



1. Introduction to the WRCCA plan

Climate change presents a substantial and escalating threat to the operational integrity of our railway network. Year after year, the Wales and Western (W&W) region contends with a rising frequency of severe weather events, including high-intensity rainfall leading to flooding, and fierce winds prevailing from the Southwest. Recognising the urgency of this situation, the W&W region is resolute in its commitment to delivering a comprehensive plan that extends into Control Period 7 (CP7) and beyond, with a primary focus on safeguarding assets vulnerable to the impacts of climate change and embedding resilience and climate change adaptation into the day-to-day operations of the region. This initiative builds upon the foundation laid during Control Period 6 (CP6) and is a testament to our dedication to proactive approach to weather and climate resilience.

Our CP6 Weather Resilience and Climate Change Adaptation (WRCCA) plan encompassed both routine operational activities and dedicated resilience workstreams, with a particular emphasis on earthworks, drainage, off-track areas (including vegetation management), and the implementation of remote monitoring at priority locations. We also addressed risks associated with structures, including scour, adverse rainfall, and flooding. However, given the extensive coastal assets within our region, heavy rainfall and high winds continue to pose significant threats and challenges, resulting in operational disruptions that impact all facets of our infrastructure. Recommendations from weather-related incidents such as Carmont and subsequent recommendations from the Lord Mair and Julia Slingo reports are being swiftly implemented to bolster earthworks resilience through a raft of measures including enhanced drainage and water management These challenges are poised to intensify in CP7 and beyond.

In CP7, our principal focus will be to mitigate the impact of climate change so that we protect our asset base and reduce the operational impact so that the impact on passengers and freight users is reduced. The CP7 plans have been developed to support the delivery of our funder's and our stakeholder's key priorities and, therefore, include interventions that should enable us to minimise and mitigate the impact of extreme weather and climate change on the network and schemes that should improve the environmental sustainability of our business. However, recognising the broader funding context and pressures, we have had to make some tough choices and trade-offs about how we balance our spending in CP7 to provide the most value to our customers and the taxpayer. Whilst we cannot be certain of the future frequency of weather extremes, we know that the physical processes involved are those that will accelerate degradation of our assets. We expect it to become increasingly challenging to keep pace with the frequency and intensity of extreme weather events which we will be a significant factor in future control period plan.

Looking ahead into CP7 and beyond, we will actively develop adaptation pathways, considering all areas but with particular focus on low-lying and coastal infrastructure, to create long-term plans that empower decision-makers with trigger points and thresholds for prioritizing future investments. We will also work closely with our partners Transport for Wales (TFW) and National Resources Wales (NRW) to ensure that a combined approach with shared outcomes that benefit the end user are put in place. Our regional Adaptation Pathways work will seek to take a strategic look at assets vulnerable to climate change and put in place plans for them following on from extreme weather events. We are committed to exploring the intricate interdependencies along our railway corridors, building upon the substantial groundwork laid during CP6. Our aim is to identify opportunities and risks collaboratively with our partners to deliver a railway that is both resilient and robust.

Chapter 2: Introduction to the Wales & Western Region

A picture showing historic flooding at Chipping Sodbury with a steam engine running through the flood waters. Simpler. Better. Greener. Wales and Western



2. Introduction to the Wales & Western region



Figure 2-1: Map of the Wales and Western Region

The Wales and Western region which is situated in the western and coastal parts of mainland UK, boasts a variety of geographical, topographical, and climatic features. Geographically, this region encompasses the westernmost reaches of the British Isles and is bordered by the expansive waters of the Atlantic Ocean to the west. Its eastern boundary extends into the heart of England, creating a transition zone between the exposed coastal landscapes and the more central, continental-like regions.

Across the region we have a significant stretch of coastal railway that is at the forefront of challenges, particularly concerning overtopping during storms, a problem further intensified by the rise in sea levels induced by climate change. The vulnerability is particularly acute in Wales, where approximately 80 miles of coastal railway could potentially be under threat.

The coastal railway lines linking Aberystwyth with Pwllheli and Holyhead with Chester faces a daunting present-day scenario with over 10 miles of sea walls in place to shield the railway from the relentless assault of waves which will only get worse with future climatic change. The Western section, which spans the Exe and Teign estuaries and includes an open-coast segment, contributes an additional

11 miles of protective infrastructure. Additionally, there is over a mile of exposed coastal railway on the approach to Penzance. Together, these areas underscore the pressing need for strategic interventions and resilient solutions to safeguard vital coastal rail infrastructure.

Topographically, the Wales and Western Region is a land of stark contrast. To the south and southwest, low-lying plains stretch across Cornwall, Devon, and Somerset, offering a gentle and picturesque landscape. Here, the rolling hills and fertile valleys give way to some higher ground around Dartmoor and North Devon, adding undulating relief to the terrain. The key Bristol to Exeter railway route on the low-lying Somerset levels has historically been subject to flooding during wet winters and is a key route for adaptation to climate change.

In striking contrast, Wales is characterised by its impressive mountainous terrain, extending from the south to the northernmost points. These majestic mountain ranges, including the renowned Snowdonia and Brecon Beacons, dominate the Welsh landscape and provide breath-taking scenery. These mountainous regions add its own unique risks to the Wales Routes' railways in terms of its geotechnical vulnerability to assets from climate change to weather induced events caused by its unique topography.

Climatically, our region experiences a unique amalgamation of maritime and continental influences. Situated in close proximity to the Atlantic Ocean, the region benefits from the impact of the Gulf Stream, bringing in mild temperatures and moisture-rich air masses. However, this its geographical location also exposes the area to the unpredictable nature of Atlantic weather systems, contributing to unpredictable and changeable weather patterns.





In the context of coastal railways, this climatic vulnerability heightens the significance of climate change in the region. As previously alluded to the influence of Atlantic weather systems can translate into challenges for coastal rail infrastructure, particularly with the increased risk of overtopping events (where water is above track level on an embankment with a positive head of water on a particular side of the track which then allows water to move from positive head to lower head which can induce washout of the track formation from the flow of water) during storms and the potential exacerbation of these issues due to climate change-induced sea level rise. The frequent occurrence of rainfall, especially in the western portions of England and Wales, adds another layer of concern, as saturated grounds can impact the stability of coastal embankments, cuttings and structures. Additionally, the susceptibility to convective storms, especially in areas like the Thames Valley, raises the potential for intense localized weather events along the railway routes, necessitating robust resilient engineering solutions and proactive maintenance strategies to mitigate the impact of extreme weather and climate change on the rail network.

Following the tragic sequence of events at Carmont on 12th August 2020 where a train derailed because of a landslip after heavy rainfall, our Weather Risk Task Force (WRTF) was established to address the recommendations from the Lord Robert Mair and Dame Julia Slingo reports. For further information on the WRTF's activities in CP7, please see our System Operator's delivery plan.

2.1 Past weather impacts in Wales and Western Region

During CP6, our region has contended with a complex array of weather-related challenges that have impacted our asset base. Flooding events, exacerbated by heavy and persistent rainfall, have posed significant threats to the stability of embankments, cuttings and track formation, resulting in service disruptions, costly schedule 8 payments (Figure 2.1-1) and extensive recovery efforts. Gale force winds, characteristic of the regions exposure to Atlantic weather systems, have proven disruptive, leading to fallen trees (exacerbated by dead, diseased, or dying trees (DDDT) across the region), debris on tracks, and structural damage to rail assets. Low temperatures, on the other hand, have triggered concerns related to frost and freezing conditions, impacting the integrity of our rail infrastructure. Conversely, periods of elevated temperatures have raised issues such as track buckling, stressing the need for thermal management measures.

Recurring flooding at Wooten Bassett has significantly impacted the railway infrastructure. The lowlying geography, combined with heavy and sustained rainfall events, has made it prone to flooding, affecting the adjacent railway lines. Floodwaters have submerged tracks, leading to service disruption, and necessitating immediate response measures to assess and mitigate the damage. The flooding at Wootton Bassett has not only posed operational challenges and high schedule 8 costs (Figure 2.1-1) but has also underscored the critical need for resilience in the railway infrastructure, demanding ongoing efforts to enhance drainage systems, reinforce embankments, and implement adaptive strategies to minimize the impact of future flooding events on this segment of the Wales and Western Region's rail network.

High winds, particularly along coastal and exposed areas often associated with Atlantic weather systems, have led to instances of fallen trees and debris on tracks, disrupting rail services. For instance, in the coastal sections connecting Holyhead with Chester, the railway has been extremely susceptible to structural damage and obstructions caused by high winds.

Over the last five years the railway has seen an increase of 50% in weather-related service affecting failures compared to the previous ten years, as shown in Figure 2. Recognising that climate change





will continue to have an increased impact on the railway, the management of weather resilience will be integral to the running of the railway in the future.

Heat has had less of an impact on our assets in Wales and Western compared to other regions, despite the higher schedule 8 for Western heat related delays. The reason can partly be attributed to the differing overhead line equipment specification and the use of modern automatic tension systems which can manage a higher rate of expansion in the Overhead Line Equipment (OLE). Our highest risk assets susceptible to head stress is limited to the OLE on the 12 miles on the approach to Paddington as this is an older system. This is a short-term risk as it is due for renewal in CP7. The effect of heat on our track assets is minimised because of the realisation of a long-standing replacement programme to eliminate these susceptible assets, such as wooden S&C layouts, jointed, and lightweight continuously welded track.

The traditional controls associated with hot weather management will continue but careful and considered preparation by our track maintenance teams each year helps reduce the impact to the operational railway.

In Wales and Western Region we have experienced several infrastructure failures during the extreme heat of summer 2022. Most of the failures occurred during the periods of July 18 & 19th and August 8th-11th. The region experienced 2 track buckles, three minor lineside fires, and several power failures. The highest recorded air temperature in the region currently stands at 37.1°C. In contrast, the rail temperature has reached 59°C at Cam and Dursley.

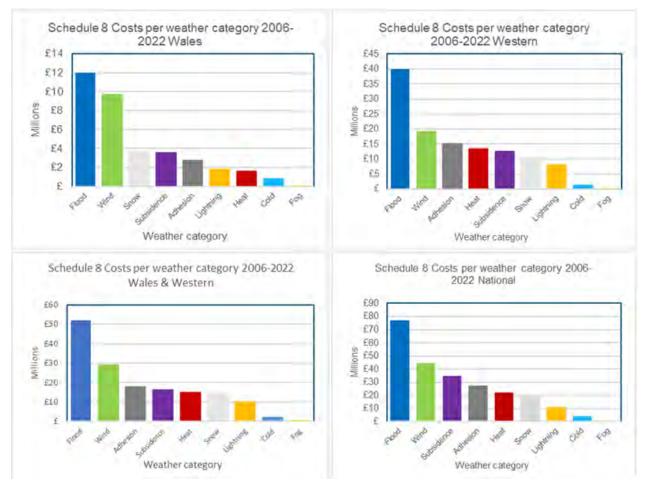


Figure 2.1-1: Schedule 8 costs for the Wales and Western Region due to impacting weather events.





The collective impact of these weather extremes during CP6 highlights the importance of a comprehensive and adaptive approach to weather resilience, infrastructure maintenance, and strategic planning within the Wales and Western Region to ensure the continued reliability of the rail network.

A photograph taken from the Dovey Junction to Pwllheli line looking over towards Fairbourne where the sea level is expected to rise and inundate the land where the railway embankment crosses.

Chapter 3: Managing WRCCA in the Wales & Western Region

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3. Managing WRCCA in the Wales & Western region

Mitigating the impact of extreme weather and climate change in CP7 is a priority. To deliver this, we have established a number of working groups, including the Strategic Weather Group and Seasonal Delivery Group. The flowing sections will outline the Wales and Western regions approach to managing WRCCA.

3.1 Governance of WRCCA in the Wales & Western region

Mitigating the impact of extreme and adverse weather, and planning for further changes in our climate, cuts across various areas of Wales and Western Region.

Our two routes (Wales and Borders route and Western route) have responsibility for the day-to-day operations of the railway, overseeing the implementation of, and updates to, the Seasonal Delivery Plans. Which support the initiatives in this plan.

Elements of this responsibility are formally covered through the risk management process. Risks associated with the resilience of our operations during extreme or adverse weather, and associated mitigations, are reviewed quarterly as part of this process and is now a key deliverable with the engineering and asset management function.

The engineering and asset management director has overall responsibility for the assets and investment plans. Dedicated asset engineers provide advice and guidance on specific assets where there may be an increased risk of failure associated with impacts of weather. They also develop work banks of planned interventions on the assets, with many of these interventions delivering weather and climate resilience benefits.

The engineering and asset management director (DEAM) provides the overview, and monitoring, of delivery of most Network Rail actions in this plan. A dedicated weather resilience and climate change adaptation strategy lead provides strategic oversight of the activities set out in this plan and provides climate data, information, and insight to support other teams in taking more effective climate action. The role also coordinates regular monitoring and reporting activities and provides updates to the head of sustainability periodic meeting and to the DEAM through periodic leadership meetings.

At national level, our Technical Authority is accountable for developing the environmental sustainability strategy and corporate risk register for managing weather and climate change risk, supporting collaboration with teams across the organisation.

The national weather resilience and climate change adaptation team also defines the company vision, strategy, and policy for the management of weather and climate change resilience within Network Rail.

3.2 Strategic Weather Group

Our Strategic Weather Group (SWG) is a periodic meeting, and plays a vital role in enabling us to coordinate our weather resilience and seasonal readiness and supports frequent engagement with stakeholders. This is achieved by sharing knowledge on current seasonal and weather-related issues and solutions. This has been piloted in Wales and Borders Route throughout CP6 and will be rolled out across the region for CP7.

The meeting is attended by cross regional representatives from all relevant functions.





Each member is responsible to represent their individual area raising concerns in addition to contributing knowledge and skillsets to undertake weather and seasonal project actions arising from SWG meetings.

3.3 Weather Risk Task Force

Following the tragic sequence of events at Carmont on 12th August 2020 where a train derailed because of a landslip after heavy rainfall, four reports were produced containing a series of recommendations:

- The Rail Accident Investigation Branch (RAIB) report contains 20 recommendations covering all aspects of the accident from train crashworthiness to how asset data is properly recorded. Each region is responsible for closing out one recommendation related to asset data gap analysis
- Network Rail's own H&S team produced a report following a Level 3 investigation containing 21 recommendations. W&W region have responsibility (with the other regions) for closing out six of these.
- An expert report was commissioned from Lord Robert Mair (focusing on earthworks/geotechnical risks for Network Rai). W&W are working to close out six regional action plans.
- A further expert report focussing on weather information was commissioned from Dame Julia Slingo. The Slingo recommendations are all being led centrally; as a region Wales and Western are contributing as required.

The following forums are attended to ensure a fully integrated approach:

- Lord Mair Recommendations Working Group a periodic group led by the TA with representation from all Regions and other action plan owners;
- Weather Risk Task Force Management Steering Group: a periodic group focussing on ensuring progress against the actions are being made – Regional Representation to provide updates;
- Slope Safety Review Group regular regional meeting set up as part of the recommendations now being used to share best practice, peer review and focus on progress against remaining actions;
- Regionally periodic meeting held with ORR to report progress.

In CP6 as part of the recommendations from the WRTF, we increased our drainage maintenance expenditure by £16m. This has been delivered through existing maintenance teams and contractor resources across Wales and Western. The CP7 business plan has seen an increase in the following areas from CP6 in line with the recommendations:

- Drainage maintenance
- Aerial surveys
- Increased assessments and monitoring





3.4 WRCCA within the Wales & Western Sustainability Strategy

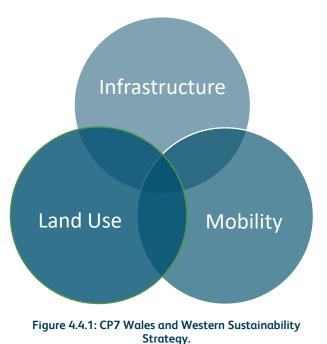
Our approach for delivering sustainable transformation is purpose driven and is a key part in delivery our WRCCA plan actions. Sustainability is complex, and trying to establish the actions and benefits without considering the role of the railway in mitigating climate change could lead to unintended consequences.

It is for this reason that the approach has been to cross-reference the role of the railway against the 17 UN Sustainable Development Goals (SDGs) to establish how we can best have an impact on global sustainability and what actions are required for that transformation. These key targets within the UN SDGs are linked in a spider diagram (below) to establish what direct and indirect areas we should focus on.

The areas of influence identified in the spider diagram are displayed in Figure 4. The WRCCA Plan has a direct influence on Land Use via the Target 13.1 (above), however there are indirect influences on the areas of Infrastructure and Mobility – whether this is designing greener infrastructure for resilience or improving the recovery of adverse weather impacts to get the railway mobile again.

Actions prescribed in this document will link in with the CP7 Wales and Western Sustainability Strategy as initiatives to meet the needs for a railway fit for the future. This will be reviewed upon the release of the national sustainability strategy version 2 later in 2023.

Link to national WRCCA Strategy which will be agreed in the summer.



3.5 Operations

The points below detail the operational plans for CP7, some of which continue from CP6. We recognise that this list of initiatives is will evolve over CP7.

- 1. The rollout of the regional seasonal weather group piloted in Wales and Borders in CP6.
- The continuation and ongoing development of EWAT (Extreme Weather Action Teleconference) and AWAT (Adverse Weather Action Teleconference) processes to manage adverse and extreme weather events to turn forecasts and alerts into real time actions to mitigate operational risks and protect the infrastructure (ORR lever 4 forecasting – see section 6.3).
- 3. Collaborative work with the route reliability improvement specialists, intelligent infrastructure technicians, performance teams and asset management and engineering teams to provide a fit-for-purpose infrastructure monitoring system.
- 4. For ice in tunnels, Wales & Western have incorporated the monitoring system into the control room automating response using real time data. The new ice in tunnels regional project has briefed out to controllers for the last two years of CP6 and will continue to be briefed into CP7





and beyond. The trial project could be expanded to include shaft locations at risk of ice formation.

- 5. Roll-out of asset recovery plans to assist control with the recovery of the asset when an event triggers line closure or the implementation of operational restrictions.
- 6. Operations Control room monitor all existing weather monitoring systems and respond to alerts and alarms triggered to initiate required response. The systems monitored include:
 - a. Tilt sensors
 - b. Track movement sensors
 - c. CCTV drainage monitoring
 - d. Flood monitoring
 - e. Ice in tunnels system
 - f. CAT/ PAT tool
- 7. Introduction of a new 24/7 IC infrastructure desk in CP6 year 5 will support continuous monitoring of the existing remote condition monitoring systems and support the introduction of additional remote condition monitoring systems in line with intelligent infrastructure aspirations.
- 8. Training development established for each rail incident commander in order to support the implementation of strategic command where required in response to extreme weather or infrastructure faults relating to extreme/ adverse weather events.
- 9. Exercising and testing carried out within control for each season (heat, cold weather and rail adhesion) in order facilitate continued improvements and ensuring all processes, roles and responsibilities are understood ahead of each change in season. This also provides an opportunity to share lessons learnt across the organisation.
- 10. Implementation and improve of contingency plans and traffic management plans in the event of degraded working as a result of weather at high risk locations to be developed and embedded during CP7.

A photograph showing a landslide at the Severn Estuary site along the South Wales mainline with a significant amount of material reaching the cess.

Chapter 4: Wales & Western Region Climate Change Risks

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4. Wales & Western Climate Change Risks

This section outlines the specific climate change risks for the Wales and Western Region. Over the last control period the region has experienced a lot of these events first hand. which have led to some large-scale failures which has caused disruption to the network. With the projected increase in the frequency of these events due to climate change, it is essential that we continue to invest in mitigating the impact of extreme weather and climate change on the railway. In addressing the pressing challenges posed by climate change, we have undertaken a comprehensive risk assessment to systematically evaluate and prioritize climate change risks.

This ARP3 Risk Assessment (Appendix A) involves a meticulous examination of vulnerabilities across the region, considering factors such as coastal overtopping leading to embankment failure, flooding in low-lying areas like Wootton Bassett, and the impact of high winds. By engaging with the regional asset teams and stakeholders, we identified key vulnerabilities and assessed their potential consequences on railway operations across the region. This methodical approach enables us to proactively address and mitigate climate change challenges, emphasizing asset resilience and operational resilience, operational recovery post events and the implementation of targeted resilience mitigation measures to ensure the ongoing functionality and reliability of the regions rail network amidst a changing climate landscape.

The remaining section in this chapter will highlight the top climate change risks that have been identified in the ARP3 Risk Assessment (Appendix A) and discuss the key implications of these risks in terms of asset vulnerability across the region.

4.1 Sea Level Rise

Wales has the largest amount of coastal rail network across the UK and so sea level rise presents a significant challenge, with discernible impacts on coastal areas and rail infrastructure. Over recent years, the sea level in these regions has been rising at an average rate of approximately 3 millimetres per year. This gradual but persistent increase in sea levels heightens the susceptibility of coastal railways and low-lying regions to the risks of overtopping during storms and tidal events. Areas like Penzance and the Exe and Teign estuaries, along with Wales, with its extensive coastal routes, faces a collective challenge in adapting to this changing coastal dynamic.

In 2014, failures of coastal defences occurred following a storm event resulting in damage to the sea wall at Dawlish. This caused significant disruption to both the railway network and the local economy with an estimated ± 50 million in economic loss to the surrounding area due to an absence in network connectivity. The south-west of England remained disconnected from the railway network for 2 months.

The National Flood Risk Assessment identified 21 % of railways are at risk (Environment Agency, 2009) with the Government office of Science estimating 4–5 per cent of the UK railway network length and stations are in areas with 'significant' or 'moderate' annual chance of coastal flooding (Dr Tamsin Edwards, 2017).

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	RCP2.6			RCP4.5			RCP8.5					
	2100*	2100†	2200†	2300†	2100*	2100†	2200†	2300†	2100*	2100†	2200†	2300
London	0.30	0.30	0.5	0.6	0.38	0.36	0.7	0.8	0.54	0.52	1.1	1.5
	- 0.71	- 0.72	- 1.5	- 2.2	- 0.84	- 0.84	- 1.8	- 2.6	- 1.16	- 1.13	- 2.8	- 4.3
Cardiff	0.28	0.28	0.4	0.5	0.36	0.34	0.6	0.8	0.52	0.50	1.1	1.4
	- 0.70	- 0.71	- 1.5	- 2.2	- 0.83	- 0.82	- 1.8	- 2.6	- 1.14	- 1.11	- 2.8	- 4.2
Edinburgh	0.09	0.08	0.1	0.0	0.16	0.14	0.2	0.2	0.30	0.28	0.6	0.7
	- 0.50	- 0.51	- 1.1	- 1.6	- 0.62	- 0.61	- 1.4	- 2.0	- 0.91	- 0.88	- 2.3	- 3.5
Belfast	0.12	0.11	0.1	0.0	0.19	0.17	0.3	0.3	0.34	0.31	0.7	0.8
	- 0.53	- 0.54	- 1.2	- 1.7	- 0.66	- 0.65	- 1.5	- 2.1	- 0.95	- 0.92	- 2.4	- 3.6

Figure 4.1-1 Comparison of the UKCP18 21st century mean annual sea-level change (m) at UK capital cities in 2100 relative to 1981-2000 average, for a low (RCP2.6), medium (RCP4.5) and high (RCP8.5) emissions scenario (left most column for each scenario) and the extended projections in 2100, 2200 and 2300. Numbers beyond 2100 are quoted to the nearest 0.1m, given the lower confidence associated with projections on these extended time horizons.

Figure 4.1-1 from the Met Office provides a comprehensive comparison of the UKCP18 (United Kingdom Climate Predictions 2018) 21st-century mean annual sea-level change at major UK capital cities. The data is presented for three emissions scenarios - low (RCP2.6), medium (RCP4.5), and high (RCP8.5) - each depicted in the leftmost column for the year 2100 relative to the 1981-2000 average. The subsequent columns extend projections into the years 2100, 2200, and 2300. Both London (Paddington Station and west) and Cardiff are geographically in the region and the data shows that for all emission scenarios London and Cardiff will see the biggest increase in sea level rise. Figure 4.1-2 illustrates this for the RCP2.6 scenario.

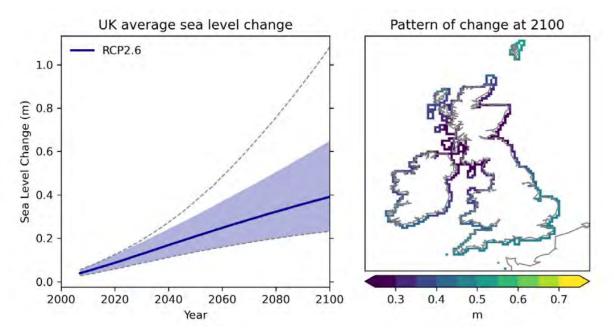


Figure 4.1-2: Graph: Time series of time-mean sea-level change based on the average of the UK ports. Map: The spatial pattern of change at 2100 associated with the central estimate of each RCP scenario

4.1.1 Shoreline Management Plans

As a result of the threat of sea level rise, Shoreline Management Plans (SMPs) have been produced for the coastlines of England, Scotland and Wales; developed by the relevant Coastal Groups, with members mainly from the local authorities and the Environment Agency and/or Natural Resources





Wales (NRW). These have been completed in line with the guidance from the Department for Environment, Food and Rural Affairs (Defra).

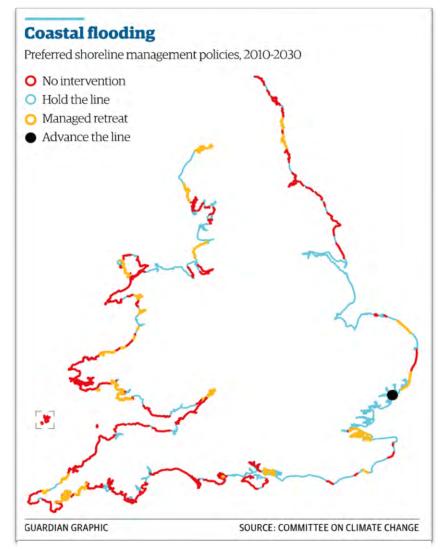


Figure 4.1-3: Map showing coastal flooding areas with preferred shoreline management plans. Note that the majority of the Wales & Western region is no active intervention.

The SMPs identify the most sustainable approach to managing the flood and coastal erosion risks to the coastline and support efforts to prepare for future sea level rises and increased likelihood of flooding caused by severe weather events over a 100-year period. The SMPs are being utilised as the guidance which local authorities and other stakeholders are using for their future plans for communities, infrastructure, and land on the coast.

To better protect the railway against future changes in sea level rise and the impact of coastal changes, Network Rail will continue to be involved in the coordination and alignment of both strategic planning and asset management. Network Rail is not a Coastal Protection Authority but at certain locations it serves as the first line of defence.

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4.1.2 Wales Specific Coastal Impacts

Wales has the largest coastal railway network in the UK, and rising sea levels prompt a need for a long-term perspective on the potential impacts on railway assets, passengers, and freight users. These coastal lines, mainly serving rural communities, are crucial for social connectivity. Climate change is already significantly affecting the National Rail network, with extreme weather events and rising sea levels negatively impacting infrastructure and performance annually.

Extreme weather affecting the Conwy Valley Line in 2019 and 2020 and emergency works at Afon Wen in 2021 highlight this impact. Each section of the Welsh coastline is categorized under Shoreline Management Plans (SMP) – Hold the Line, Managed Realignment, and No Active Intervention, aligned with specific EPOCH periods (Up to 2025, 2026–2055, and 2056–2105). SMPs forecast likely effects over short, medium, and long terms, each with three assigned policies for implementation during respective epochs.

Shoreline Management Plan epoch periods are as follows:

- Epoch 1 Up to 2025
- Epoch 2 2026 2055
- Epoch 3 2056 2105

SMP Policy Definition:

- No active intervention (NAI) A decision not to invest in providing or maintaining coastal defences
- Hold the line (HTL) Maintain or upgrade the standard of protection offered by existing defences.
- Managed realignment (MR) Allowing the shoreline to move backwards or forwards, to realign the natural coastline configuration.

Work will be undertaken throughout CP7 to identify the key assets that will be at risk of sea level rise and where they will become the first line of defence if no active intervention is states in the SMP. This work will form part of the Adaptation Pathways (Chapter XX) and will require extensive collaboration between Network Rail, Natural Resources Wales and Transport for Wales.

4.1.3 Western Specific Coastal Impacts

Western Route has experienced several high-profile coastal flooding events, however, with sea levels due to rise by the end of century, relative to 1990 levels (based on UKCP18), water inundation will become more prevalent within coastal sections of the Route. Western Route has 245 miles of coastal boundary. With sea level rise, there are numerous branch lines to coastal resorts that are inherently more vulnerable to flooding, coastal erosion, and potential loss of the railway.

Within the Western route, there are multiple high-risk areas from sea level rise, with the Penzance area forecasted to be the most impacted in the UK by 2050 with Weston-Super-Mare a close second. Sea level is expected to rise with increasing storm intensity and frequency along the southwest coast posing significant risk to Network Rail infrastructure.





4.2 Changing precipitation patterns & flooding

Climate change is instigating noticeable shifts in precipitation patterns across the Wales and Western Region, bringing with it new climatic challenges. As a consequence, the region is experiencing alterations in its usual rainfall distribution and intensity. These changing precipitation patterns hold profound implications for Network Rail's infrastructure, as increased rainfall heightens the risk of flooding in low-lying areas and coastal regions. Furthermore, these shifts may also influence the stability of embankments and cutting supporting the tracks, requiring a strategic and adaptive approach to railway management in response to the evolving climate dynamics.

Figure 4.2-1 illustrates the anticipated changes in winter precipitation expressed as a percentage for three different future periods: the 2030s, 2050s, and 2070s. These projections are made in comparison to a baseline established during the years 1981-2000. The left-to-right progression shows an increase in winter precipitation for Wales and Western. The most noticeable increase is in the Southwest with the highest increase across the UK.

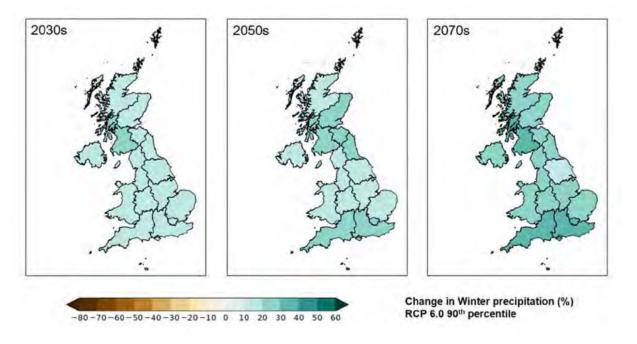


Figure 4.2-1: Change in Winter precipitation (%) (left to right; 2030s, 2050s and 2070s) based on a 1981-2000 baseline.

Flooding (fluvial & Pluvial) continues to be a significant issue in Wales & Western and carries the most significant portion of our weather-related delay minutes, representing £51m in schedule 8 costs and over 1.2 million delay minutes between 2006 to 2022. Our earthwork adverse and extreme weather plan relies on operational restrictions to mitigate risk from earthwork failure. The risk in the Wales and Western Region is greater than the national risk scores due to the influence of the Atlantic Weather systems and gulf stream arriving at our topography before the rest of the country.





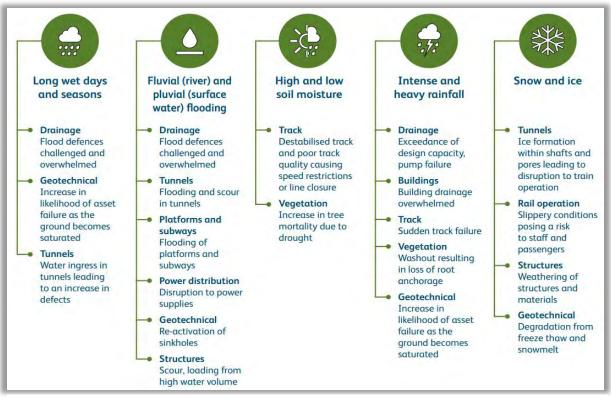


Figure 4.2-2: Key rainfall risk to our network (Network Rail, 2021).

To represent this increased risk Wales and Western have increased the likelihood associated with rainfall on our ARP3 climate risk assessment scores. Figure 4.2-1 highlights our key precipitation risks to our network and the key failure mechanisms to our assets and Table 4.2-1 highlights the key risks and identifies the CP7 plan to address these climate risks.

Table 4.2-1: Table highlighting key precipitation risks to our network from Figure 4.2-1 and the CP7 plan to address.

Asset Type	Climate Implication	Climate Future Risk	CP7 Plan
Drainage	Long wet days and seasons Fluvial and Pluvial flooding	Flood defences challenged and overwhelmed	As our drainage systems are renewed, they are being designed to manage current and future predicted extreme weather conditions in line with our drainage design standards. Due to underinvestment in the drainage assets over the last 30+ years, many of the systems which reach capacity are also at the end of their serviceable life and are therefore funded from the asset condition driven core business plan. This approach covers off multiple ORR levers (2 – whole systems, 5 – design redundancy, 6 – design reliability and 7 – design resistance) due to the systems approach established in





	Intensity in heavy rainfall	Exceedance of design capacity, pump failure	the region to drainage assets complimented by the design standards which ensure all drainage systems are fit for the future climate change projections.			
	Long wet days and seasons	Increase in likelihood of asset failure as the ground becomes saturated.	The risk is mitigated through operational restrictions which has a detrimental effect on performance, this is managed through the earthwork adverse weather plan which looks to reduce the consequence and not the likelihood of failure. The CP7 earthworks			
	Fluvial and Pluvial flooding	Reactivation of sinkholes and overtopping of embankments,	business plan seeks to manage all sites identified as adverse weather risk locations within the adverse weather plan. This indicated a commitment to remediate the existing known locations identified within the adverse weather plan in CP7.			
Geotechnical	Intense and heavy rainfall	Increase in likelihood of asset failure as the ground becomes saturated.	Fluvial flooding has become a major issue for Wales and Borders Route in CP6 with multip failures of embankments in floodplains. In response to the 5 washouts that occurred between 2019 and 2022 on Wales and Borders at Welshpool (as shown in Figure 18			
	Snow and ice	Degradation due to freeze thaw action.	Llanrwst, and Pandy, a project has been created to determine embankment flood risk. The purpose is to identify embankments at high-risk of washout failure during overtopping events and prioritise future flood resilience works.			
	Long wet days and seasons	Water ingress in tunnels leading to an increase in defects	A revised version of NR/L2/CIV/295 (Scour assessment of bridges, culverts and retaining walls) dated December 2022 incorporates the effects of climate change on structures subject to scour with factors added to the design flood waters and velocities. The design flood is the flood that a structure should be capable of withstanding without			
Structures	Fluvial and Pluvial flooding	Flooding, scour and loading from high water volume	suffering damage; the probability of this is normally expressed by the return period, the average period between events of a similar magnitude. The design flood would therefore require the following actions:			
	Snow and Ice	Ice formation within tunnels	Tunnels deemed at high risk of ice formation are included in the extreme weather plan. The extreme weather plan details a trigger level			

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and shafts	action plan including the operation response
and	during periods of sustained cold weather,
weathering of	further details can be found in the document
materials.	'Plan for managing ice in Tunnels – Regional'
	held by the senior asset engineer for tunnels.

4.3 Temperature Range

One of its most tangible impacts on railway infrastructure lies in the altering temperature patterns that affect the Wales and Western Region. The pervasive warming of the Earth's climate introduces a suite of challenges and considerations for Network Rail. Rising temperatures can influence the integrity of rail tracks, embankments, and other critical components, potentially leading to issues such as track buckling. Moreover, extreme temperature events, both high and low, can impose stress on railway systems, demanding adaptive strategies to ensure resilience.

The mean daily minimum temperature for Wales and Western Region is also projected to show increases throughout the year with the highest in Summer. The level of increase is expected to become higher across the century. In Wales and Western Region, on our primary routes our asset can withstand a 35°C air temperature, as the air temperature raised above this operational restrictions may be applied. The highest mean minimum temperatures for Summer are expected to be in July, with increases of 4.1°C to 14.7°C by the 2050s and 5.9°C to 16.5°C by the 2080s. The lowest mean minimum temperatures will still occur in February with expected increases being 3.2°C by the 2050s to 3.8°C, and 4.5°C by the 2080s to 5.1°C. The graph demonstrates this in Figure 15

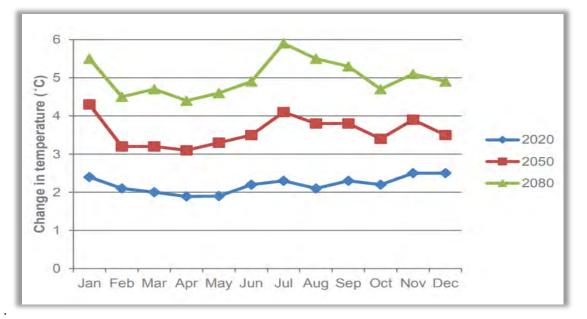


Figure 4.3-1: Wales, mean minimum temperature changes, medium emissions 90th percentile.

The Wales and Western Region faces an escalating level of risk concerning temperature ranges attributed to climate change (Figure 4.3-2), exerting considerable pressure on the railway infrastructure. Figure 4.3-2 illustrates the projected changes in mean daily maximum summer temperatures, expressed in degrees Celsius, for three future periods: the 2030s, 2050s, and 2070s. The data is compared against a baseline established during the years 1981-2000. The left-to-right progression denotes a chronological timeline, with each subsequent column representing a





subsequent decade. The values in degrees Celsius indicate the expected shift in daily maximum summer temperatures during the specified future periods relative to the baseline.

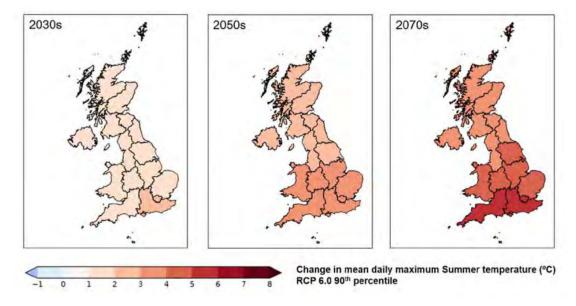


Figure 4.3-2 Change in mean daily maximum Summer temperature (°C) (left to right; 2030s, 2050s and 2070s) based on a 1981-2000 baseline.

Between 2016 and 2022 low and high temperatures have accounted for £17 million in Schedule 8 costs (£2.8 million per year) and just over 300k delay minutes in Wales and Western region. The risks experienced within our region are reflected in Figure 16 and considering climate change projections these are likely to increase in future years.

However, the impacts of both extremes are highly variable within the region. In 2016/17 the Schedule 8 impact of cold temperatures cost \pm 50k whereas 12 months later in 2017/18 the costs were closer to \pm 500k. The impact of high temperatures on the railway have varied from less than \pm 120k in 2012/13 to over \pm 4 million in 2018/19. It should also be noted that extreme temperatures affect a much wider area than other more localised impact types such as flooding.

In recent years, hot summers have put a spotlight on our vulnerabilities to high temperatures particularly around our track, OLE assets and the welfare of lineside personnel and passengers on stranded trains. Additional safety, reputational and performance risks come from the potential for derailments from track buckles in high temperatures. As a result, there is an increased need for incident response which in turn reduces the capacity to undertake tasks.

As climate change progresses, risks associated with the diurnal range are also likely to rise and these can have a considerable impact on our infrastructure.





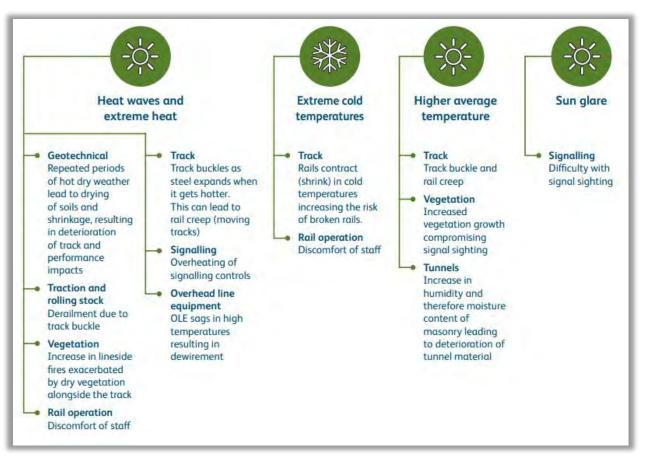


Figure 4.3-3: Key temperature risks to our network (Network Rail, 2021).

4.3.1 Heat

Wales and Western Region has both continuously welded rail and jointed track, with Wales route having a higher proportion of jointed track compared with most routes nationally. Steel rails expand or contract depending on their temperature, and in direct sunshine can be up to 20°C hotter than ambient air temperature. If the temperature rises above the critical rail temperature level, this could lead to a track buckle.

The risk of track buckling can be increased by existing deficiencies in track condition (lack of ballast, changing rails and not restoring stress), track support (poor formation conditions e.g., wet beds) and the activities which may disturb the track (manual and mechanical replacement of ballast, On-Track Machine intervention and track replacement). Other engineering work on or around the track bed which may affect the track support zone can also introduce new instabilities whilst the assets settle. Primarily in jointed track, another phenomenon that increases the risk of a track misalignment is rail creep where the rail moves towards a fixed asset. It does take place in continuously welded rail where certain rail fastenings increase this risk. Locations with significant track gradients and repeated braking of trains also contribute to rail creep.









Figure 4.3-2: Track buckle on Western route in summer 2018.

The mitigation measure for track buckles is to slow trains through temporary speed restrictions when high temperatures are experienced, this does not reduce the likelihood of the track misaligning (see figure 4.3.2) but significantly reduces the consequence. The hot summers experienced over the past few years have resulted in a high number of speed restrictions when track temperatures reach up to 50°C. While the network can continue to operate under a reduced capacity it can cause major disruption particularly if restrictions are widespread with cancellations and severe delays to passengers and freight.

Calendar year	Maximum monthly temperature (°C)					
	June	July	August			
2018	33.0	31.0	27.8			
2019	29.9	30.0	28.8			
2020	31.3	31.1	33.5			
2021	27.4	31.2	24.5			
2022	28.4	37.1 (Wales Record)	33.8			

Table 4.3-2: Maximum Monthly Summer Temperatures

With average global temperatures on the rise, instances of extreme heat are becoming more frequent and are projected to become the norm. According to climate data (highlighted in table 4.3=2), the region has experienced a notable increase in the number of days with temperatures exceeding historical averages. Extreme heat events not only contribute to track deformation, leading to the phenomenon known as track buckling, but also compromise the structural integrity of railway





infrastructure. For instance, prolonged exposure to high temperatures can result in the deterioration of rail tracks and components, elevating the risk of service disruptions and safety concerns.

4.3.2 Temperature impacts on our electrification assets

During extreme hot weather, overhead wires can sag as they expand beyond the capacity of the builtin systems maintaining their tension. Sagging lines can catch on train pantographs which transfer the power to the train, breaking the overhead wires shutting the line down and triggering significant delays.

Wales and Western region currently have a relatively small amount of OLE assets susceptible to temperature related failure compared to other regions. However, the 12 miles out of Paddington are particularly vulnerable to temperature related failure due to the older design. These major assets are due to be renewed in CP7 with future risk in mind and currently subject to an enhanced maintenance regime to mitigate the risk in the interim. Alongside these major asset renewals there will be some component renewals taking place.

4.3.3 Temperature impacts on clay embankments

The impact of heat on clay embankments arises when prolonged periods of elevated temperature and minimal rainfall lead to a relative deficit of water content within the soil matrix. When this occurs some clay rich soils can shrink as the water that was previously locked into the soil matrix is lost to evaporation and contracts/shrinks. Risk areas in railway infrastructure occur in interfaces between fixed structures such as bridges, high water demand trees, and in embankments of different fill material. In these circumstances there is potential for the soils to shrink and contract causing subsidence and poor track quality, which if not properly mitigated can cause derailment risk.

There are no known locations on Wales route which experience significant shrink/swell due to a lack of these clay soils, however there are several locations in Western route which experience this phenomenon see Figure 4.3.4-1 below. These areas align accurately with the BGS map of likely shrink/swell clay locations.

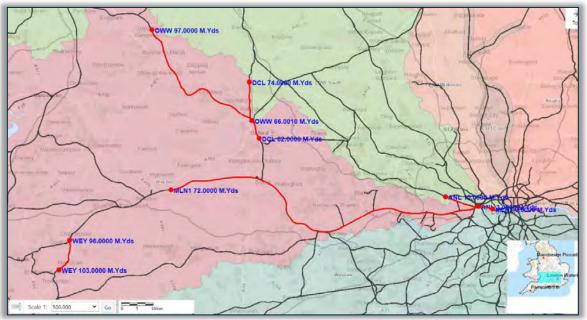


Figure 4.3.4-1: High risk embankment areas from soil moisture deficit highlighted in red





Figure 27 represents the rate of soil moisture deficit change between different calendar years, and highlights the significant challenges faced in 2022 as reflected in section **Error! Reference source not f ound..**. The year 2018 was considered as a very significant year for shrink/swell clay embankments and yet 2022 shows a higher rate of change.

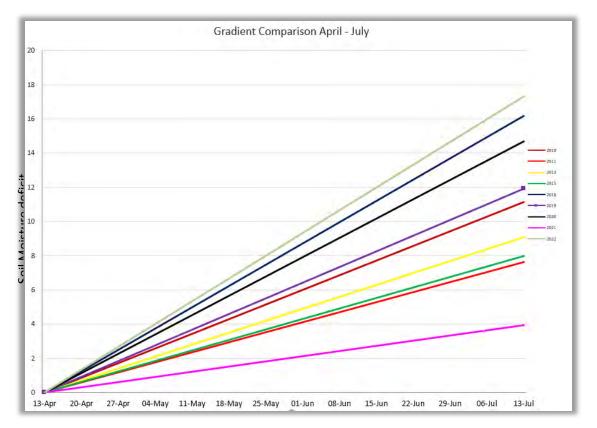


Figure 4.3.4-2: Rate of soil moisture deficit change April to August per year.

4.3.4 Temperature impacts on vegetation.

Shorter periods of temperature close to freezing will increase the active growing season for many plant species. This combined with wetter winters will lead to more vigorous growth in the spring, although it is possible that the drier summers will act as a growth limiter. For some species there may also be a later period of growth in the late summer/early autumn. This suggests that current patterns of vegetation management will need to change, potentially starting earlier and continuing longer leading to greater costs and workforce safety issues. While these risks may increase under future climate projections there is still significant uncertainty in this area and further research will be necessary

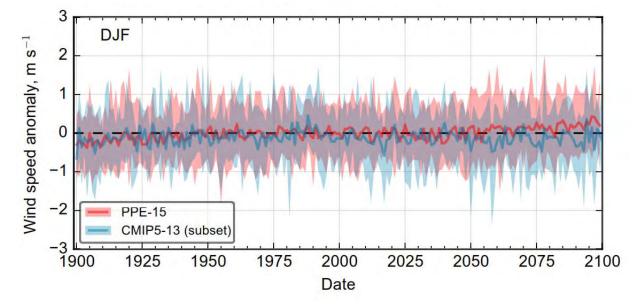
4.4 Storms and high winds

Storms and high winds damage lineside trees and can increase the number of trees and branches reaching the track, OLE and the associated impact on the safe operation of trains. This is a risk which will increase further as the number of storms increase and the extended growing season results in more trees remaining in leaf as the stormy period in autumn begins.

An example of this was storm Arwen at the end of November 2021. Following a temperate Autumn there was an unseasonably high windstorm event resulting in several trees falling onto the line and







subsequent delays. These storms lead to performance impacts including the implementation of blanket speed restrictions and performance delays relating to storm induced asset failures.

Figure 4.4-1: Global projections for changes in winter (DJF) mean near surface wind speed over the UK for 1900-2100 with respect to 1981-2000.

Figure 4.4-1 provides global projections for changes in winter (DJF) mean near-surface wind speed over the UK spanning the period from 1900 to 2100 in relation to the 1981-2000 baseline. Two main datasets are represented: the red line depicts the mean of the PPE-15, while the blue line represents the mean of the CMIP5-13. The accompanying red and blue shading illustrates the range of values derived from the respective datasets, highlighting the variability in projections. It's important to note that among the CMIP5-13 models, only nine have available wind speed data for the entire 1900-2100 period.



Figure 4.4-2: Key storm and wind risks for the region.





Wind effects performance directly in that blanket speed restrictions are imposed when thresholds of wind speed are reached. This is mainly due to the danger of various debris being blown onto the line from our lineside environment and from neighbouring sites. The region saw these types of incidents during both Storms Barney (November 2015) and Doris (April 2017). Other potential impacts include:

- Containers blown off freight trains
- Damage to track protection assets such as fences
- Station roofs, platform canopies and lineside equipment such as signs and lights getting damaged
- Level crossing barriers failing and blocking the crossing

The high winds in storms drive wave formation in both the sea and other significant waterbodies such as estuaries. Large volumes of spray from breaking waves can lead to speed restrictions and even service cancellation in extreme conditions. It can also wash away ballast destabilising tracks, damage earthworks, overwhelm drainage systems and salt water can accelerate asset corrosion.

Wind is currently the second biggest weather-related cost with lightning occupying the 7th position for the region. Between 2016 and 2022, their combined impacts were £38 million in schedule 8 costs and just over 840k delay minutes. Wind alone represented two thirds of the costs and more than half of the delay minutes.

Whilst the UKCP18 data does not contain projections for this type of weather the evidence suggests that they are likely to show increases as the climate changes, therefore we need to plan accordingly.

4.5 Health, Safety Welfare

The health, safety, and welfare of our front-line responders is a critical part of our plan. An example of this is the implementation of blanket speed restrictions for heat in place of watchmen and the application of speed restrictions over the winter period to prevent staff from having to place speed boards during adverse weather.

During extreme high temperature weather events Network Rail staff have increased welfare needs due to an increased risk of fatigue, heatstroke and exhaustion undertaking key trackside duties in hot weather. Sunburn and dehydration may also occur. Passengers may also suffer negative health and safety impacts such as heat exhaustion and dehydration, particularly if cooling systems within trains fail and/or trains are delayed due to other service or asset issues.

Winter weather can cause danger to passenger journeys, as well as the health and well-being of staff. According to our winter safety campaign, the number of major injuries suffered by railway employees peaks every winter. Night-time and other difficult conditions bring hazards of slips, trips, and falls. The proactive plans for the winter adverse weather period and implementation of remote condition monitoring systems reduces the need for staff to drive in poor weather conditions reducing the risk of road traffic accidents.

Climate and weather changes forecasted by climate change modelling infer that there will be future impact on health, safety and welfare with potential increase for the risks described above.





4.6 Interdependencies

The Wales and Western Region WRCCA plan will have an impact on various interfaces where interdependencies exist, these are but not limited to:

- Train paths cross from one region to another, this is particularly the case for CrossCountry and freight services as they rely on the smooth transition between regions.
- Public services rely on one another, such as delivering passengers on time to airports, in Wales and Western region this could be the case for Heathrow, Bristol and Cardiff and feed many others such as Gatwick via Reading. We also connect with Transport to London and Transport for Wales services to enable passengers to reach their end destination on time.
- Our passengers and freight operators rely on a reliable service, on Wales and Borders route specifically between Network Rail and Transport for Wales Infrastructure at Cardiff Central. It is important that our response to weather events and plans for a resilient railway network is aligned.
- Freight flows from within Wales and Western are feeding aggregate from the Mendips and Wales to HS2 and London, oil, and fuel to supply much of the south of the UK and container traffic from Felixstowe to the north of England and south Wales. Without resilient infrastructure these night-time flows cannot reach their destination on time, having a significant impact to the wider supply chain.
- Third party assets which are directly impacted by the resilience of the railway infrastructure. For example, the National Blood Bank in Filton was subject to high flood risk due to the condition of a Network Rail culvert which was partially collapsed and not capable of carrying the volumes of water experienced, an emergency culvert repair was undertaken after months of over pumping to protect this asset. Another example is the residents of Parc Y Eryr Estate in Llanrwst where our embankment was holding water causing flood risk, here Network Rail installed 6 culverts to drop the water level behind the embankment as part of the 2019 resilience and repair work.
- Internally, track and earthworks rely heavily on drainage assets and signalling assets rely on the buildings assets to keep their assets dry. Resilience needs to be considered and applied with the railway system in mind to ensure fixing one issue in isolation doesn't create another. This is being mitigated in Wales and Western in line with our regional strategy.
- We have developed a memorandum of understanding (MoU) and joint annual intensions document with Natural Resources Wales (NRW). Through these documents we determine joint programmes and objectives to ensure that both organisations work as one on issues such as coastal squeeze, habitat compensation and licencing. Both parties, under the MoU are responsible to deal with any issues that arise and the formulation of the MoU will enable us to take a collaborative and informed approach to any arising issues in CP7. Any issues associated with habitat compensation or coastal squeeze will be discussed and agreed with NRW through our MoU.
- We will look to increase the use of nature-based solutions when undertaking resilience improvements and will collaborate with third parties to support activities undertaken outside the railway boundary. The region is looking at Nature-based solutions and working with the





EA and NRW to facilitate this. Work is currently being done within the region, working on a pilot within the River Evenlode catchment in the Cotswolds to develop a nature based solution to re-meander the river within the catchment, moving it away from the railway corridor and slowing down the course of the water. Development of new funding mechanisms and procurement mechanisms to enable more cross boundary works to be developed across vital catchments.

Simpler. Better. Greener.

Chapter 5: Strategy and investment in Control Period 7 (CP7).

A photograph showing Barmouth Viaduct on the Dovey Junction to Pwllheli line undergoing a large renewal on the metallic spans



Strategy and Investment in CP7

In CP7, schemes that mitigate the impact of extreme weather and climate change is a key part of our plan. Our approach in CP7 involves proactively undertake the next round of schemes to mitigate disruption to our railway post-weather event and is linked to the 11 levers (Figure 5.2-1).

Our approach is providing solutions to minimise the damage to the railway post-weather event, enabling us to recover service in hours rather than days, weeks, or months. The resilience of the railway is not about protecting the railway at the detriment of other infrastructure and settlement but allowing the railway to withstand weather events and return to normal working quickly and effectively. Wales and Western developed a solution to at-risk embankments in floodplains. A good example is when the railway is closed following alarms from our telemetry on the lineside, inspected and reopened quickly following the passing of the weather event. Allowing operations colleagues to make informed decisions based on real data and pictures from the site without needing to leave the control room is a big part of providing a resilient railway.

Wales and Western has an allocated, standalone budget of £19m to fund pure resilience activities directly addressing weather impacts facing our region along with dedicated project management resource to develop these resilience sites. The funding will be split into a £1m development pot where NRDD (Network Rail Design & Delivery) will develop 14 schemes and take 6 of them to detailed design and delivery. The remaining £18m budget will be used to deliver the schemes. If the value of the schemes should exceed the current budget arrangements, then we will put a proposal to the region to get the schemes funded.



5.1 Control Period 7 (CP7) Delivery

The Wales and Western CP7 delivery plan, contains many activities which will make our assets more resilient and allow us to deliver our commitments to weather resilience and climate change adaptation with a continuation of the great work undertaken in CP6.

The CP7 delivery plan includes funding for train accident risk reduction (TARR) activities which are intrinsically linked to WRCCA through the delivery of resilience activities aligned to earthwork washout, drainage asset condition and dead, diseased and dying tree management.

Included in the delivery plan:

Wales and

Western

- In response to the Lord Robert Mair and Dame Julia Slingo's recommendations, we will implement changes to manage earthwork and drainage assets aligned to the 11 levers to reduce the risk of potentially catastrophic failure.
- We will improve environmental sustainability through significant investment in:
 - o Decarbonisation
 - Air quality
 - o Weather resilience and climate change adaptation
 - o Biodiversity
 - Environmental management.

The table below sets out our CP7 investments in the Wales & Western Region, the full work bank in appended in Appendix B.

Table 5.1: Wales and Western Control Period 7 delivery plan.

No.	Asset Class /Team	Category	Location	Description	Cost (£m)	Benefit
1	Resilience	Development	Regional	NRDD to develop 12 highest priority resilience schemes in CP7 year 1 which will likely result in 6 schemes being developed within the control period. Development will include modelling and risk assessment for each site to determine the priority.	£1.0	Establishes a representative risk for the region which will establish a prioritised list of sites based on modelling and climate change predictions. Modelling and desk study will have been completed for the majority of sites with potential options available for development at a later date.
2	All Asset Areas	Development	All Region	Adaptation Pathways program to be developed over the whole of CP7 for both the Wales and Western routes to determine the highest risk lines of route along the railway due to climate change. Adaptation pathways for railways involve dynamic, flexible strategies to respond to climate change and evolving needs. They provide	£4.0	By adopting flexible and dynamic approaches, the region can incrementally adjust its infrastructure and operational strategies, ensuring resilience to future uncertainties. Adaptation pathways enable efficient resource allocation, facilitating timely



Wales and W<u>estern</u>



este	ern					
				a structured framework for incremental adjustments in infrastructure and operations. This approach enables timely upgrades, efficient resource allocation, and stakeholder collaboration. Adaptation action plans will be developed based on modelling of climatic risk to the infrastructure and options proposed for the route		upgrades and innovations. Additionally, the adaptive nature of the approach promotes stakeholder engagement, fostering collaboration between communities, authorities, and businesses to collectively address the evolving demands of the rail network.
3	Earthworks	Monitoring	All Region	Enhanced earthworks monitoring of earthwork assets to better understand the risk across a portfolio level. The monitoring will be put in place at the most at risk assets as a result of the increased frequency of increment weather condition that affect the stability of the earthworks as a result of climate change.	£11.0	Earthworks monitoring enhances construction safety, detects potential issues early, and ensures project compliance. It improves efficiency, reduces costs, and aids in optimizing resource allocation.
				, six of the following schemes resilience budget:	£18m	
4	Resilience	Renewal	Sonning, Western, MLN1	Adverse weather site east of reading which affects Elizabeth line and GWR. Slope and crest drainage. Resilience not BAU.		Reduced flooding damage to the track. and disruption to the railway network. Reduced delay minutes from extreme weather and repair time. Reduced repair costs. TSR will become redundant. Reduced maintenance time and costs.
5	Resilience	Renewal	St Fagans, Wales, SWM2	Once flowing beneath the bridge at 174.61 M.Chns, the River Ely changes direction 90 degrees northeast 50 metres downstream. At high water levels, this river bend could slow water flow leading to flooding of the land surrounding the railway. A flood level could be reached which means water overtops the railway. In January 2023, high water levels in River Ely led to flooding of the railway and washout events. These events will likely increase in the future with climate change.		Reduce damage to bridge and increase life span. Reduce repair cost and time. Lower disruption time. Reduce flooding in surrounding areas as well.
6	Resilience	Renewal	Clawd- Coch, Wales, SWM2	The highest recorded river level of the river that flows beneath the railway at this site is 1.5m below the height of the embankment. In the future, it is expected with climate change that higher river levels will occur. Flood		Reduce damage to bridge and increase life span. Reduce repair cost and time. Lower disruption time. Reduce flooding in surrounding areas as well.





CSU	em					
				levels could reach the height of the embankment and therefore the railway could be overtopped. Tan 15 flood maps show that the railway at this site is in a flood zone.		
7	Resilience	Enhance	Chipping Sodbury, Western, SW	Determine size and capacity requirements of the proposed system which is operating at full capacity to provide resilience in the face of increased extreme weather and Climate Change. This is a repeat failure location with 8 major floods occurred in the last 13 years.	vo to tr m ex co re w di	void wet beds and biding which can lead b damage to rail and ains as well. Eliminate ain line closure during ktreme weather biditions. Quick covery from extreme eather. Reduced sruption. Reduced epair costs and time.
8	Resilience	Renewal	Llangua court, Wales, HNL1	"At this site, the railway bridge squeezes the channel of the River Monnow. Therefore, at high river levels, it is likely water will build up before the bridge and spill on to the floodplain upstream of the railway. This floodplain has a pinch point due to a road being build close to the railway. As a result, when the flood plain reaches its maximum capacity, water would likely be pushed on to the railway and a washout event could occur. Tan 15 flood maps show that the railway at this site is in a flood zone."	cc pr Av su Re	educe repair time and osts. Increased rotection of railway. void flooding in areas irrounding the railway. educed disruption and iminate TSR.
9	Resilience	Renewal	Nailsea, Western, MLN1	"At this site, the railway bridge squeezes the channel of the River Kenn. Therefore, at high flood levels, it is likely water will build up along the railway at the base of the hills. This floodplain has a pinch point due to hills on both sides of the railway pushing flood water to collect along the railway. This site is in a known floodplain, and it is expected to get worse due to sea level rise as it is exposed to tidal flooding."	cc pr A' su Re el	educe repair time and osts. Increased rotection of railway. void flooding in areas urrounding the railway. educed disruption and iminate TSR. Reduce altwater deterioration.
10) Resilience	Renewal	Llangyfelac h, Wales, SD12	Up size drainage system which is operating at full capacity to provide resilience in the face increasing extreme weather caused by climate change. 500m earthwork renewal ditch/channel and 5 5chl Earthwork Refurb, 1100m track drainage	da aı ra Re fr aı Re T	educed flooding amage to the track nd disruption to the tilway network. educed delay minutes om extreme weather nd repair time. educed repair costs. SR will become edundant.
11	Resilience	Renewal	Flax Bourton, Western, MLN1	Install infrastructure to protect cutting from flooding in adverse weather.	tc di	void flooding damage) the track and (sruption to the ilway network.



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Reduced delay minutes from extreme weather and repair time. Avoid repair costs. TSR will not be implemented. Reduced flooding damage to the track. and disruption to the railway network. Reduced delay minutes

from extreme weather and repair time. Reduced repair costs. TSR will become redundant. Avoid wet beds and voiding which can lead to damage to to rail and trains as well. Eliminate main line closure during extreme weather conditions. Quick recovery from extreme weather. Reduced disruption.

Reduced repair costs and time. Protect equipment.

Avoid wet beds and voiding which can lead to damage to rail and trains as well. Eliminate main line closure during extreme weather conditions. Quick recovery from extreme weather. Reduced disruption. Reduced repair costs and time. Protect equipment.

Avoid wet beds and voiding which can lead to damage to rail and trains as well. Eliminate backup for main line closure during extreme weather conditions. Quick recovery from extreme weather. Reduced disruption. Reduced repair costs and time. Protect equipment.

Reduce repair time and costs. Increased protection of railway. Avoid flooding in areas surrounding the railway. Reduced disruption and eliminate TSR. Reduce saltwater deterioration.

-						
	12	Resilience	Renewal	Flax Bourton, Western, MLN1	Bringing the existing Rosemount Road SUDS pond back online. Replacing the existing partially blocked culvert. Upsizing approximately 170m of existing track drainage from 450mm diameter to 500mm/525mm	
	13	Resilience	Renewal	Wootton Bassett, Western, MLN1	Remove the pinch point where water drains under the railway into a canal on the down side (south). When this floods both routes between Swindon and Bristol are closed. Take cognisance of recent and planned housing developments to north.	
	14	RAM(DOT)	Renewal	Dauntsey, Western, MLN1	Outside party drainage here has caused flooding several times a year including in Jan 2023 and Jan 2024 when a train ran into floodwater at 125mph. Recent targeted intervention to drainage has helped but not prevented flooding.	
	15	RAM(DOT)	Renewal	Somerton, Western, CCL	Frequent flood site and closes off fast route from Reading to West Country via Westbury. If coupled with a closure at Flax Bourton means both main routes out of west country are closed.	
	16	RAM(DOT)	Renewal	AvonMouth , Western, AMB	Flood defence protects railway from sea level rise creating salt water marsh nature area.	





17	RAM(DOT)	Renewal	Powderham , Western, MLN	Protect main line to Devon and Cornwall from threat from erosion of sand spit at mouth of exe estuary accelerating erosion and frequency of overtopping of powderham banks.		Strengthen track stability and support. Reduce flood risk and avoid voids and wet beds. TSR would become redundant. Performance of railway equipment would improve.
18	RAM(DOT)	Renewal	Oxford, Western, DCL	Enlarged culverts under road bridge adjacent to railway to prevent build up of flood water to north impacting railway		Reduced flooding damage to the track and disruption to the railway network. Avoid voids and wet beds that may lead to serious failure events. Reduced delay minutes from extreme weather and repair time. Reduced repair costs. TSR will become redundant
				TOTAL	£34m	





5.2 Residual Risks

Across all regions, there will be a lower volume of asset renewals and a greater proportion of refurbishment and maintenance volumes to mitigate decline in asset condition. This could result in more reactive and unplanned interventions on existing assets.

In Wales and Western we have a dedicated resilience budget to develop a number of schemes throughout the beginning of the control period, once the schemes are developed, an assessment on the urgency of the schemes based on likely failure due to extreme weather or changing climate. Off the back of the assessment some schemes will be carried out in the control period and the others pushed into the next control period or form part of the adaptation pathways remit. There is a potential residual risk that some sites may fail sooner than assessed and modelled.

Enabling activities are planned for CP7 that will help us better understand and measure the risks associated with climate change on our infrastructure, for example, improvements to how we undertake climate risk assessments and development of longer-term adaptation pathways for the locations where a more transformational approach to managing climate-related risks will be likely required.

Combined, these approaches will allow us, in time, to better quantify levels of climate-related risk across our railway, and to better articulate the impact of our weather and climate-related resilience interventions on addressing those risks.



5.3 Weather Resilience Levers for Earthworks & Drainage

Figure 5.3-1: 11 Weather Resilience Levers for Earthworks & Drainage.

5.3.1 Neighbours and Catchment (Lever 1)

A comprehensive program focused on the clearance and maintenance of lineside vegetation has prioritized sites with the highest risk, eliminating dead, diseased, and dying trees (DDDT). Wales Route have the highest amount of DDDT trees across the country, with approximately 25 %. This initiative enhances the network's resilience to high winds and minimizes disruptions caused by fallen trees and debris from vegetation on the tracks. Collaborative efforts with third parties, including key stakeholders like the Natural Resources Wales, Welsh Government Transport for Wales, are integral to





developing sustainable and holistic management solutions. A memorandum of understanding has been developed between NRW and Network Rail to best develop solutions. Should there be any issues that arise during the course of CP7, the MOU will enable NR and NRW to work collaboratively to deal with these issues and provide us with guidance on how to do so.

5.3.2 Whole Systems (Lever 2)

When implementing new systems, a holistic approach will be taken looking at the system as whole. In the past the siloed nature of asset refurbishments and renewals meant that a drainage renewal would have been constructed to a capacity and then the outfall into a track drainage system that doesn't match the capacity of the other system. Through the CP7 delivery, Wales and Western will now not allow this kind of activity to happen and will look to engineer solutions taking into account the whole system.

5.3.3 Monitoring (Lever 3)

80 5ch earthwork assets that are deemed at risk of failure and could impact safety of trains are now covered with Earthwork Failure Detection (EFD) equipment in W&W. These numbers are ever changing as more assets have EFD equipment installed and other sites have remedial works undertaken therefore negating the requirement for EFD equipment. The equipment consists of tilt sensors installed at the toe of cuttings, cant and twist sensors on sleeper ends to monitor embankment failures and 2D LiDAR mounted cameras. This equipment reports directly into control (as well as the Route Asset Management Team) when a level of movement indicating a potential failure has occurred with Control following a pre-determined process.

Further to this, another 100 5ch assets have Remote Condition Monitoring equipment installed consisting of Inclinometers, Extensometer, Piezometers, flood monitoring and ground water monitoring allowing long term data trends to be established of any potential earthwork movements.

On 5th February 2021, 2D LiDAR equipment was installed along the Severn Estuary at approximately 129.0340-0460yds and recorded movement earthwork movement greater than the threshold. The movement was recorded at 20:47 and by 20:48 both lines had been closed to traffic. The resulting failure had moved a two tier concrete block wall at the cess impacting gauging.

W&W plan to spend> £11 million earmarked for new monitoring equipment in CP7 and to service existing monitoring.

5.3.4 Forecasting (Lever 4)

Trial of the new ROWS platform. Implementation of CAT and the Proportionate Risk Response to Implementing Mitigating Speeds to Assets (PRIMA) tool, to dynamically manage train speeds against risk. Development of risk-based management of train speeds in relation to earthworks and drainage looking at increasing the trigger levels to decrease the frequency of adverse weather speeds. PRIMA is a tool that ensures the most effective operational response is made for each type of rainfall event in each specific area.

5.3.5 Design Redundancy (Lever 5)

Wales and Western Region will ensure that when implementing and installing new designs that the whole life system is taken into account. As above in Lever 2 the system may be governed by its weakest link. Throughout CP7 delivery, more emphasis will be taken on ensuring that primary and secondary resilience benefits are captured within the designs.





5.3.6 Design Reliability (Lever 6)

Design reliability encompasses strategic considerations and engineering solutions aimed at ensuring the robustness and dependability of rail systems. This involves meticulous planning and adherence to Network Rail standards, incorporating redundancy and fail-safes into the design process. By considering factors such as Drainage layout and the resilience of critical components, design reliability becomes a foundational lever in enhancing the overall resilience, performance and safety of the railway network.

5.3.7 Design Resistance (Lever 7)

As a result of climate change the drainage standards have been updated to include climate change projections. Working into CP7 we will build upon this working directly with the technical authority to develop guidance for all standards around climate change adaption, Wales & Western will be leading the way in developing these standards. We will also be designing more resilient solutions in our renewals, ensuring that the solutions consider the climate change risks.

5.3.8 Intervention extents (Lever 8)

Through efficient planning the renewals conducted will be conducted in a joint way across the disciplines, where possible and practicable. For instance, the Severn Tunnel track renewal and 6ft drain renewal will be combined maximise efficiency. This model will be adapted through the development of the local railways initiatives being rolled out across Wales.

5.3.9 Asset knowledge (Lever 9)

In CP7, the region has identified a budget for the strategic planning of WRCCA ahead of CP8. It will include Adaptation Pathways to identify our asset management, maintenance and operational requirements and changes in the future.

5.3.10 Funding and risks (10)

The Wales and Western Region approach to climate resilience in CP7 is different to that of CP6. Following experiences throughout the last control period, Wales and Western Region has brought climate resilience into the plan as part of the core submission. In the CP6 plan, climatic resilience was an option to buy, which was not funded as part of the CP6 determination. As a result, the circa £19m resilience budget to fund the reactive schemes was allocated from the risk budget and through overplanning taking advantage of unspent funds in year.

5.3.11 Awareness and implementation (11)

Sufficient capacity for drainage and lineside, and development More efficient asset management of a competency framework (Mair and Slingo).

5.4 Adaptation Pathways

In CP7, the region has identified a budget for the strategic planning of WRCCA ahead of CP8. It will include Adaptation Pathways to identify our asset management, maintenance and operational requirements and changes in the future. This funding equates to a total of £4m, which will include elements of Adaptation Pathways work that will inform the wider strategy. Wales and Western Region intend to develop an adaptation pathways workstream in CP7.

Adaptation pathways are a sequence of adaptation investments or policy actions that work coherently to achieve resilience efficiently and affordably over time. The pathways approach supports strategic, flexible and structured decision-making. It allows decision makers to plan for, prioritise and





stagger investment in adaptation options with trigger points and thresholds helping to identify when to revisit decisions or actions.

The methodology for undertaking the adaptation pathways work in Network Rail is in development building on the lessons learned during the pilot project undertaken in Southern in 2023. A multicriteria screening will be undertaken of all operational route sections of the rail network to identify those at highest risk from extreme weather and climate change. The outputs of this prioritisation work will be reviewed by asset managers and combined with their understanding of where the highest risk lies prior to shortlisting locations to go through a rapid adaptation pathways assessment. This will do a high level review of the key risks and adaptation options for a particular location. Those areas deemed to be highest priority from a risk/criticality perspective will be put forward for a detailed adaptation pathways assessment with modelling of adaptation solutions.

The output of the adaptation pathways work will be detailed understanding of where and when investment will be required in the railway setting out the pathways for achieving the strategic objective.

The adaptation pathways approach allows decision-makers to plan for, prioritise and structure investment in adaptation options with trigger points and thresholds. This will help identify when to revisit decisions or actions. This is standard practice in adaptation planning because it supports strategic, flexible, and structured decision-making.

The workstream will involve using climate modelling systems to understand better potential future challenges of managing the railway infrastructure in different climate scenarios. This work stream aims to identify key operational vulnerabilities within our assets. This enables us to conduct vulnerability assessments on all facets of the railway asset management system related to climate change scenarios. The output of this work stream will facilitate the discussion around long-term asset management strategies with climate change in mind. Climate change adaptation pathways will support a more strategic, proactive and collaborative (ORR lever 1, neighbours and catchment) approach to long-term adaptation strategies. This guides decision-making regarding intervention and investment across Opex and Capex activities through CP7, into CP8 and beyond.

5.5 Asset Led Activities

The Technical Authority has led a piece of work to better understand the resilience benefit of business as usual investment in asset management. Working with WRCCA Leads across regions, Network Technical Heads of asset engineering teams and the Cost and Volumes team in Finance, a review of the key volume lines (KVL) within the CP7 workbanks was undertaken to determine the resilience benefit of each activity within our workbanks. This analysis includes activities where weather resilience is a primary or secondary benefit of the maintenance or renewals defined as follows:

Primary Benefit	Secondary Benefit
 Pure resilience schemes - these are activities that are being undertaken solely for the purpose of improving our network's resilience to extreme weather. Business as usual asset schemes with resilience - these are activities which are driven by poor asset condition as well as 	• Activities where there may be a secondary weather resilience benefit, but this has yet to be determined (i.e. design work for this project has not been undertaken but it could be the case that when we undertake further design of the project, we include some changes to the

Table 5.1-1: Difference between Primary and Secondary resilience.





weather condition challenges so undertaking	asset which improve its resilience to
this work delivers an improvement in asset	extreme weather).
condition and a clear improvement in	• Activities where just by the nature of doing
weather resilience (i.e. a primary benefit of	a renewal, makes the asset more resilient
the work is improved resilience to extreme	(e.g., modern standards are more resilient
weather)	than asset is designed to).

The primary resilience work is comprised of a stand alone pure resilience budget of £19m resilience in addition to the primary benefit associated with the asset core business plan. The elements of the asset business plan which, by design and standard, will provide a secondary benefit have not been included in this plan but will be monitored throughout CP7.

The resilience budget focuses on performance and safety-driven schemes rather than asset conditiondriven schemes which is covered in the primary resilience benefit from our asset workbanks. This provides us with a planned and resourced work bank to deal with these proactively. Many schemes will provide secondary resilience benefit delivered through the asset core business plan; this will be tracked throughout the control period through the investment authority process (ref ORR Lever 10 – Funding and Risk).

Table 5.5 outlines the total primary benefit figure and sections 5.5.1 to 5.5.11 will discuss the investments the individual asset areas. The CP7 forecast that is shown in table 5.5 is predominantly condition driven investment and the primary benefit weather resilience has been calculated.

Asset Area & Work Type	CP7 £m Forecast	Weather Resilience Primary Benefit
Earthworks	£308	£271.8
Drainage	£77	£63.7
Electrification & Fixed Plant	£189	£28
Signalling	£422	£13
Structures	£340	£8.7
Track	£681	£2.3
Telecoms	£64	£1.7
Off Track	£96	£1.5
Level Crossings	£110	-
Buildings	£301	-
Other Renewals	£140	£19.00**
TOTAL:	£2726m	£409m

Table 5.5: Summary of CP7 expenditure across the asset areas and work types for the Wales & Western Region.

**The £19m accounts for the pure resilience budget that the Wales and Western region have secured for development and delivery of schemes outside of the BAU work bank, these schemes are listed in Table 5.1 of Section 5.

5.5.1 Earthworks

Earthworks spend accounts for the most expenditure in the Wales and Western region with most CP7 work items having a primary benefit resilience output at £271.82m. The works across a portfolio level will include refurbishment, renewal and monitoring of soil slopes, rock cutting and embankments. Along with these works, there will be works that form part of the adaptation pathways program, at circa £3m that will look at increased assessment activity that will be looking at mitigating the effects of weather and climate change. Furthermore, we plan to spend £19m on pure resilience schemes in





CP7 which will have a significant proportion allocated to earthworks and long term mitigation and monitoring of earthwork assets as these are the most vulnerable to weather and climate change.

Most modern earthworks interventions provide resilience during high rainfall or flooding events. In addition, it will address the risks of earthwork failures, improving both safety, performance and operation reliability through preventing landslides obstructing the line or leading to loss of support in embankments, and reducing the requirement for increased maintenance and operation speed restrictions. Along some sections of the railway within the Wales & Western region it may be necessary to allow the railway to be inundated with flood waters and then recover the service after, work into determining where this can take place will form part of the adaptation pathways and resilience works.

Overall, the spend is highest on earthworks as these are the most vulnerable to the failure mechanisms associated with increased intensity in weather events induced by climate change.

5.5.2 Drainage

The Drainage work bank plays a pivotal role in enhancing Network Rail's climate change resilience. By increasing the capacity of drainage systems, increase the maintenance of drainage assets, it mitigates the impact of extreme weather events associated with climate change, such as heavy rainfall and flooding. An expected £64m of primary benefit is forecast for CP7.

Making drainage systems more resilient to climate change minimizes the risk of service disruptions and infrastructure damage, ensuring the reliability and safety of the rail network. As the frequency and intensity of extreme weather events increase, effective drainage becomes paramount in mitigating flood risks and ensuring the resilience of the rail network. Upgrading drainage infrastructure enhances the capacity to manage heavy rainfall, reducing the likelihood of waterrelated disruptions and track instability. This not only safeguards the operational efficiency of the railway but also contributes to the overall climate resilience of the transportation system. By investing in robust drainage solutions, the railway sector takes a proactive stance in adapting to the changing climate, promoting reliability and sustainability in the face of environmental challenges.

5.5.3 Electrification and Fixed Plant

The majority of the £28m primary benefit costs for E&P budget is for the replacement of OLE for the first 12miles outside of Paddington. This marks a significant stride toward enhancing the resilience of the railway network. The new OLE systems bring modern technology and design, increasing the reliability and efficiency of the electrification infrastructure. This upgrade not only reduces the risk of equipment failures and service disruptions but also ensures better adaptability to the challenges posed by climate change. The improved OLE systems contribute to a more robust and weather-resistant railway, capable of withstanding adverse weather conditions and providing a more reliable service to passengers. Additionally, the replacement aligns with sustainability goals by incorporating energy-efficient technologies, further positioning the railway for long-term resilience and environmental responsibility.

5.5.4 Signalling

A forecast £13m in primary benefit is expected across the CP7 signalling work bank. Upgraded signalling infrastructure often includes weather-resistant components, reducing the vulnerability of critical systems to extreme conditions such as heavy rainfall or temperature fluctuations. This not only ensures the reliability of train operations but also contributes to the overall climate resilience of the railway, aligning with sustainable and forward-looking practices in the face of evolving environmental challenges.





5.5.5 Structures

Structures as they age become increasingly more vulnerable to the impacts of weather. £9m of the investment is being spent on protecting bridges and retaining structures from scour due to rivers being at higher flows in storm conditions. The rest of the investment is in strengthening structures to be more resilient and reliable.

5.5.6 Track, Telecoms & Off Track

Upgrading Track (2.32m), Telecoms (£1.7), and Off-Track (£1.5) infrastructure on the railway is paramount in enhancing its resilience to climate change. By integrating resilient materials, improved systems, and advanced monitoring technologies, the upgraded track infrastructure becomes better equipped to withstand extreme weather events such as heavy rainfall, flooding, and temperature fluctuations.

Enhanced telecoms systems facilitate real-time communication and data exchange, enabling swift responses to weather-related disruptions. Off-track components, including bridges and embankments, benefit from reinforced designs and proactive maintenance, reducing the risk of structural damage during severe weather events. Collectively, these upgrades not only ensure the reliability and safety of train operations but also bolster the railway's overall resilience to the challenges posed by a changing climate, contributing to a more sustainable and future-proof transportation network.

5.5.7 Other Renewals

In W&W we have £19m in the resilience budget these schemes are highlighted in table 5.1 and the £19m is highlighted in table 5.5 as 'Other Renewals'. We plan to spend £1m on the development of 14 schemes in the first year of CP7, the region is setting an exemplary standard for proactivity in tackling climate-related challenges. Furthermore, we plan to spend the remaining of the £18m on the implementation of the top 6 schemes underscores the region's commitment to transforming plans into impactful, on-the-ground solutions. Notably, the flexibility to request additional funds should the business case prioritise this, reflects the region's approach and dedication to building a railway network that is not only robust in the face of climate change but also serves as a example of innovation and adaptability within Network Rail.



5.6 Adaptation Actions and Progress

During CP6, the region has managed the impact of weather through the implementation of Wales and Western WRCCA plans. The WRCCA plans included specific work items that improve resilience to assets at risk of weather-related failures. The work streams included many different asset types from the different engineering disciplines, and the progress of work items was reported bi-annually. The WRCCA plan included business-as-usual activities and stand-alone resilience work streams to ensure items associated with weather resilience were focused upon. Work items within the plan were predominantly on Geotech, Lineside and Drainage assets, as well as Structures susceptible to flooding, adverse rainfall, scour and coastal erosion. Additional items encompassed within the WRCCA plan included stakeholder engagement, academic engagement, and carbon reduction initiatives. In Wales, particular attention was placed on embankment resilience by delivering three accelerated rock armour resilience schemes. In Western considerable investment was sought to deliver the South West Rail Resilience Programme (SWRRP) scheme (in excess of £170 million) to prevent damage from wave action, storm surge and cliff instability. Interventions with a design life of 120 years and enhanced resilience to climate change have been developed and delivered in a phased approach.

At the time of reporting at the end of CP6, most actions were completed or on track for completion in line with the forecast, with nine actions being completed early due to early opportunity for delivery. Six actions are completed (delivered late), and these items have been completed later than proposed in the action plan, this is due to a range of factors including delivery, access constrains and change in priorities. Eighteen are reported as completed (work not required) due to risk assessment of structures passing over watercourses from pier and abutment scour. The assessments determined that no further interventions were required, closing the actions. The five actions reported as "not started" are scheduled later within the control period. One item categorised as "data unavailable" duplicates another action. In total, seven items are delayed. Four are on track for completion by the end of the control period with delays being related to challenges in programme delivery and obtaining agreement with third party licencing bodies. Two within the Wales Route are delayed due to the issues with delivering coastal defence interventions, and one in Western due to a change in delivery approach using contractors.

5.7 CP6 Asset Resilience

Throughout CP6 there have been a number of opportunities following storm events where failure of existing asset has led to a business decision to renew the asset with resilience at the core of the works. A number of schemes were quickly developed between the asset owners, resilience sponsor and NRDD. The schemes utilised emergency access and were turned around in a matter of months, such as the rock armour works along the Conwy Valley and Welshpool. Further opportunities were taken at Vineyards Farm, where there were reoccurring washouts closing one of the most frequently used lines on the Wales Route. Utilizing the same team, the scheme was turned around to be delivered within a few months which has now made the stretch of railway between Newport and Hereford more resilient to future events.

Resilience scheme	Investment	Description
South West Rail Resilience Scheme (SWRRP)	£170m (Across CP6 on first four phases,	 Phase 1: Dawlish sea wall to south west of station (350m total) Phase 2: Dawlish sea wall to north east of station (415m total)

Table 6.1-1: Table showing that CP6 Primary Resilience schemes across the Wales and Western Region





	remaining phases funded in CP7)	 Phase 3: Rockfall shelter and cliff nails and netting to north of Parson's Tunnel Phase 4: works to cliffs between Dawlish and Holcombe
Severn Estuary Resilience Programme (SERP)	£56m (Across CP6 & CP7)	Passive netting and active netting to cliffs along a 3mile section of vulnerable railway that fails following big storm events.
Welshpool rock armour	£6m	Rock armour scheme installed along an 1mile long embankment following 27 washouts that occurred in 2021.
Conwy Valley rock armour	£5	Rock armour installed to various section along the Conwy Valley following some severe flooding in the area leading to overtopping of the railway resulting to embankment washouts.
Vineyards Farm	£5.6m	Rock armour installed to 880yards of embankment after the
Chipping Sodbury flood resilience	£5m	New lagoon and pumping system to reduce length of railway closure when in flood
Blackbridge deck raising	£8m	Raising of bridge deck to increase resilience of the railway to high river levels
TOTAL in CP6	£255.6m*	*Some sites are being completed into CP7.

The COVID-19 pandemic also opened up a number of opportunities to deliver some resilience to sections of the railway that were able to be closed due to low passenger numbers traveling due to the pandemic. Access opportunities along the Conwy Valley to install rock armour and at Blackbridge to increase the height of the bridge deck were utilized.

Fluvial flooding has become a major issue for Wales and Borders Route in CP6 with multiple failures of embankments in floodplains caused by increased river levels, in some cases exacerbated by tidal influence and reduced upper catchment capacity. In response to the 5 washouts that occurred between 2019 and 2022 on Wales and Borders at Welshpool (as shown in Figure 18), Llanrwst, and Pandy, a project has been created to determine embankment flood risk. The purpose is to identify embankments at high-risk of washout failure during overtopping events and prioritise future flood resilience works.

The initial stages of the project involved completing a desk study, reviewing each line within the route using Geo-RINM. Sections of railway which had similar topographical features to the past washout sites and located within Natural Resources Wales TAN 15 Flood Zone 2 and 3 were flagged as sites of potential washout risk. There were 173 sites which were identified as at risk of washout.

A review of the 173 sites in Wales and Borders was then carried out to identify structural features of the embankments. The sites that did not have features like those of the past washout locations were disregarded as sites of potential washout risk. On completion of this exercise, 45 sites of potential washout risk remained in the dataset.

The final stage of the desk study section of the project involved determining the degree of washout risk at each of the 45 sites. This led us to identify the sites where further site reconnaissance, and/or modelling should be prioritised. Using the structural and topographical feature data of the past washout locations, 3 high risk thresholds were defined by technical experts. Those of the 45 sites that met more than 2 of the thresholds were confirmed as potentially high-risk. There are 15 potential





high risk washout sites in the Wales and Borders route. Visits to the potentially high-risk washout sites were carried out in Autumn 2022; the result of these field studies was that 13 sites were deemed likely high risk. Currently, a remit is being written to undertake the flood modelling to determine, at a higher degree of confidence, the risk of the 13 sites; the models will show the current and future flood risk (under IPCC's RCP scenarios) of the catchments in which the sites are located.

Further planning around future resilience has been embedded into the asset teams with the tide finally turning on 'like for like' rebuilding following failure but more towards resilience at the forefront when events occur. This has laid the foundations for more pure resilience schemes into CP7 and beyond.

As a region, throughout CP6 we have been reporting progress every quarter to the ORR and the actions from CP6 action plan with key dates and milestones which have been hit and any delay in projects or cancelations. Wales and Western route have achieved the majority of its CP6 targets and also with the addition of the reactive primary resilience works completed in Table 6.1-1, benefited from additional resilience above and beyond the CP6 plan. Some schemes such as the CERDs (Coastal, Estuarine and River Defences) programme have been held up due to the introduction of SMPs (Chapter 4.1-1).

5.8 Lessons Learnt from CP6 Delivery

The works completed in CP6 were undertaken in response to weather events occurring within the region and highlighting the assets that were not fit for purpose to deal with these events. In some cases multiple failures led to the implementation of a resilience based intervention in order to future proof the assets against more frequent events.

It is clear from the works completed in CP6 that the standard approach to intervention needed to be reviewed, and making an asset more resilient didn't have to mean that it was completely immune to the threats of weather related events, enhanced by the threats of climate change, but rather take the approach that the railway could withstand the events and once the weather event was over the railway could reopen to traffic safely.

An example of this approach where a lot was learnt was the rock armour resilience scheme at Vineyards Farm. The site was modelled for flooding events with climate change predictions included and a number of options were modelled, however, these options such as raising the height of the railway or installing culverts were not fit for purpose because they were unattainable for the railway. Instead a rock armour scheme was developed in order for the railway to withstand the failure mechanism expected. This approach is fundamental in our approach to making the railway more resilient.

5.9 Resources and Implementation

Throughout CP7, there will be a resource to undertake WRCCA reporting and development and to drive the completion of actions. The Engineering and Asset Management Function will provide this resource through the Head of Engineering, Asset Strategy and Planning team. Responsibility for WRCCA is linked to the Head of Engineering, Asset Strategy and Planning job description. Opportunities will be derived from joint business ventures with TFW, Welsh Government, GWR, NRW, NE and EA for additional delivery.

Support and assistance on projects and development of the strategies will be by new entrant programmes such as Graduate Engineers and Placement Students. At the same time, Network Rail Design Delivery will develop schemes with third-party modelling consultants.





NR will require additional resources and expertise to undertake the Adaptation Pathways work. This is likely to be in the form of consultants to help our regional teams produce this output through a workshop.

An appropriately resourced seasonal management team in both route businesses would support the increasing demand due to the developing risk of adverse and extreme weather events and allow the team to develop systems to deliver robust and consistent responses and learn from these events.

Delivery of asset volumes will be tracked through a report of authorised investment of activities providing resilience benefit. Unless identified as a standalone line item in Table XX (the actions table), individual projects will not be reported in favour of an overarching view of activity within different asset functions. This process will also enable us to demonstrate where asset volumes are providing secondary resilience benefit and it is expected that cumulative investment in resilience during CP7 will be higher than what is forecast in this plan.

The Director of Engineering and Asset Management is accountable for delivery of this plan. Progress on delivery will be reported every six months (April - September and October - March each financial year) through the Technical Authority to the Climate Change Adaptation Steering Group and to ORR A photograph showing the extents of flooding at Hele level crossing in Western region.

Chapter 6: Control Period 8 (CP8) and beyond

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6. Control Period 8 (CP8) & Beyond

Regional business plans have been drafted for CP7, these business plans have been developed in line with existing processes such as asset condition led processes however, the approach to business planning needs some change in order to fully build resilience and climate change adaption into the business plans.

Throughout CP7 and into CP8 there needs to be a mindset shift into thinking 'resilience' and thinking 'climate change adaption'. The railway, in certain areas is almost 200 years old, and although some of the assets are still safe and reliable, much of them are unable to withstand the changes that 200 years of climatic change has thrown at them.

A photograph showing the earthworks assets along the Dovey Junction to Pwllheli line with Fairbourne in the distance.

Appendices A-F

Appendix A – Climate Change Risk Assessment Appendix B – Wales and Western Resilience Workbank

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NR Integrated Clim	ate Risk Assessment for	CP7 WRCC	A Plans															
Key risks identified in asset risk register risks identified in asset risk register	and route risk register				2/minor 3/minor	4/moderate	6/moderate	8/moderate 10/major 1.	12/major 16/major	20/severe 25/s	evere							
risks identified in route risk register											ľ	uture risk - no additional adaptatio	on					
Ref. Function Function type	Asset/activity/service description	Climate variable	Type of risk	Region Route/Line	National risk owner Region risk owner	Decision threshold, process or trigger point for action on the	risk Narrative	ARP 3 risk CP2 current National WR national confidence risk	7 Region RCCA Plan Regional k current confidence	CP7 Wales and Borders Route Score	stern Score Narrative :	2050s - National 2080s - Nationa	al National confidence	2050s - Regional 2080s - Regional	Regional Confidence Assumptions (including on data, operational, regulatory changes, etc) Regional narrative for variations the national risk	unked CCRA3 Risks (not within the DEFRA template but included in the NR RA)		
							There are links to earthwork failure/potential bank slip where an access point can be affected		ore (2022)		Heavy rainfall could destabilise the earthwork causing the land to slip. If this is near an							
AP1 Asset Access point	All access point types	Heavy rain/cloudburst	Interdependency (us on them)	Wales & Western Wales & Western	Professional Head of Geotechnical and RAM	Increased risk of trespass and closure of access point until maintenance or renewal undertaken.	due to slippage e.g. step/ handrail. Leads to performance and safety issues due to inability to access the railway/taking longer to attend an incident as staff may need to walk further to step/incident	6/moderate Medium 8/r	moderate Medium	8/moderate 8/mo	derate access facility (e.g. a set of steps leading to the track a landslip could cause the whole access facility to slip	9/moderate 9/moderate	Low	9/moderate 9/moderate	Low Assuming earthworks standards remain as current, the risk impact should remain the No Variation same but the likelihood will increase	Risks to infrastructure services from river, surface water and Risks to transport networks from slope and embankment groundwater flooding failure		
AP2 Asset Access point	All access point types	Flooding	Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track RAM GLD and RAM	Increased risk of trespass and closure of access point until maintenance or renewal undertaken.	Flooding may also be linked to the drainage asset due to blockages in the drainage system causing water to overflow and waterlogging which could affect the stability of the access point particular access points on an embankment/cutting? Leads to performance and safety issues due to inability to access the railway/taking longer to attend an incident as staff may need to		2/minor Medium	8/moderate 2/m	The risk of an incident occurring at an access point due to heavy rainfall is minimal, inor however failure of an access point can have an affect on safety and performance	2/minor 2/minor	Low	2/minor 2/minor	The future climate projections suggests storm events will be more frequent, this could Low mean that it will be more likely for heavy rain and flooding events, better drainage at access onits will be beneficial	Risks to infrastructure services from river, surface water and groundwater flooding		
		Heavy			Professional Head of	Increased risk of incursion both livestock and people	walk further to site/incident Heavy rainfall resulting in flooding may also be linked to the drainage asset due to blockages in the drainage system causing water to overflow and waterlogging which could affect the stabilit	w			Wet ground conditions are known to have an effect on the stability of fence posts. This may be dependent on the depth of the footings, materials used and age of fence.		Low		The future climate suggests storm events will be more frequent, this could mean that	Risks to infrastructure services from river, surface water and Risks to transport networks from slope and embankment		
BD1 Asset Boundary	All fence types	rain/cloudburst	Direct	Wales & Western Wales & Western	Drainage and Off Track and RAM Professional Head of	Inspection resulting in maintenance or renewal required Increased risk of incursion both livestock and people	of the boundary? Flooding may also be caused by third parties such as rivers bursting their banks or overflow of other water bodies A NRJ'srd party Tree failing onto a boundary/dry stone wall, has the potential to create loss of	9 6/moderate Medium 8/r	moderate Medium	s/moderate s/mo	Although this would be classed as an unlikely event, this type of issue has been known to occur on the infrastructure	9/moderate 9/moderate		9/moderate 9/moderate	In a higher level of maintenance/increased inspections The future climate suggests storm events will be more frequent, this could mean that it	groundwater flooding failure		
BD2 Asset Boundary	Wall	Storms/high wind	ds Direct	Wales & Western Wales & Western	Drainage and Off Track RAM GLD and RAM	Inspection resulting in maintenance or renewal required, incre- risk to service capacity from obstruction on line (from trees)	3rd party trees. Boundary repair/renewal will be required	of 6/moderate Medium 1	16/major Medium	10/major 6/mo	derate Although this would be classed as an unlikely event the loss of boundary in particular where there is livestock could result in a train derailment	9/moderate 9/moderate	Low	9/moderate 9/moderate	Low will be more likely for trees to fall over, however with vegatation management, identification of problem trees and continued inspection this will reduce the increase in risk	Risk to transport from high and low temperatures, high winds, lightning		
BD3 Asset Boundary	All fence types	Storms/high wind	ds Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track RAM GLD and RAM	Increased risk of incursion both livestock and people Inspection resulting in maintenance or renewal required	A NR/3rd party Tree failing onto a boundary/dry stone wall, has the potential to create loss of boundary, there is also the risk of the wall failing onto a person and/or 3rd party property. Vegetation management may be required for NR trees and liaison with adjacent land owners for the store of the s	or 6/moderate Medium 8/r	moderate Medium	16/major 6/mo	Although this would be classed as an unlikely event the loss of boundary in particular where there is livestock could result in a train derailment	10/major 10/major	Low	10/major 10/major	The future climate suggests storm events will be more frequent, this could mean that it used its more likely for tress to all over, however with vegetation management, dentification of problem trees and continued inspection this will reduce the increase in No Variation	Risk to transport from high and low temperatures, high winds, lightning		
BD4 Asset Boundary	Wooden panel	High winds	Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track RAM GLD	Increased risk of incursion both livestock and people Maintenance, or renewal required. Upgrade of fence type may required if in an area more susceptible to high winds	3rd party trees. Boundary repair/renewal will be required Maintenance or renewal will be required in the event of a loss of boundary incursion due to hig y be winds. Temporary measures and/or increased inspection may be required until works are undertaken	gh 6/moderate Medium 1	10/major Medium	6/moderate 4/mo	Wooden panel fencing is usually in residential areas, therefore the risk of livestock incursion is reduced/minimal. Which reduces the impact	9/moderate 9/moderate	Low	9/moderate 9/moderate	Low Chef future climate suggests that high winds will be more prevalent. Assumption that Low Current management practices will continue No Variation	Risk to transport from high and low temperatures, high winds, lightning		
BD5 Asset Boundary	All fence types	Heavy snow	Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track	Increased risk of incursion both livestock and people. Maintenance or renewal required	Maintenance or renewal will be required in the event of a loss of boundary incursion due to heavy Snow. Temporary measures and/or increased inspection may be required until works are undertaken	e <mark>6/moderate</mark> Medium 6/r	moderate Medium	8/moderate 6/mo	not be a high risk everywhere	4/moderate 4/moderate	Low	4/moderate 4/moderate	Low The future climate suggests that occurrences of heavy snow will reduce in the future. No Variation Therefore reducing the risk of boundary failure due to snow	Risk to transport from high and low temperatures, high winds, lightning		
BD6 Asset Boundary	All fence types	Heavy rain/cloudburst	Interdependency (us on them)	Wales & Western Wales & Western	Professional Head of Geotechnical and RAM	Increased risk of incursion both livestock and people. Maintenance or renewal required	There are links to earthwork failure/potential bank slip where the boundary at the bottom or to of the embankment could be at risk	⁰¹ 6/moderate Medium 8/r	moderate Medium	8/moderate 8/mo	Heavy rainfall could destabilise the earthwork causing the land to slip, this in turn could derate bring fencing down, causing a failure of the boundary measure and result in livestock incursion(trespass	9/moderate 9/moderate	Low	9/moderate 9/moderate	Dependent on future earthworks programme and development of more resilient Low embankments or cuttings this risk impact should remain the same but the likelihood will No Variation increase	Risks to infrastructure services from river, surface water and Risks to transport networks from slope and embankment groundwater flooding failure		
DR1 Asset Drainage	Culvert	Heavy rain/cloudburst	Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track, Professional Head of	Linked to trigger level for investment which is asset condition on need to uprate culvert size/capacity	There is a risk across the country although there may be a higher risk in the North West and areas where rainfall levels are projected to increase further than in the south.	9/moderate Medium 1	10/major Medium	10/major 10/r	Current asset condition and location knowledge is limited. Work over next three years focusses on providing better data	12/major 16/major	Low	12/major 16/major	Low We have low confidence in the risk rating but we have high confidence that the risk will No Variation increase in the absence of action	Risks to infrastructure services from river, surface water and groundwater flooding		
					Geotechnical and RAMs													
DR10 Asset Drainage	Underground piped drainage	High soil moisture	e Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track		I More extreme wetting of soils has the potential to increase movement resulting from swelling soils. Open jointed or damaged pipes and culverts may be compromised in terms of their ability to manage flows		moderate Low	4/moderate 3/m	Up to date condition data on an asset that is buried is difficult to ascertain. Damage may not be apparent until flooding results	3/minor 3/minor	Low	3/minor 3/minor	Low Current asset condition and inventory not well understood. Potential to impact assets not No Variation easy to understand	Risks to subterranean and surface infrastructure from subsidence		
DR2 Asset Drainage	Pump	Heavy rain/cloudburst	Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track RAM GLD	Linked to trigger level for investment which is asset condition/potential to compromise serviceability of track	When pumping rates cannot keep pace with rising groundwater levels track circuit may fail/water over the rail head may prevent normal running of trains	12/major Medium 1	16/major Medium	16/major 16/r	Although general asset inventory for drainage is only partially known/pumps are fairly	12/major 12/major	Low	12/major 12/major	Confidence around specific pump assets ability to cope difficult to assess as multiple Low location specific factors (e.g. hydrology) will contribute No Variation	Risks to infrastructure services from river, surface water and groundwater flooding		
		Heavy			and RAM Professional Head of	(submerged railhead/track circuit)	Increasing pressure on water resources (groundwater) resulting in increased regulatory pressur								That current funding for existing management practices will remain available Assumption that the regulators continue to consent pumped abtraction in the current way in the light of hotter, drier summers. Projected increased average rainfail levels and No Variation	Risks to infrastructure services from river, surface water and		
DR3 Asset Drainage	Pump	rain/cloudburst	Direct	wales & western wales & western	Drainage and Off Track RAM GLD and RAM Professional Head of		to deploy pumped solutions at emergent flood locations. This could lead to the requirement fo major capital works Wetter winters could result in design capacity of both track and geotechnical drainage systems		moderate Medium	6/moderate 6/mo	derate Future flood locations difficult to predict without comprehensive hydrological data Difficult to assess as the drainage inventory is incomplete and asset design information is	12/major 12/major	Low	12/major 12/major	respectively	groundwater flooding		
DR4 Asset Drainage	Track/earthwork drainage	Heavy rain/cloudburst	Direct	Wales & Western Wales & Western	Drainage and Off Track RAM GLD and RAM	When condition of parent asset is affected (Wetbeds, Track qu Flooding & Earthwork stability)	uality, being exceeded compromising the integrity of parent assets. As drainage systems are likely to have been designed to local historical storm patterns this effect is likely to transpire across the whole country. Under other removes could local to assist of a drawabe Table could reach in a drainane outcome.	Allowing Madium	16/major Medium	16/major 16/r	not available or is incomplete (as-built drawings etc). However reasonable assumption that older drainage will degrade and is unlikely to have been designed with climate change needs in mind	12/major 12/major	Low	12/major 12/major	Low That maintenance and construction will follow current standards. That older drainage will degrade and is unlikely to have been designed with climate change needs in mind	Risks to infrastructure services from river, surface water and groundwater flooding		
DR5 Asset Drainage	Track/earthwork drainage	Long hot, dry summer	Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track RAM GLD and RAM	Linked to trigger level for investment which is asset condition/ drainage failing to function as designed for NR managed assets/flood events for third party lineside neighbouring assets	achieving self cleansing velocity for less of the time causing greater amounts of solids to drop	3/minor Low 4/r	moderate Low	4/moderate 4/mo	derate Diffcult to assess as drainage inventory incomplete and asset design information not available or incomplete (As-built drawings etc)	12/major 12/major	Low	12/major 12/major	Low Presumption that installed drainage systems are designed to local historical rainfall No Variation Attems and don't account for climate change	Risk to transport from high and low temperatures, high winds, lightning		
	Sustainable Drainage Systems (SuDS)	Long wet	Direct	Wolce 8, Works	Professional Head of	Linked to trigger level for investment which is asset condition/	SuDS infrastructure will be designed to attenuate flows, primarily to reduce downstream flood risk. It is likely to have been designed with sufficient storage to accommodate a 'critical storm'		Implact	6 land	Most SuDS will have been designed with a factor of safety for climate change. Some	2/m		3/6/100	Low Presumption that Suds systems may not have been designed to accommodate projected No Variation	Risks to infrastructure services from river, surface water and		
Dro Asset Drainage	infrastructure	winter/spring	Direct	wates & Western Wales & Western	Drainage and Off Track RAM GLD and RAM	drainage failing to function as designed for NR managed assets/Flood events for third party lineside neighbouring asset	(storm of a duration and intensity resulting in the largest storage requirement for a given ts discharge). Longer wetter winters and more intense summer storms could result in insufficient storage capacity leading to exceedance events and possible consequent flooding	3/minor Low 6/r	moderate Low	6/moderate 4/mo	derate residual risk remains because of lack of maintenance and SuDS from third party lineside development	3/minor 3/minor	Low	3/minor 3/minor	climate change to 2050/80	groundwater flooding		
DR7 Asset Drainage	Non-return valves/river outfalls	Long wet winter/spring	Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track and RAM	When condition of parent asset is affected (Wetbeds, Track qu Flooding & Earthwork stability)	Outfalls are likely to have been set at antecedent levels for all locations across the country and uality, therefore all locations could be affected by increases in river flows. If non return valves and outfalls are prevented from allowing outflow by higher downstream water levels, flooding could be appreciated from allowing outflow by higher downstream water levels, flooding could be affected by increases in the set of the	12 feedback	moderate Low	8/moderate 16/r	Asset inventory and its criticality unlikely to be fully understood. Interaction/ interdependence/phase of operation of disparate flood defence infrastructure on and off the railway is not necessarily understood, resulting in a potential increase in flood risk to	16/major 16/major	Low	16/major 16/major	Very poor understanding of how catchment wide hydrology interacts with railway drainage systems and is exacerbated by increasing lineads evelopment. Nore modern to an	Risks to infrastructure services from river, surface water and Risks to infrastructure services from coastal flooding and groundwater flooding		
		· · ·····/b					result Outfull: an Illink to have been not at astronomet level: for all locations some the country and				railway and lineside neighbours Asset inventory and its criticality unlikely to be fully understood. Interaction/				climate change isostatic rebound and consequent nisked water levels in mind but older pystem are vulnerable Very poor understanding of how catchment wide hydrology interacts with railway drainage systems and is exacebrated by increasing lineside evelopment. More modern			
DR7a Asset Drainage	Non-return valves/coastal outfalls	Flooding	Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track	When condition of parent asset is affected (Wetbeds, Track qu Flooding & Earthwork stability)	allity Quarties are then you have been set an attractional reversion of an inclusion actions across one country and therefore all locations occuld be affected by increases in sea level. If non return valves and outfails are prevented from allowing outflow flooding could result	12/major Low 1	16/major Low	6/moderate 16/r	interdependence/phase of operation of disparate flood defence infrastructure on and of the railway is not necessarily understood, resulting in a potential increase in flood risk to railway and lineside neighbours	16/major 16/major	Low	16/major 16/major	Low drainage systems and 0 scaked values of wincesang turbuide developments: which indexin Low drainage systems and flood defence schemes are likely to have been designed with climate change isostatic rebound and consequent raised water levels in mind but older systems are vulnerable	Risks to infrastructure services from coastal flooding and erosion		
					professional Head of Drainage and Off Track/		Flood defence structures challenged and overwhelmed by rising river/estuarine water levels, leading to flooding which can compromise railway performance. Structures most structures relative active designed to contract the calibus from flooding will base base built in a time when								Asset inventory and condition likely not to be understood especially in the context of catchment wide flood management. As flood defences tend to be high profile and are			
DR8 Asset Drainage	Flood defences/revetments	Long wet winter/spring	Direct	Wales & Western Wales & Western	Professional Head of Structures/ Professional Head of Geotechnical and	When condition of parent asset is affected (Wetbeds, Track qu Flooding & Earthwork stability)/ Flooding of third party land through failure to maintain assets as a flood defence 'structure		12/major Low 4/r	moderate Low	6/moderate 16/r	Current asset liventory and condition not necessarily known/ understood. Effect on flooding and flood management not necessarily understood particularly on a catchment wide basis and or multi agency management basis	12/major 16/major	Low	12/major 16/major	Low likely to be monitored to an enhanced frequency based on condition, the risk is not likely to be monitored to an enhanced frequency based on condition, the risk is not likely to device our the medium term but will worsen over the longer period. Flood defence of the result of th	Risks to infrastructure services from river, surface water and groundwater flooding		
					RAMs		design purpose. In some cases the assets may be designated as statutory flood defence under Schedule 1 of the Flood & Water Management Act 2010								dimate change projections.			
		United			professional Head of Drainage and Off Track/ Professional Head of	When condition of parent asset is affected (Wetbeds, Track qu	Flood defence structures challenged and overwhelmed by rising river/estuarine water levels, leading to flooding which can compromise railway performance. Structures most structures deliberately designed to protect the railway from flooding will have been built in a time when climate change was not considered and freeboard/factor of safety where structures have been				Current asset inventory and condition not necessarily known/ understood. Effect on				Asset inventory and condition likely not to be understood especially in the context of catchment wide flood management. As flood defences tend to be high profile and are likely to be monitored to an enhanced frequency based on condition, the risk is not likely	Risks to infrastructure services from river, surface water and		
DR8a Asset Drainage	Flood defences/revetments	rain/cloudburst	Direct	Wales & Western Wales & Western	Structures/ Professional Head of Geotechnical and RAMS	Flooding & Earthwork stability)/ Flooding of third party land through failure to maintain assets as a flood defence 'structure	designed as a fleed defense may not prove to be adequate. Pallway structures such as bridges		L6/major Low	16/major 16/r	naor flooding and flood management not necessarily understood particularly on a catchment wide basis and or multi agency management basis	12/major 16/major	Low	12/major 16/major	Low they to be monutoes to an enhanced regionary bases on cubinous, the risks inclusively No Variation to get wors: over the medium term houl will worsen over the longer period. To flood defence, is constantly updated/reviewed to deal with rising water levels but not in relation to climate change projections.	groundwater flooding		
					professional Head of		Schedule 1 of the Flood & Water Management Act 2010 Flood defence structures may become overwhelmed by rising coastal water levels, leading to								Asset inventory and condition likely not to be understood especially in the context of			
DR8b Asset Drainage	Coastal defences/revetments	Flooding	Direct	Wales & Western Wales & Western	Drainage and Off Track/ Professional Head of Structures/ Professional	Flooding & Earthwork stability)/ Flooding of third party land	flooding which could compromise railway performance. Most structures deliberately designed uality, to protect the railway from flooding will have been built in a time when climate change was no considered and freeboard/factor of safety may not prove to be adequate. Railway structures	t 12/major Low 1	16/major Low	4/moderate 16/r	Current asset inventory and condition not necessarily known/ understood. Effect on moor flooding and flood management not necessarily understood particularly on a catchment	12/major 16/major	Low	12/major 16/major	About were investigated to consistent were into to de diadors succe sejectary in our clustes to were catchment wide do management. All food defences team to be high profile and are low likely to be monitored to an enhanced frequency based on condition, the risk is not likely. No Variation to get wors: over the medium term bout will worsen over the longer period. Theod defence	Risks to infrastructure services from coastal flooding and errorion		
					Head of Geotechnical and RAMs	through failure to maintain assets as a flood defence 'structure	e ¹ such as bridges, earthworks or revetments can also act as flood defences whether or not this is their primary design purpose. In some cases the assets may be designated as statutory flood defence under Schedule 1 of the Flood & Water Management Act 2010				wide basis and or multi agency management basis				is constantly updated/reviewed to deal with rising water levels but not in relation to climate change projections			
DR9 Asset Drainage	Underground piped drainage	Low soil moisture	e Direct	Wales & Western Wales & Western	Professional Head of Drainage and Off Track RAM GLD and RAM	Linked to trigger level for investment which is asset condition/ drainage failing to function as designed for NR managed assets flood events for third party lineside neighbour assets		3/minor Low 6/r	moderate Low	4/moderate 4/mo	derate Up to date condition data on an asset that is buried is difficult to ascertain. Damage may not be apparent until flooding results	3/minor 3/minor	Low	3/minor 3/minor	Low Current asset condition and inventory not well understood. Potential to impact assets not reary to understand	Risks to subterranean and surface infrastructure from subsidence		
Geo1 Asset Geotechnical	Rock cuttings, soil cuttings, embankments	Long hot, dry	Direct	Wales & Western Wales & Western	Professional Head of RAM GLD	Earthwork Evaluation is the business process during which thre and consequences are considered holistically and managemen	through academic research programmes. More extreme cyclical processes between the summi	er 12/major High 6/r	moderate High	6/moderate 16/r	Potentially high consequence events in 2019/20 with potential for 2-10 fatalities, rajor c.£200m/yr. geotechnical spend, 10 lines closed simultaneously at one point in February	25/severe 25/severe	Medium	25/severe 25/severe	Medium Assumes current levels of intervention/mitigation activity, which in the long run are No Variation	Risks to transport networks from slope and embankment Risk to transport from high and low temperatures, high		
		summer			Geotechnical and RAM	strategies including interventions and mitigations determined	and writer win require greater levels or investment to maintain the levels of performance in predominantly clay areas (mostly the south-east)		-		due to earthworks failures				medulin unsustainably low without factoring in climate change adaptation No valuation	failure winds, lightning		
Geo2 Asset Geotechnical	Rock cuttings, soil cuttings, embankments	Heavy rain/cloudburst	Direct	Wales & Western Wales & Western	Professional Head of Geotechnical and RAM	Earthwork Evaluation is the business process during which thre and consequences are considered holistically and managemen strategies including interventions and mitigations determined	balance needed to adequately invest in strengthening to make intrastructure more resistant an mitigating short-term increases in safety risk as short notice storms occur, then recoonding &	d 12/major High 1	16/major High	16/major 16/r	Potentially high consequence events in 2019/20 with potential for 2-10 fatalities, c.£200m/yr.geotechnical spend, 10 lines closed simultaneously at one point in February due to earthworks	25/severe 25/severe	Medium	25/severe 25/severe	Medium Assumes current levels of intervention/mitigation activity, which in the long run are unsustainably low without factoring in climate change adaptation No Variation	Risks to transport networks from slope and embankment failure Risks to infrastructure services from river, surface water and groundwater flooding	sks to infrastructure services from coastal flooding and rosion	Risks to subterranean and surface infrastructure from subsidence
		High average			Professional Head of	Earthwork Evaluation is the business process during which three	Increased extremes of wetting and drying increase the rate of deterioration, demonstrated eats through academic research programmes. A prolonged wet period (e.g. winter 2013/14) will				Potentially high consequence events in 2019/20 with potential for 2-10 fatalities,				Assumes current levels of intervention/mitigation activity, which in the long run are	Risks to transport networks from slope and embankment Risks to infrastructure services from river, surface water and	sks to infrastructure services from coastal flooding and	Ricks to subterranean and surface infrastructure from
Geo3 Asset Geotechnical	Rock cuttings, soil cuttings, embankments	rainfall over several days	Direct	Wales & Western Wales & Western	Geotechnical and RAM		t cause problems that become immediately apparent and interrupt operations, but also create longer term problems with a large proportion of assets that have been extensively stressed but not quite to the point of failure		16/major High	16/major 16/r	najor c.£200m/yr. geotechnical spend, 10 lines closed simultaneously at one point in February due to earthworks	25/severe 25/severe	Medium	25/severe 25/severe	Medium unsustainably low without factoring in climate change adaptation in the long rate with No Variation	failure a unapper lectronical contraction and contraction many of management of a second and the	rosion	subsidence
Geo4 Asset Geotechnical	Rock cuttings, soil cuttings, embankments	Long hot, dry summer	Direct	Wales & Western Wales & Western	Professional Head of Geotechnical and RAM	Earthwork Evaluation is the business process during which three and consequences are considered holistically and managemen strategies including interventions and mitigations determined	Increased extremes of wetting and drying increase the rate of deterioration, demonstrated	12/major High 6/r	moderate High	6/moderate 16/r	Potentially high consequence events in 2019/20 with potential for 2-10 fatalities, c.2200m/yr. geotechnical spend, 10 lines closed simultaneously at one point in February due to earthworks	25/severe 25/severe	Medium	25/severe 25/severe	Medium Assumes current levels of intervention/mitigation activity, which in the long run are unsustainably low without factoring in climate change adaptation No Variation	Risks to transport networks from slope and embankment failure Risks to subterranean and surface infrastructure from subsidence	sks to digital from high and low temperatures, high winds nd lightning	
Geo5 Asset Geotechnical	Rock cuttings, soil cuttings, embankments	Snow/ice	Direct	Wales & Western Wales & Western	Professional Head of RAM GLD	Earthwork Evaluation is the business process during which thre and consequences are considered holistically and managemen	eats t Historical and ongoing extreme cold weather events and the associated thawing have long-terr	ⁿ 12/major High 6/r	moderate High	10/major 12/r	Potentially high consequence events in 2019/20 with potential for 2-10 fatalities, najor c.£200m/yr. geotechnical spend, 10 lines closed simultaneously at one point in February	25/severe 25/severe	Medium	25/severe 25/severe	Medium Assumes current levels of intervention/mitigation activity, which in the long run are No Variation	Risks to transport networks from slope and embankment Risks to subterranean and surface infrastructure from	sks to digital from high and low temperatures, high winds	
IX1 Accet Louel concrise		High winds	Direct	Wales & Western Wales & Western	Geotechnical and RAM Professional Head of Level Crossing and RAM	strategies including interventions and mitigations determined At point of failure or advance weather warning	oegradation effects on geotechnical assets There is a risk across the country although the risk will be higher in the exposed areas where th	e 9/Moderate Medium 4/r	moderate Medium	9/Medanta 6/m	due to earthworks Historic evidence from Level Crossing barrier failures provides sufficient knowledge of	9/moderate 12/major	Medium	9/moderate 12/major	unsustainably low without factoring in climate change adaptation Medium Assumptions based on current asset location and knowledge of surrounding No Variation	failure subsidence subsidence subsidence	nd lightning	
LX1 Asset Level crossing		Storms	Direct	Wales & Western Wales & Western	Broforcional Head of Loual	At point of failure or advance weather warning	wind speed will be higher There is a risk across the country although the risk will be higher in the exposed areas where th wind speed will be higher		10/major Medium	10/major 10/r	botential failure risks Historic evidence from Level Crossing barrier failures provides sufficient knowledge of optential failure risks	9/moderate 12/major	Medium	9/moderate 12/major	Medium environmental conditions Assumptions based on current asset location and knowledge of surrounding Medium No Variation	winds, lightning Risks to infrastructure services from river, surface water and Risks to transport from high and low temperatures, high groundwater flooding		
LX3 Asset Level crossing	Level crossing	Flooding	Direct		Professional Head of Level RAM GLD	At point of failure or advance weather warning	There is a risk across the country although the risk will be higher in areas prone to flooding	6/moderate Medium 8/r	moderate Medium	8/moderate 8/mo	Historic addappo from Lovel Creation barrier machine and location care follower provider	6/moderate 12/major	Medium	6/moderate 12/major	Medium Precipitation predictions from UKCP09 No Variation	Risks to infrastructure services from river, surface water and groundwater flooding		
LX4 Asset Level crossing	Level crossing	Snow/ice	Direct	Wales & Western Wales & Western	Professional Head of Level Crossing and RAM	At point of failure or advance weather warning	Greater risk for Northern areas	4/moderate Medium 4/r	moderate Medium	4/moderate 4/mo	Dense snowfall could affect visibility of RTLs but this is not currently an issue. Circular derate cross section of boom means snow is unable to build up on the boom. Historically snow has effected OD equipment but mitigations are effective	4/moderate 4/moderate	Medium	4/moderate 4/moderate	Medium Assumptions based on current asset location and knowledge of surrounding environmental conditions	Risk to transport from high and low temperatures, high winds, lightning		
LX5 Asset Level crossing	Level crossing	Extreme hot temperatures	Direct	Wales & Western Wales & Western	Professional Head of Level Crossing and RAM	At point of failure or advance weather warning	Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain	4/moderate Medium 6/r	moderate Medium	3/minor 6/mo	Ristoric information chows that there is a small increase in failures on het daws but it is	6/moderate 9/moderate	Medium	6/moderate 9/moderate	Medium This analysis assumes that treadles are considered as a separate asset No Variation	Risk to transport from high and low temperatures, high winds, lightning		
OLE 1 Asset OLE	Wire run auto tension (single stack balance weights)	Extreme hot temperatures	Direct	Wales & Western Wales & Western	Professional Head of Contact Systems and RAM Electricfication	Ambient temperatures reaches over 38 degrees C (design ran limits)	ge Records show we have not had issues through high temperatures previously, only in isolated locations going back to hot spells in 1976	4/moderate Medium 4/r	moderate Medium	3/minor 6/mo	f the wire run is maintenance free, with no heat related defects with sufficient play on the balance weights the risk is low to medium	8/moderate 12/major	Medium	8/moderate 12/major	Latest 0.12 designs have used spring tensioners, which have the capacity to work up to a Medium Medium the higher temperature range, current systems are to be maintained and adjutced to meet the higher temperature ranger, including work on the wire interface areas	Risk to transport from high and low temperatures, high winds, lightning		
OLE 2 Asset OLF	Wire run auto tension (single stack balance weights)	Heat wave	Direct	Wales & Western Wales & Western	Professional Head of RAM	Ambient temperatures reaches over 25 degrees C (Design rang	ge Records show we have a number of wire runs that have not had stretch recovery work	6/moderate High 6/r	moderate High	4/moderate 8/mo	The mitigations are through carrying out patrols to identify the risk and carry out	8/moderate 12/major	Medium	8/moderate 12/major	(crossover/overlap.) Latest DLE design have used spring tensioners, which have the capacity to work up to a higher temperature range, or to adjust the anchor to a single wheel twin stack Medium arrangement: key factors to address. No Variation	Risk to transport from high and low temperatures, high		
	stretch recovery repairs not completed				Contact Systems and RAM Electricfication						mitigation work to allow for more downward movement on the stack of weights When temperatures reach above 38 degrees C, creates sag in the wire. Greater risk at				* Longer track access, to adjust and maintain * Improve the skills fade	winds, lightning		
OLE 3 Asset OLE	Wire run fixed termination	Extreme hot temperatures	Direct	Wales & Western Wales & Western	Professional Head of RAM Contact Systems and RAM Electricfication	Ambient temperatures reach over 38 degrees C (Design range limits)	Previous records through the 1976 heatwave no issues were recorded, 2019 was the first time this has been recorded, due to low tensioned wire runs	12/major High 6/r	moderate High	10/major 16/r	sites where there are converging and diverging wires. Risk also increased where projects have been working in the area and making basic adjustments that will interfere with the tensions. Track access at such sites is also limited and this is essential to carry out the work. (below	8/moderate 12/major	High	8/moderate 12/major	Current plans are to check tensions on fixed terminations and make adjustments when required: key factors to address High * Longer track access, to adjust and maintain * Improve the kills face into knowledge of fixed terminations equipment	Risk to transport from high and low temperatures, high winds, lightning		
		~ .			Perfering light f						specification) Understand and manage areas where we have low wire heights When temperatures reach above 40 degrees C, there is enough tolerance to take it				This type of equipment is not mainline affecting but exists in mainline terminal stations			
OLE 4 Asset OLE	Wire run auto tension (spring tension devic	Extreme hot temperatures	Direct	Wales & Western Wales & Western	Professional Head of RAM Contact Systems and RAM Electricfication Professional Head of RAM	Ambient temperatures reach over 40 degrees C (Design range limits) Ambient temperatures reach over 38/40 degrees C (design ran	No historic records for this type of failure on this device at these temperatures inge				derate slightly higher. Work with the manufacturer to understand the risk at higher temperatures then specified Through high temperatures the risk is when the weights have reached its lower limits or	9/moderate 12/major	Low		Low the future that is to monitor the tensioners in extreme temperature conditions & work with Pfisterer to understand the full risk. The current plans is to monitor the balance weights in extreme temperature conditions,	Risk to transport from high and low temperatures, high winds, lightning Risk to transport from high and low temperatures, high		
OLE 5 Asset OLE	Neutral section	temperatures Extreme hot	Direct	Wales & Western Wales & Western	Contact Systems and RAM Electricfication Professional Head of RAM	Ambient temperatures reach over 38 / 40deg C (Design range	No riscond records for this type of randre on this device, but brank speeds will reduce the risk		moderate Medium		derate extent of travel on the tensorex, causing loss of tension Through high temperatures the risk is when the weights have bottomed out, causing derate failure	8/moderate 12/major	Medium	8/moderate 12/major	Medium and apply blanket speed to limit the risk. Also making sure the profile set-up is in order The rurrent place is to monitor the balance weights in extreme temperature conditions	winds, lighting Risk to transport from high and low temperatures, high Risk to transport from high and low temperatures, high		
OLE 6 Asset OLE	Section insulators	temperatures	Direct	Wales & Western Wales & Western	Contact Systems and RAM Electricfication Professional Head of	limits)	No inscond rectors for this type of device, but plank speeds will reduce the risk.					8/moderate 12/major	Medium	8/moderate 12/major	Medium and apply blanket speed to limit the risk. Also making sure the profile set-up is in order No Variation	winds, lightning Risk to transport from high and low temperatures, high		
PD02 Asset Distribution	HV power system protection	Lightning	Indirect	Wales & Western Wales & Western	and RAM	Linked to trigger level for investment which is asset condition	thunderstorms	6/moderate High 8/r	moderate High	6/moderate 6/mo	derate More likely than a direct strike, but far easier to repair	6/moderate 9/moderate	Medium	6/moderate 9/moderate	Medium Assuming general increase in storm frequency and severity No Variation	winds, lightning		
PD03 Asset Power Distribution	Changeover Panels	Lightning	Indirect	Wales & Western Wales & Western	Protessional Head of Power Distribution HV/LV and RAM	Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	4/moderate High 8/r	moderate High	4/moderate 6/mo	derate More likely than a direct strike, but far easier to repair	4/moderate 6/moderate	Medium	4/moderate 6/moderate	Medium Assuming general increase in storm frequency and severity No Variation	Risk to transport from high and low temperatures, high winds, lightning		
PD04 Asset Distribution	Distribution network operator supplies	Flooding	Interdependency (us on them)	Wales & Western Wales & Western	Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfail levels will be higher	9/moderate Medium 1	10/major Medium	10/major 10/r	najor Current typical flood levels are known and accounted for	9/moderate 12/major	Low	9/moderate 12/major	Low Assuming current drainage strategies pensist No Variation	Risks to infrastructure networks (water, energy, transport, ITC) from cascading failures		
PD05 Asset Power Distribution	Distribution network operator supplies	Lightning	Interdependency (us on them)	Wales & Western Wales & Western	Professional Head of Power Distribution HV/LV and RAM	Linked to trigger level for investment which is asset condition	This is a risk across the country	6/moderate Medium 8/r	moderate Medium	6/moderate 6/mo	derate Unlikely but can have devastating effects	9/moderate 12/major	Low	9/moderate 12/major	Low Assuming general increase in storm frequency and severity No Variation	Risks to energy from high and low temperatures, high wind, lightning		
PD06 Asset Power	Distribution network operator supplies	Storms	Interdependency	Wales & Western Wales & Western	Professional Head of RAM	Linked to trigger level for investment which is asset condition	This is a risk across the country	6/moderate Medium 8/r	moderate Marking	8/moderate 8/m	derate Unlikely. Mitigations generally effective, where applied	9/moderate 12/major	Low	9/moderate 12/major	Low We have low confidence in the risk rating but we have high confidence that the risk will No Variation	Risks to energy from high and low temperatures, high wind, Risks to infrastructure services from river, surface water and		
PDUB Asset Distribution			(us on them)		Power Distribution HV/LV Electricfication Professional Head of RAM										increase in the absence of action	lightning groundwater flooding Risk to transport from high and low temperatures, high		
PD07 Asset Distribution	Functional supply points	Heat wave	Cumulative	Wales & Western Wales & Western	Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition	where the temperature will be higher	4/moderate Medium 6/r	moderate Medium	2/minor 4/mo	derate Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 6/moderate	Low	4/moderate 6/moderate	Low Assuming current manufacturing techniques and materials No Variation	winds, lightning		
PD08 Asset Distribution	Functional supply points	Large diurnal temperature rang	ge Direct	Wales & Western Wales & Western	Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 6/r	moderate Medium	4/moderate 4/mo	derate Asset is generally capable of withstanding current range of temperatures	4/moderate 6/moderate	Low	4/moderate 6/moderate	Low Assuming current manufacturing techniques and materials No Variation	Risk to transport from high and low temperatures, high winds, lightning		
PD09 Asset Power Distribution	Functional supply points	Low soil moisture	e Direct	Wales & Western Wales & Western	Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	3/minor Low 6/r	moderate Low	3/minor 4/mo	derate This issue often goes undetected	3/minor 6/moderate	Low	3/minor 6/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action No Variation	Risk to transport from high and low temperatures, high winds, lightning		
PD1 Asset Power Distribution	AC power supply conditioning	Extreme hot temperatures	Direct	Wales & Western Wales & Western		Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 6/r	moderate Medium	2/minor 6/mo	Current asset condition is known and generally capable of withstanding current range of high temperatures	6/moderate 8/moderate	Low	6/moderate 8/moderate	Low Assuming current manufacturing techniques and materials No Variation	Risk to transport from high and low temperatures, high winds, lightning		
PD10 Asset Power	Functional supply points	Flooding	Direct	Wales & Western Wales & Western	and RAM Professional Head of Power Distribution HV/LV	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas	4/moderate Medium 6/r	moderate Medium	6/moderate 6/mo	derate Current typical flood levels are known and accounted for	4/moderate 6/moderate	Low	4/moderate 6/moderate	Low Assuming current drainage strategies persist No Variation	Risks to infrastructure services from river, surface water and		
Distribution					and RAM		where rainfall levels will be higher	- Of		0,110		, house it		L, MOULULE		groundwater flooding		

PD100 Asset Power Lighting support structure	High winds Direct	Wales & Western Professional Head of Profesional Head of Professional Head of Professional Head	This is a risk across the country, particularly in areas where the asset is exposed	2/minor Medium 6/mo	derate Medium	2/minor 2/minor	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/n	minor 3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk will	No Variation	Risk to transport from high and low temperatures, high	
PD101 Asset distribution Lighting support structure	Storm: Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV RAM Electricitication Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	2/minor Medium 8/mo	derate Medium		Structures are designed to withstand current weather extremes	2/minor 3/minor		minor 3/minor	Low Increase in the absence of action We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action.	No Voriation	winds, lightning Risks to infrastructure services from river, surface water and Risk to transport from high and low temperatures, high	
- Power	Extreme hot	Professional Head of	There is a risk across the country although the risk will be higher in the South East and areas				Structures are designed to withstand current weather extremes				cow increase in the absence of action		groundwater flooding winds, lightning Rikk to transport from high and low temperatures, high	
PD102 Asset Power Supply >120V	temperatures Cumulative	Wales & Western Wales & Western Power Distribution HV/LV Plextrictication Linked to trigger level for investment which is asset condition and RAM.	where the temperature will be higher	6/moderate Medium 6/mo	derate Medium	4/moderate 9/moderate	high temperatures	6/moderate 6/moderate	Low 6/mo	oderate 6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	winds, lightning	
PD103 Asset Power distribution Signal box: power supply >120V	Heat wave Cumulative	Wales & Western Wales & Western Professional Head of PAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	6/moderate Medium 6/mo	derate Medium	4/moderate 8/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	6/moderate 9/moderate	Low 6/mo	oderate 9/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Rick to transport from high and low temperatures, high winds, lightning	
PD104 Asset Power distribution Signal box: power supply >120V	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 6/mo	derate Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor 4/moderate	Low 2/n	minor 4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Rick to transport from high and low temperatures, high winds, lightning	
PD105 Asset Power distribution Signal box: power supply >120V	Flooding Direct	Wales & Western Wales & Western Power Distribution HV/LV Electricification and RAM Electricification	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	6/moderate Medium 8/mo	derate Medium	8/moderate 8/moderate	Current typical flood levels are known and accounted for	6/moderate 9/moderate	Low 6/mo	oderate 9/moderate	Low Assuming current drainage strategies persist	No Variation	Ruks to infrastructure services from river, surface water and groundwater flooding	
PD106 Asset Power distribution Signal box: power supply >120V	Erosion Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Rectricitication Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	6/moderate Medium 4/mo	derate Medium	9/moderate 9/moderate	Current asset condition known, mitigations generally effective	6/moderate 9/moderate	Low 6/mo	oderate 9/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD107 Asset Power distribution Signal box: power supply >120V	Lightning Direct	Wales & Western Wales & Western Power Distribution HV/LV RAM and RAM Electricitication A RAM E	This is a risk across the country although the risk will be higher in areas with more thunderstorms	6/moderate Low 10/r	major Low	6/moderate 6/moderate	Unlikely but can have devastating effects	6/moderate 6/moderate	Low 6/mo	oderate 6/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Ruk to transport from high and low temperatures, high winds, lightning	
PD108 Asset Power distribution Signal box: power supply >120V	Lightning Indirect	Wales & Western Wales & Western and RAM Electric/fication and RAM Elec	This is a risk across the country	6/moderate Medium 6/mo	derate Medium	6/moderate 6/moderate	More likely than a direct strike, but far easier to repair	6/moderate 9/moderate	Low 6/mo	oderate 9/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD109 Asset Power distribution 1500V DC/1500V HV cables	Extreme hot temperatures	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 8/mo	derate Medium	2/minor 6/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 4/moderate	Low 4/mo	oderate 4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD11 Asset Power Distribution Functional supply points	Erosion Direct	Wales & Western Wales & Western Professional Head of Poner Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	4/moderate Medium 8/mo	derate Medium	6/moderate 6/moderate	Current asset condition known, mitigations generally effective	4/moderate 6/moderate	Low 4/mo	oderate 6/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk will Increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD110 Asset Power distribution AC power supply conditioning	Heat wave Cumulative	Wales & Western Wales & Western Professional Head of RAM Uniked to trigger level for investment which is asset condition PV/VV Electric/fication	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 8/mo	derate Medium	2/minor 6/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 6/moderate	Low 4/mo	oderate 6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD111 Asset Power distribution Battery & charger	Flooding Direct	Wales & Western Professional Head of Power Distribution HV/LV RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfail levels will be higher	4/moderate High 6/mo	derate High	6/moderate 6/moderate	Current typical flood levels are known and accounted for	4/moderate 6/moderate	Medium 4/mo	oderate 6/moderate	Medium Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD112 Asset Power 1500V DC cables	Large diurnal temperature range	Wales & Western Professional Head RAM Dour Distribution MV/V Electrification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 6/mo	derate Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor 4/moderate	Low 2/n	minor 4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, legitiniting	
PD113 Asset Power distribution 1500V DC cables	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV RAM Electricitation Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more	4/moderate Low 8/mo	derate Low	4/moderate 6/moderate	Unlikely but can have devastating effects	4/moderate 4/moderate	Low 4/mo	oderate 4/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high	
Power provide white		Professional Head of PAM	Thick is a side access the sources	4/moderate Medium 10/r	major Medium		More likely than a direct strike, but far easier to repair	4/moderate 6/moderate		oderate 6/moderate			winds, lightning Rick to transport from high and low temperatures, high	
POIL4 Paset distribution 1000 DC (addes	Extreme hot	and RAM Electricitation	This is a risk across the country There is a risk across the country although the risk will be higher in the South East and areas				More likely than a direct strike, but far easier to repair Current asset condition is known and generally capable of withstanding current range of					No Variation	winds, lightning Risk to transport from high and low temperatures, high	
PD115 Asset distribution 1500V DC/1500V HV switchgear	temperatures Cumulative	Wales & Western Wales & Western Mass & Western Linked to trigger level for investment which is asset condition Mass & Western	where the temperature will be higher	4/moderate Medium 6/mo	derate Medium		high temperatures	4/moderate 4/moderate		oderate 4/moderate		No Variation	winds, lightning	
PD116 Asset Power distribution 1500V DC/1500V HV switchgear	Heat wave Cumulative	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV RAM Linked to trigger level for investment which is asset condition Professional Head of Power Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher There is a risk across the country although the risk will be higher in the South East and areas	6/moderate Medium 10/r	major Medium		Current asset condition is known and generally capable of withstanding current range of high temperatures	6/moderate 9/moderate	Low 6/mo	oderate 9/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Rick to transport from high and low temperatures, high winds, lightning	
PD117 Asset Power distribution 1500V DC switchgear	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	3/minor Medium 10/r	major Medium	3/minor 3/minor	Asset is generally capable of withstanding current range of temperatures	3/minor 6/moderate	Low 3/n	minor 6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Rick to transport from high and low temperatures, high winds, lightning	
PD118 Asset Power distribution 1500V DC/1500V HV switchgear	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate High 6/mo	derate High	6/moderate 6/moderate	Current typical flood levels are known and accounted for	4/moderate 6/moderate	Medium 4/mo	oderate 6/moderate	Medium Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD119 Asset Power distribution Insulation monitoring devices	Extreme hot temperatures Cumulative	Wales & Western Wales & Western Potencional Hoad of Power Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 8/mo	derate Medium	2/minor 6/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 4/moderate	Low 4/mo	oderate 4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Ruk to transport from high and low temperatures, high which, lightning	
PD12 Asset Power Distribution Auxiliary transformer	Extreme hot temperatures	Wales & Western Wales & Western Orower Distribution HV/LV and RAM Electricification Area and	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	derate Medium	2/minor 6/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 4/moderate	Low 4/mo	oderate 4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD120 Asset Power distribution 1500V DC switchgear	Lightning Direct	Wales & Western Wales & Western Power Distribution HV/LV AM Electricification Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	4/moderate Low 12/r	major Low	4/moderate 6/moderate	Unlikely but can have devastating effects	4/moderate 4/moderate	Low 4/mo	oderate 4/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD121 Asset Power distribution 1500V DC switchgear	Lightning Indirect	Wales & Western Wales & Western and RAM Biotribution HV/LV RAM Electricification and RAM Electri	This is a risk across the country	4/moderate Medium 12/r	major Medium	4/moderate 6/moderate	More likely than a direct strike, but far easier to repair	4/moderate 6/moderate	Low 4/mo	oderate 6/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD122 Asset Power distribution 1500V HV cables	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of RAM Linked to trigger level for investment which is asset condition PV/LV Electricitication	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 8/mo	iderate Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor 4/moderate	Low 2/n	minor 4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD123 Asset Power distribution 1500V HV cables	Lightning Direct	Wales & Western Wales & Western Ordersional Head of Power Distribution HV/LV BAM Electricitization and RAM.	This is a risk across the country although the risk will be higher in areas with more thunderstorms	4/moderate Low 12/r	major Low	4/moderate 6/moderate	Unlikely but can have devastating effects	4/moderate 4/moderate	Low 4/mo	oderate 4/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD124 Asset Power distribution 1500V HV cables	Lightning Indirect	Wales & Western Wales & Western Professional Head of Portersional Head of Power Distribution HV/LV Reprinting to the United to trigger level for investment which is asset condition	This is a risk across the country	4/moderate Medium 12/r	major Medium	4/moderate 6/moderate	More likely than a direct strike, but far easier to repair	4/moderate 6/moderate	Low 4/mo	oderate 6/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD125 Asset Power distribution Insulation monitoring devices	Large diurnal temperature range	Wales & Western Professional Head of Power Distribution W/V/V BAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 8/mo	derate Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor 4/moderate	Low 2/n	minor 4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lepticity and low temperatures and low temperatures and low temperatures are set of the set	
PD126 Asset Power distribution 1500V HV switchgear	Large diurnal Direct	Wile & Worker, White & Worker, Professional Head of RAM United to trianer level for investment which is yest condition.	There is a risk across the country although the risk will be higher in the South East and areas	3/minor Medium 8/mo	derate Medium	3/minor 3/minor	Asset is generally capable of withstanding current range of temperatures	3/minor 6/moderate	Low 3/n	minor 6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high	
Power	temperature range	Wales & Western Wales & Western Power Distribution HV/LV Electricitication United to trigger level on investment which is asset condution Wales & Western Wales & Western Porfessional Head of Power Distribution HV/LV BAM Electricitication Linked to trigger level for investment which is asset condition	where the temperature will be higher This is a risk across the country although the risk will be higher in areas with more	8/moderate Low 10/r			Unlikely but can have devastating effects						winds, lightning Risk to transport from high and low temperatures, high	
	Lightning Direct	Professional Head of	thunderstorms					8/moderate 8/moderate		oderate 8/moderate		No Variation	winds, lightning Risk to transport from high and low temperatures, high	
PD128 Asset Power distribution 1500V HV switchgear	Lightning Indirect	Wales & Western Western Power Distribution IV/LV PAM Bletrictication Linked to trigger level for investment which is asset condition Vales & Western Vorofessional Head of asset asset asset	This is a risk across the country There is a risk across the country although the risk will be higher in the South East and areas	6/moderate Medium 12/r			More likely than a direct strike, but far easier to repair	6/moderate 9/moderate	Low 6/mo	oderate 9/moderate	Low Assuming general increase in storm frequency and severity	No Variation	winds, lightning Risk to transport from high and low temperatures, high	
distribution	temperatures Cumulative	Wales & Western Wales & Western Power Distribution IV/LV PAM Entropy of the entr	where the temperature will be higher	6/moderate Medium 10/r	major Medium	2/minor 9/moderate	Luirent asset conductin s known and generally capacie of withstanding current range of high temperatures	6/moderate 6/moderate	Low 6/mo	oderate 6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	winds, lightning	
PD13 Asset Power Distribution Functional supply points	Lightning Direct	Wales & Western Wales & Western Power Distribution HV/LV RAM Electricitication Linked to trigger level for investment which is asset condition and RAM		6/moderate Low 10/r			Unlikely but can have devastating effects	6/moderate 6/moderate	Low 6/mo	oderate 6/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD130 Asset Power distribution 1500V HV transformer/ rectifier	Heat wave Cumulative	Wales & Western Wales & Western Porfessional Head of Power Distribution HV/LV Rectricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	6/moderate Medium 6/mo	iderate Medium	4/moderate 8/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	6/moderate 9/moderate	Low 6/mo	oderate 9/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Rick to transport from high and low temperatures, high winds, lightning	
PD131 Asset Power distribution 1500V HV transformer/ rectifier	Large diurnal temperature range	Wales & Western Wales & Western Portecisional Head of Power Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/m	ninor Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor 4/moderate	Low 2/n	minor 4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD132 Asset Power distribution 1500V HV transformer/ rectifier	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Bectricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate High 6/mo	iderate High	6/moderate 6/moderate	Current typical flood levels are known and accounted for	4/moderate 6/moderate	Medium 4/mo	oderate 6/moderate	Medium Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD133 Asset Power distribution 1500V HV transformer/ rectifier	Lightning Direct	Wales & Western Wales & Western Power Distribution HV/LV and RAM Electric/Lication and RAM.	This is a risk across the country although the risk will be higher in areas with more thunderstorms	8/moderate Low 10/r	major Low	8/moderate 8/moderate	Unlikely but can have devastating effects	8/moderate 8/moderate	Low 8/mo	oderate 8/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD134 Asset Power distribution Insulation monitoring devices	Heat wave Cumulative	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	iderate Medium	2/minor 6/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 6/moderate	Low 4/mo	oderate 6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD135 Asset Power distribution 1500V HV transformer/ rectifier	Lightning Indirect	Wales & Western Wales & Western and RAM Biotribution HV/LV BAM Electricification and RAM Electricification and RAM Electricification and RAM Biotribution HV/LV Biotribution B	This is a risk across the country	6/moderate Medium 8/mo	derate Medium	6/moderate 6/moderate	More likely than a direct strike, but far easier to repair	6/moderate 9/moderate	Low 6/mo	oderate 9/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD136 Asset Power distribution Metering	Heat wave Cumulative	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricification Lunked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/m	ninor Medium	2/minor 4/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	2/minor 3/minor	Low 2/n	minor 3/minor	Low Assuming current manufacturing techniques and materials	No Variation	Ruk to transport from high and low temperatures, high whody, lightning	
PD137 Asset Power distribution Metering	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of RAM Linked to trigger level for investment which is asset condition PV/LV Electricitization	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/m	ninor Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor 2/minor	Low 2/n	minor 2/minor	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD138 Asset Power distribution Metering	Flooding Direct	Wales & Western Wales & Western Professional Head of RAM Unked to trigger level for investment which is asset condition PV/LV Electricitation	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor High 4/mo	iderate High	4/moderate 4/moderate	Current typical flood levels are known and accounted for	2/minor 3/minor	Medium 2/n	minor 3/minor	Medium Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD139 Asset Power distribution Metering	Lightning Direct	Wales & Western Professional Head of Power Distribution HV/LV RAM Linked to trigger level for investment which is asset condition Formation HV/LV	This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo			Unlikely but can have devastating effects	2/minor 2/minor	Low 2/n	minor 2/minor	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lettining	
PD14 Asset Power Distribution Functional supply points	Lightning Indirect	Woles & Workson White & Workson Professional Head of RAM RAM Using the transmission for investment which is year condition.	Thunderstorms This is a risk across the country	6/moderate High 8/mo	iderate High	6/moderate 6/moderate	More likely than a direct strike, but far easier to repair	6/moderate 9/moderate		oderate 9/moderate		No Variation	Risk to transport from high and low temperatures, high	
PD140 Asset Power distribution Metering	Lightning Indirect	Wales & Waters Wales & Waters Professional Head of RAM (Initiation Tricase law) for insetment which is asst rootline					More likely than a direct strike, but far easier to repair	2/minor 3/minor		minor 3/minor	Medium Assuming general increase in storm frequency and severity	No Variation	winds, lightning Risk to transport from high and low temperatures, high	
Bower	Extreme hot Cumulative	Power Ustribution HV/LV Electricitation Professional Head of	There is a risk across the country although the risk will be higher in the South East and areas		_		Current asset condition is known and generally capable of withstanding current range of				Necium Assuming general increase in scorm nequency and severity Low Assuming current manufacturing techniques and materials	No Variation	winds, lightning Risk to transport from high and low temperatures, high	
	temperatures Cumulative	vales a vestelin vales a vestelin vales a vestelin vales de final data data data data data data data da	where the temperature will be higher									veraldilli	winds; lightning Risk to transport from high and low temperatures, high	
PD142 Asset Power Points heater monitor	Heat wave Cumulative	wales & western Wales & western Power Distribution HV/LV Electricitication unwed to tragger level for investment which is asset condition	where the temperature will be higher There is a risk across the country although the risk will be higher in the South East and areas	2/minor Medium 2/m	_		high temperatures	2/11/01				No Variation	Note to designed it for in ingression we compensatively ingression and the second seco	
PD143 Asset distribution Points neater monitor	Large diurnal temperature range	wales & western Wales & Western Power Distribution HV/LV Electric/fication unkee to tragger level for investment which is asset condition	where the temperature will be higher	z/minor medium z/m			Asset is generally capable of withstanding current range of temperatures	2/minor 2/minor		minor 2/minor		No Variation	winds, lightning	
PD144 Asset Power distribution Insulation monitoring devices	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	Aymoderate mgn dymo	derate High	6/moderate 6/moderate	Current typical flood levels are known and accounted for	4/moderate 6/moderate	Medium 4/mo	oderate 6/moderate	Medium Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD145 Asset Power distribution Points heater monitor	Flooding Direct	Wales & Western Wales & Western Portexional Head of Power Distribution HV/LV Rectricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor High 4/mo	derate High	4/moderate 4/moderate	Current typical flood levels are known and accounted for	2/minor 3/minor	Medium 2/n	minor 3/minor	Medium Assuming current drainage strategies persist	No Variation	Ruks to infrastructure services from river, surface water and groundwater flooding	
PD146 Asset Power distribution Points heater monitor	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricification Lunked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo	derate Low	2/minor 2/minor	Unlikely but can have devastating effects	2/minor 2/minor	Low 2/n	minor 2/minor	Low Assuming general increase in storm frequency and severity	No Variation	Ruk to transport from high and low temperatures, high whose light to the second	
PD147 Asset Power distribution Points heater monitor	Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Rectricification Linked to trigger level for investment which is asset condition	This is a risk across the country	2/minor High 4/mo	iderate High	2/minor 2/minor	More likely than a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/n	minor 3/minor	Medium Assuming general increase in storm frequency and severity	No Variation	Ruk to transport from high and low temperatures, high winds, lightning	
PD148 Asset Power distribution Power supply monitor	Extreme hot temperatures	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV and RAM RAM Linked to trigger level for investment which is asset condition and RAM	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/m	ninor Medium	2/minor 4/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	2/minor 2/minor	Low 2/n	minor 2/minor	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD149 Asset Power Power supply monitor (including signa distribution power)	hal Heat wave Cumulative	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV BAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/m	ninor Medium	2/minor 4/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	2/minor 3/minor	Low 2/n	minor 3/minor	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD15 Asset Power Distribution Functional supply points	High winds Direct	Wales & Western Professional Head of Power Distribution HV/LV and RAM AuAd Electricification Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is exposed	4/moderate Medium 4/mo	iderate Medium	4/moderate 2/minor	Structures are designed to withstand current weather extremes	4/moderate 6/moderate	Low 4/mo	oderate 6/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD150 Asset Power distribution Power supply monitor	Large diurnal temperature range	Wales & Western Professional Head of Power Distribution HV/JV RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/m	ninor Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor 2/minor	Low 2/n	minor 2/minor	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
			I								1			

PD151 Asset Power power supply monitor (including signal	al Flooding Direct	Professional Head of Wales & Western Wales & Western Power Distribution HV/LV	RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas	2/minor High 4/mc	oderate High	4/moderate 4/moderate Current typical f	ood levels are known and accounted for	2/minor 3/minor	Medium 2/mi	nor 3/mino	Medum Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and	
PD152 Asset Power distribution Power supply monitor	Lightning Direct	and RAM and RAM Wales & Western Wales & Western Wales & Western		where rainfall levels will be higher This is a risk across the country although the risk will be higher in areas with more	2/minor Low 4/mo	oderate Low	2/minor 2/minor Unlikely but can	have devactation afforts	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming general increase in storm frequency and severity	No Variation	groundwater flooding Risk to transport from high and low temperatures, high	
Rauge		Desfeateel Used of		thunderstorms										winds, lightning Risk to transport from high and low temperatures, high	
PD153 Asset Power supply monitor	Lightning Indirect	Wales & Western Wales & Western Protessional nead of Power Distribution HV/LV Power Distribution HV/LV Professional Head of	Linked to trigger level for investment which is asset condition	This is a risk across the country There is a risk across the country although the risk will be higher in the South East and areas	2/minor High 4/mo	oderate High	2/minor 2/minor More likely than		2/minor 3/minor	Medium 2/mi	nor 3/mino	Medium Assuming general increase in storm frequency and severity	No Variation	winds, lightning	
PD154 Asset distribution Signal power supply monitor	temperatures Cumulative	Wales & Western Wales & Western Power Distribution HV/LV	Linked to trigger level for investment which is asset condition	where the temperature will be higher	2/minor Medium 2/r	ninor Medium	2/minor 4/moderate Current asset co high temperatur	ndition is known and generally capable of withstanding current range of es	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD155 Asset Power distribution Insulation monitoring devices	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV		This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/m	oderate Low	2/minor 2/minor Unlikely but can	have devastating effects	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high whick, lightning	
PD156 Asset Power distribution Signal power supply monitor	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	V Electricification Linked to trigger never for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/r	ninor Medium	2/minor 2/minor Asset is general	capable of withstanding current range of temperatures	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD157 Asset Power distribution Signal power supply monitor	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV and RAM	v RAM Electricitication Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo	oderate Low	2/minor 2/minor Unlikely but can	have devastating effects	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high which, lightning	
PD158 Asset Power distribution Signal power supply monitor	Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM V Electricfication	This is a risk across the country	2/minor High 4/mo	oderate High	2/minor 2/minor More likely than	a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/mi	nor 3/mino	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD159 Asset Power distribution UPS management	Extreme hot temperatures	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV and RAM	RAM Electricfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/r	ninor Medium	2/minor 4/moderate Current asset co	ndition is known and generally capable of withstanding current range of es	2/minor 2/minor	Low 2/min	nor 2/mino	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD16 Asset Power distribution Functional supply points	Storms Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV and RAM	v RAM Electricfication Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate Structures are d	signed to withstand current weather extremes	4/moderate 6/moderate	Low 4/mod	erate 6/modera	te Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risk to transport from high and low temperatures, high winds, lightning Risks to infrastructure services from river, surface water and groundwater flooding	
PD160 Asset Power distribution UPS management	Heat wave Cumulative	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV and RAM	RAM Electricfication	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/r	ninor Medium	2/minor 4/moderate Current asset co	ndition is known and generally capable of withstanding current range of es	2/minor 3/minor	Low 2/min	nor 3/mino	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD161 Asset Power distribution UPS management	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV		There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/r	ninor Medium	2/minor 2/minor Asset is generall	capable of withstanding current range of temperatures	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD162 Asset Power distribution UPS management	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor High 4/me	oderate High	4/moderate 4/moderate Current typical f	ood levels are known and accounted for	2/minor 3/minor	Medium 2/mi	nor 3/mino	Medium Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD163 Asset Power distribution UPS management	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/m	oderate Low	2/minor 2/minor Unlikely but can	have devastating effects	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD164 Asset Power distribution Insulation monitoring devices	Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is asset condition	This is a risk across the country	2/minor High 4/m	oderate High	2/minor 2/minor More likely than	a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/mi	nor 3/mino	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD165 Asset Power distribution UPS management	Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for invertment which is series condition	This is a risk across the country	2/minor High 4/m	oderate High	2/minor 2/minor More likely than	a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/mi	nor 3/mino	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lefthing	
PD166 Asset Power distribution TPCMS equipment (all)	Extreme hot temperatures	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	oderate Medium	3/minor 6/moderate Current asset co	ndition is known and generally capable of withstanding current range of es	4/moderate 4/moderate	Low 4/mod	erate 4/modera	te Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD167 Accot Power TDPMS aquipment (10)	Heat wave Cumulative	Wales & Mostern Wales & Mostern Professional Head of	RAM Liekot to trianor level for levertmost which is sent condition	There is a risk across the country although the risk will be higher in the South East and areas		oderate Medium	2/minor 6/moderate Current asset co	ndition is known and generally capable of withstanding current range of	4/moderate 6/moderate	Low 4/mod	erate 6/modera		No Variation	Risk to transport from high and low temperatures, high	
Power TPCMS coulomont (10)	Large diurnal	Power Distribution HV/LV Woler & Mostern Professional Head of	RAM Lieked to triange level for jourstmost which is send condition	where the temperature will be higher There is a risk across the country although the risk will be higher in the South East and areas		_	high temperatur	es v capable of withstanding current range of temperatures	2/minor 2/minor		nor 2/mino		No Variation	winds, lightning Risk to transport from high and low temperatures, high	
aistribution	temperature range	Wales & Western Wales & Western Professional Head of	RAM Linked to triaser level for investment which is asset condition	where the temperature will be higher There is a risk across the country although the risk will be higher in the North West and areas										winds, lightning Risks to Infrastructure services from river, surface water and	
PD169 Asset Power distribution TPCMS equipment (all)	Flooding Direct	Wales & Western Wales & Western Power Distribution HV/LV Professional Head of	PANA	where rainfall levels will be higher There is a risk across the country although the risk will be higher in the South East and areas	winderate riign oyni	oderate High	6/moderate 6/moderate Current typical f		4/moderate 6/moderate		erate 6/modera		No Variation	groundwater flooding groundwater flooding floodi	
PD17 Asset distribution LV autorecloser	temperatures Cumulative	Wales & Western Wales & Western Power Distribution HV/LV Professional Head of		where the temperature will be higher This is a risk across the country although the risk will be higher in areas with more	4/moderate Medium 4/mo	oderate Medium	3/minor 6/moderate Current asset co high temperatur	es	4/moderate 4/moderate	Low 4/mod	erate 4/modera	te Low Assuming current manufacturing techniques and materials	No Variation	winds, lightning Bisk to transport from high and low temperatures, high	
PD170 Asset distribution TPCMS equipment (all)	Lightning Direct	Wales & Western Wales & Western Power Distribution HV/LV and RAM	Electricitication	tins is a risk across the country autoogn the risk will be righter in areas with more thunderstorms	4/moderate Low 4/mo	oderate Low	4/moderate 6/moderate Unlikely but can	have devastating effects	4/moderate 4/moderate	Low 4/mod	erate 4/modera	te Low Assuming general increase in storm frequency and severity	No Variation	nos. O Languer i non migri ano sovi cemperatures, riign winds, lightning	
PD171 Asset Power distribution TPCMS equipment (all)	Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV			4/moderate High 4/mo	oderate High	4/moderate 6/moderate More likely than	a direct strike, but far easier to repair	4/moderate 6/moderate	Medium 4/mod	erate 6/modera	te Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high which, lightning	
PD172 Asset Power distribution Points heating	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM V Electricitation	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Low 2/r	ninor Low	2/minor 2/minor Asset is general	capable of withstanding current range of temperatures	2/minor 3/minor	Low 2/min	nor 3/mino	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high which, lightning	
PD173 Asset Power distribution Points heating	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM V Electricication	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor High 4/mo	oderate High	4/moderate 4/moderate Current typical f	ood levels are known and accounted for	2/minor 3/minor	Medium 2/mi	nor 3/mino	Medium Assuming current drainage strategies persist	No Variation	Risks to Infrastructure services from river, surface water and groundwater flooding	
PD174 Asset Power distribution Points heating	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Electricfication	This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/m	oderate Low	2/minor 2/minor Unlikely but can	have devastating effects	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD175 Asset Power distribution Integrated protection and control	Extreme hot temperatures	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Electricfication	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	oderate Medium	3/minor 6/moderate Current asset co	ndition is known and generally capable of withstanding current range of es	4/moderate 4/moderate	Low 4/mod	erate 4/modera	te Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD176 Asset Power distribution Points heating	Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Electricification	This is a risk across the country	2/minor High 4/m	oderate High	2/minor 2/minor More likely than	a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/mi	nor 3/mino	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD177 Asset Power distribution Asset walkway lighting	lce/Hail Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV		There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medium 2/r	ninor Medium	4/moderate 2/minor Structures are d	esigned to withstand current weather extremes	2/minor 1/minor	Low 2/mi	nor 1/mino	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD178 Asset Power distribution Asset walkway lighting	Snow/ice Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM V Electricfication	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medium 2/r	minor Medium	2/minor 2/minor Structures are d	esigned to withstand current weather extremes	2/minor 1/minor	Low 2/mi	nor 1/mino	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD179 Asset Power distribution Asset walkway lighting	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Electricition Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	1/minor Medium 1/r	minor Medium	1/minor 1/minor Asset is general	capable of withstanding current range of temperatures	1/minor 2/minor	Low 1/mi	nor 2/mino	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD18 Asset Power distribution LV autorecloser	Heat wave Cumulative	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	oderate Medium	2/minor 6/moderate Current asset co	ndition is known and generally capable of withstanding current range of es	4/moderate 6/moderate	Low 4/mod	erate 6/modera	te Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD180 Asset Power distribution Asset walkway lighting	Long hot, dry summer Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/r	ninor Medium	2/minor 4/moderate Structures are d	signed to withstand current weather extremes	2/minor 4/moderate	Low 2/mi	nor 4/modera	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD181 Asset Power distribution Asset walkway lighting	Long wet winter/spring Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medium 4/mo	oderate Medium	4/moderate 4/moderate Structures are d	esigned to withstand current weather extremes	2/minor 3/minor	Low 2/mi	nor 3/mino	We have low confidence in the rick rating but we have high confidence that the rick will	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
Power Acret wolkway lighting	Heavy	Wales & Mostore Wales & Mostore Professional Head of	RAM Linked to trigger level for levertment which is sent condition	There is a risk across the country although the risk will be higher in the North West and areas	2/minor Medium 4/mo	oderate Medium	4/moderate 4/moderate Structures are d	esigned to withstand current weather extremes	2/minor 3/minor	Low 2/mi	nor 3/mino	I new We have low confidence in the risk rating but we have high confidence that the risk will	No Variation	Risks to infrastructure services from river, surface water and	
Power Accet walkurau lighting	rain/cloudburst Direct	Power Distribution HV/LV Wales & Monton Professional Head of	RAM Lieled to triang level for jourstmeet which is used condition	where rainfall levels will be higher There is a risk across the country although the risk will be higher in the North West and areas		ninor Medium			2/minor 3/minor		nor 3/mino	increase in the absence of action		groundwater flooding	
Bewer	Low soil moisture Direct	Wales & Western Wales & Western Power Distribution HV/LV Wales & Western Wales & Western Power Distribution HV/LV available & Western Power Distribution HV/LV		where rainfall levels will be higher		ninor Medium						Increase in the absence of action		groundwater flooding Risk to transport from high and low temperatures, high	
PD184 Asset distribution Asset walkway lighting		Broforcional Hand of		This is a risk across the country, particularly in areas where the asset is on earthworks There is a risk across the country although the risk will be higher in the North West and areas				signed to withstand current weather extremes				increase in the absence of action	NO VALIALION	winds, lightning Risks to infrastructure services from river, surface water and	
PD185 Asset Power distribution Asset walkway lighting	Flooding Direct	Wales & Western Wales & Western Power Distribution HV/LV	PAM	where rainfall levels will be higher There is a risk across the country although the risk will be higher in the South East and areas	2/minor rign 4/mk	oderate High	4/moderate 4/moderate Current typical f	ood levels are known and accounted tor	2/minor 3/minor		nor 3/mino		No Variation	groundwater flooding flook to transport from high and low temperatures, high flook to transport from high and low temperatures, high	
Poiso Asset distribution integrated protection and control	Heat wave Cumulative	Power Distribution HV/LV	V Electricitation Uneo to ungger level for investment which is asset conduton PAM	where the temperature will be higher		oderate Medium	Lynnobelate high temperatur	8	4/modelate Ofmodelate		erate 6/modera	Me have low confidence in the risk ratios but we have hish confidence that the risk will	No Variation	Nix to Datapter Lifering and Dave temperatures, right which is the second secon	
PD187 Asset Power distribution Asset walkway lighting	Erosion Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV		This is a risk across the country, particularly in areas where the asset is on earthworks			3/minor 3/minor Current asset co		2/minor 3/minor		nor 3/mino		No Variation	groundwater flooding	
PD188 Asset Power distribution Asset walkway lighting	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV		This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo	oderate Low	2/minor 2/minor Unlikely but can	have devastating effects	2/minor 2/minor	Low 2/mi	nor 2/mino	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD189 Asset Power distribution Asset walkway lighting	Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	V Electricification		2/minor High 4/mo	oderate High	2/minor 2/minor More likely than	a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/mi	nor 3/mino	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winks, lightning	
PD19 Asset Power distribution LV autorecloser	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM V Electricification Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	oderate Medium	4/moderate 4/moderate Asset is general	capable of withstanding current range of temperatures	4/moderate 6/moderate	Low 4/mod	erate 6/modera		No Variation	Risk to transport from high and low temperatures, high which, lightning	
PD190 Asset Power distribution Asset walkway lighting	High winds Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV and RAM	V RAM Electricfication Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is exposed	2/minor Medium 2/r	ninor Medium	2/minor 2/minor Structures are d	signed to withstand current weather extremes	2/minor 3/minor	Low 2/mi	nor 3/mino		No variation	Bisk to transport from high and low temperatures, high which, lightning	
PD191 Asset Power distribution Asset walkway lighting	Storms Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV and RAM	V RAM Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	2/minor Medium 4/mo	oderate Medium	4/moderate 4/moderate Structures are d	esigned to withstand current weather extremes	2/minor 3/minor	Low 2/mi	nor 3/mino	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and Risk to transport from high and low temperatures, high groundwater flooding winds, lightning	
PD192 Asset Power distribution CCTV crossing lighting	Ice/Hail Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM V Electricfication	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 4/mo	oderate Medium	6/moderate 2/minor Structures are d	signed to withstand current weather extremes	4/moderate 2/minor	Low 4/mod	erate 2/mino	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD193 Asset Power distribution CCTV crossing lighting	Snow/ice Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM V Electricfication	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 4/mo	oderate Medium	4/moderate 4/moderate Structures are d	signed to withstand current weather extremes	4/moderate 2/minor	Low 4/mod	erate 2/mino	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD194 Asset Power distribution CCTV crossing lighting	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Electricfication	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	oderate Medium	4/moderate 4/moderate Asset is general	capable of withstanding current range of temperatures	4/moderate 6/moderate	Low 4/mod	erate 6/modera	te Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD195 Asset Power distribution CCTV crossing lighting	Long hot, dry summer Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	oderate Medium	2/minor 6/moderate Structures are d	esigned to withstand current weather extremes	4/moderate 6/moderate	Low 4/mod	erate 6/modera	te Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action.	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD196 Asset Power distribution CCTV crossing lighting	Long wet winter/spring	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Electricfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate Structures are d	signed to withstand current weather extremes	4/moderate 6/moderate	Low 4/mod	erate 6/modera	te Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD197 Asset Power distribution CCTV crossing lighting	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/r	ninor Medium	2/minor 2/minor Asset is general	capable of withstanding current range of temperatures	2/minor 4/moderate	Low 2/mi	nor 4/modera	te Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD198 Asset Power distribution CCTV crossing lighting	Heavy rain/cloudburst Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is send condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate Structures are d	esigned to withstand current weather extremes	4/moderate 6/moderate	Low 4/mod	erate 6/modera	te Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD199 Asset Power distribution CCTV crossing lighting	High soil moisture Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is acrest condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 4/mo	oderate Medium	4/moderate 4/moderate Structures are d	signed to withstand current conditions	4/moderate 6/moderate	Low 4/mod	erate 6/modera	We have low coefficience in the sink entire has we have high coefficience that the sink will	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD20 Asset Power distribution LV autorecloser	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV	RAM Linked to trigger level for investment which is accet condition	Where is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate Current typical f	ood levels are known and accounted for	4/moderate 6/moderate	Low 4/mod	erate 6/modera		No Variation	pointmate social	
PD200 Asset distribution CCTV crossing lighting	Low soil moisture Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV		where raimain evers will be righter This is a risk across the country, particularly in areas where the asset is on earthworks	4/moderate Medium 4/mo	oderate Medium		esigned to withstand current weather extremes	4/moderate 6/moderate	Low 4/mod	erate 6/modera	We have low confidence in the risk rating but we have high confidence that the risk will	No Variation	Risk to transport from high and low temperatures, high	
PD201 Ascet Power CCTV crossing lighting	Flooding Direct	Waler & Worton Waler & Worton Professional Head of	RAM Linked to trigger level for investment which is acred condition	There is a risk across the country although the risk will be higher in the North West and areas		oderate High	6/moderate 6/moderate Current typical f		4/moderate 6/moderate		erate 6/modera		No Variation	winds, lightning Risks to infrastructure services from river, surface water and Risks to infrastructure services from river, surface water and	
distribution CCTV crossing lighting		Power Distribution HV/LV		where rainfall levels will be higher	····g·· •/18					4,000				groundwater flooding	

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PD202 Asset	Power distribution	CTV crossing lighting	Erosion Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	4/moderate Medium 6/mo	derate Medium	6/moderate 6/moderate	Current asset condition known, mitigations generally effective	4/moderate 6/moderate	Low 4/moderate	6/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and proundwater flooding	
PD203 Asset	Power distribution	CTV crossing lighting	Lightning Direct	Wales &	Western Wales & Western Professi Power D	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	4/moderate Low 6/mo	derate Low	4/moderate 6/moderate	Unlikely but can have devastating effects	4/moderate 4/moderate	Low 4/moderate	4/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD204 Asset	Power distribution	CTV crossing lighting	Lightning Indired	ct Wales &		nal Head of RAM stribution HV/LV Electricfica	ation Linked to trigger level for investment which is asset condition	n This is a risk across the country	4/moderate High 6/mo	derate High	4/moderate 6/moderate	More likely than a direct strike, but far easier to repair	4/moderate 6/moderate	Medium 4/moderate	6/moderate	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD205 Asset	Power distribution	CTV crossing lighting	High winds Direct	Wales &	Western Wales & Western Power I and RAI	nal Head of stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is exposed	4/moderate Medium 4/mo	derate Medium	4/moderate 2/minor	Structures are designed to withstand current weather extremes	4/moderate 6/moderate	Low 4/moderate	6/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	I No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD206 Asset	Power distribution	CTV crossing lighting	Storms Direct	Wales &	Western Wales & Western Power I	nal Head of stribution HV/LV	Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	4/moderate Medium 6/mo	derate Medium	6/moderate 6/moderate	Structures are designed to withstand current weather extremes	4/moderate 6/moderate	Low 4/moderate	6/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	I No Variation	Risk to transport from high and low temperatures, high Risks to infrastructure services from river, surface water and winds, lightning groundwater flooding	
PD207 Asset	Power	rossing, escape, junction & siding lighti	ing Ice/Hail Direct	Wales &		nal Head of RAM	linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas	5 2/minor Medium 2/m	ninor Medium	4/moderate 2/minor	Structures are designed to withstand current weather extremes	2/minor 1/minor	Low 2/minor	1/minor	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high	
	distribution Power		Large diurnal		Profession	nal Head of RAM	auun	where rainian revers will be ingine.		ninor Medium			2/minor 4/moderate		4/moderate		No Variation	winds, lightning Risk to transport from high and low temperatures, high	
PD208 Asset	distribution "	C power supply conditioning	temperature range		Broford	nal Head of RAM		where the temperature will be ingree.				Asset is generally capable of withstanding current range of temperatures						winds, lightning Risks to infrastructure services from river, surface water and	
PD209 Asset	distribution	ntegrated protection and control	Flooding Direct	Wales &	Western Wales & Western Power I	stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	where rainfall levels will be higher	⁵ 4/moderate High 6/mo	derate High	6/moderate 6/moderate	Current typical flood levels are known and accounted for	4/moderate 6/moderate	Medium 4/moderate	6/moderate	Medium Assuming current drainage strategies persist	No Variation	groundwater flooding	
PD21 Asset	Power distribution	V autorecloser	Lightning Direct	Wales &	Western Wales & Western Professi Power D	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	6/moderate Low 6/mo	derate Low	6/moderate 6/moderate	Unlikely but can have devastating effects	6/moderate 6/moderate	Low 6/moderate	6/moderate	Low Assuming general increase in storm frequency and severity.	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD210 Asset	Power distribution C	rossing, escape, junction & siding lighti	ing Snow/ice Direct	Wales &	Western Wales & Western Professi Power D	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 2/minor Medium 2/m	ninor Medium	2/minor 2/minor	Structures are designed to withstand current weather extremes	2/minor 1/minor	Low 2/minor	1/minor	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightening	
PD211 Asset	Power distribution	rossing, escape, junction & siding lighti	Ing Large diurnal temperature range	Wales &	Western Wales & Western Professi Power D	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	1/minor Medium 1/n	ninor Medium	1/minor 1/minor	Asset is generally capable of withstanding current range of temperatures	1/minor 2/minor	Low 1/minor	2/minor	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD212 Asset	Power distribution	rossing, escape, junction & siding lighti	ing Long hot, dry Direct	Wales &	Western Wales & Western Professi Power D	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/n	ninor Medium	2/minor 4/moderate	Structures are designed to withstand current weather extremes	2/minor 4/moderate	Low 2/minor	4/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD213 Asset	Power distribution	rossing, escape, junction & siding lighti	ing Long wet winter/spring Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	ation Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	^s 2/minor Medium 4/mo	derate Medium	4/moderate 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	l No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD214 Asset	Power distribution	rossing, escape, junction & siding lighti	ing Heavy Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 2/minor Medium 4/ma	derate Medium	4/moderate 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD215 Asset	Power distribution	crossing, escape, junction & siding lighti	ing High soil moisture Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 2/minor Medium 2/m	ninor Medium	2/minor 2/minor	Structures are designed to withstand current conditions	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi	l No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD216 Asset	Power distribution	crossing, escape, junction & siding lighti	ing Low soil moisture Direct	Wales &		nal Head of	linked to trigger level for investment which is asset condition		2/minor Medium 2/m	ninor Medium	2/minor 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi	I No Variation	Risk to transport from high and low temperatures, high	
PD217 Accet	Power	rossing, escape, junction & siding lighti			and RAI	nal Head of RAM	Liokod to trianor loval for investment which is prost condition	There is a risk across the country although the risk will be higher in the North West and areas		derate High		Current typical flood levels are known and accounted for	2/minor 3/minor	Medium 2/minor		Increase in the absence of action Medium Assuming current drainage strategies persist	No Variation	winds, lightning Risks to infrastructure services from river, surface water and	
noset	distribution	rossing; electrification and Junction ligh			Western Wales & Western Power I	nal Head of RAM	Lioked to trianor level for levertment which is prost condition	where rainfall levels will be higher	2/minor nign 4/mo							We have low confidence in the rick ratine but we have hish confidence that the rick wi		groundwater flooding Risks to infrastructure services from river, surface water and	
PD218 Asset	distribution f	loodlights and signage	- Frosion Direct		Western Wales & Western Power [stribution HV/LV Electricfica				ninor Medium		Current asset condition known, mitigations generally effective	2/minor 3/minor	Low 2/minor	3/minor	Increase in the absence of action	No Variation	groundwater flooding	
PD219 Asset	Power distribution	rossing lighting	Lightning Direct	Wales &	Western Wales & Western Power D	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo	derate Low	2/minor 2/minor	Unlikely but can have devastating effects	2/minor 2/minor	Low 2/minor	2/minor	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD22 Asset	Power distribution	V autorecloser	Lightning Indired	ct Wales &	Western Wales & Western Professi Power D	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	n This is a risk across the country	6/moderate High 8/mo	derate High	6/moderate 6/moderate	More likely than a direct strike, but far easier to repair	6/moderate 9/moderate	Medium 6/moderate	9/moderate	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightoning	
PD220 Asset	Power distribution	ntegrated protection and control	Lightning Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	8/moderate Low 8/mo	derate Low	8/moderate 8/moderate	Unlikely but can have devastating effects	8/moderate 8/moderate	Low 8/moderate	8/moderate	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD221 Asset	Power distribution	rossing lighting	Lightning Indired	ct Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	n. This is a risk across the country	2/minor High 4/mo	derate High	2/minor 2/minor	More likely than a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/minor	3/minor	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD222 Asset	Power distribution	rossing, escape, junction & siding lighti	ing High winds Direct	Wales &	Western Wales & Western Power I and RAI	nal Head of stribution HV/LV Electricfica	ation Linked to trigger level for investment which is asset condition	n. This is a risk across the country, particularly in areas where the asset is exposed	2/minor Medium 2/m	nor Medium	4/moderate 2/minor	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD223 Asset	Power distribution	rossing, escape, junction & siding lighti	ing Storms Direct	Wales &		nal Head of stribution HV/LV	Linked to trigger level for investment which is asset condition	 This is a risk across the country, particularly in areas where the asset is on earthworks 	2/minor Medium 4/mo	derate Medium	4/moderate 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi	I No Variation	Risks to infrastructure services from river, surface water and Risk to transport from high and low temperatures, high groundwater flooding winds, lightning	
PD224 Asset	Power distribution E	lectrification signage lighting	Ice/Hail Direct	Wales &	Professi	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 2/minor Medium 2/m	nor Medium	4/moderate 2/minor	Structures are designed to withstand current weather extremes	2/minor 1/minor	Low 2/minor	1/minor	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD225 Asset	Power	lectrification signage lighting	Snow/ice Direct	Wales &	Mostern Molor & Mostern Professi	nal Head of RAM	Listed to trigger level for investment which is send condition	There is a risk across the country although the risk will be higher in the North West and areas	⁵ 2/minor Medium 2/n	nor Medium	2/minor 2/minor	Structures are designed to withstand current weather extremes	2/minor 1/minor	Low 2/minor	1/minor	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high	
	distribution Power		Large diurnal		Professi	nal Head of RAM		where raining revers will be ingree There is a sick access the sounter although the sick will be bisher in the South Exst and sense										winds, lightning Risk to transport from high and low temperatures, high	
PD226 Asset	distribution E	lectrification signage lighting	Long hot, dry		Power I	stribution HV/LV Electricfica		where the temperature will be higher	2/11/00 Weddin 2/1			Asset is generally capable of withstanding current range of temperatures	1/minor 2/minor		2/minor	Low Assuming current manufacturing techniques and materials We have low confidence in the risk rating but we have high confidence that the risk wi	No Variation	winds, lightning Risk to transport from high and low temperatures, high	
PD227 Asset	distribution	lectrification signage lighting	summer Direct	Wales &	Power D	stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	where the temperature will be higher		ninor Medium	2/minor 4/moderate	Structures are designed to withstand current weather extremes	2/minor 4/moderate	Low 2/minor	4/moderate	increase in the absence of action		winds, lightning	
PD228 Asset	Power distribution E	lectrification signage lighting	Long wet winter/spring Direct	Wales &	Western Wales & Western Professi Power I	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 2/minor Medium 4/mo	derate Medium	4/moderate 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD229 Asset	Power distribution ^E	lectrification signage lighting	Heavy rain/cloudburst Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 2/minor Medium 4/mo	derate Medium	4/moderate 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD23 Asset	Power Distribution	uxiliary transformer	Heat wave Cumul	lative Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	derate Medium	2/minor 6/moderate	Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 6/moderate	Low 4/moderate	6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD230 Asset	Power distribution	lectrification signage lighting	High soil moisture Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 2/minor Medium 2/n	nor Medium	2/minor 2/minor	Structures are designed to withstand current conditions	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD231 Asset	Power distribution	ntegrated protection and control	Lightning Indired	ct Wales &	Western Wales & Western Professi Power (nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	n This is a risk across the country	6/moderate High 8/mo	derate High	6/moderate 6/moderate	More likely than a direct strike, but far easier to repair	6/moderate 9/moderate	Medium 6/moderate	9/moderate	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD232 Asset	Power distribution	lectrification signage lighting	Low soil moisture Direct	Wales &	Western Wales & Western Profess	nal Head of stribution HV/LV	Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	2/minor Medium 2/m	ninor Medium	2/minor 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	I No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD233 Asset	Rowor	lectrification signage lighting	Flooding Direct	Wales &	Western Wales & Western	nal Head of RAM	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas	5 2/minor High 4/mo	derate High	4/moderate 4/moderate	Current typical flood levels are known and accounted for	2/minor 3/minor	Medium 2/minor	3/minor		No Variation	Risks to infrastructure services from river, surface water and	
PD324 Accet	Power		Lightning Direct	Wales 8	Professi	nal Head of RAM		where raining every win we ingree This is a sisk across the country different he sisk will be blober in score with more	2/minor Low 4/mo			Unlikely but can have devastating effects	2/minor 2/minor	Low 2/minor			No Variation	roundwater flooding Risk to transport from high and low temperatures, high	
PD234 Asset	distribution Power	lectrification signage lighting			Power	nal Head of RAM										Low Assuming general increase in storm frequency and severity		winds, lightning Risk to transport from high and low temperatures, high	
PD235 Asset	distribution E	lectrification signage lighting	Lightning Indired		Power I	stribution HV/LV Electricfica			2/minor High 4/mo			More likely than a direct strike, but far easier to repair	2/minor 3/minor		3/minor	Medium Assuming general increase in storm frequency and severity We have low confidence in the risk ratine but we have high confidence that the risk wi	No Variation	winds, lightning	
PD236 Asset	Power distribution	lectrification signage lighting	High winds Direct	Wales &	Western Wales & Western Power I and RAI	stribution HV/LV	Linked to trigger level for investment which is asset condition	n This is a risk across the country, particularly in areas where the asset is exposed	2/minor Medium 2/m	ninor Medium	4/moderate 2/minor	Structures are designed to withstand current weather extremes	2/minor 3/minor	Medium 2/minor	3/minor	increase in the absence of action	NO VALIALION	Risk to transport from high and low temperatures, high winds, lightning	
PD237 Asset	Power distribution	lectrification signage lighting	Storms Direct	Wales &	Western Wales & Western Power I and RAI	stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition		2/minor Medium 4/mo	derate Medium	4/moderate 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/minor	Low 2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	No Variation	Risks to infrastructure services from coastal flooding and Risk to transport from high and low temperatures, high winds, lightning	
PD238 Asset	Power distribution	VAC changeover panel	Large diurnal temperature range	lative Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/n	ninor Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor 4/moderate	Low 2/minor	4/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from Nigh and low temperatures, high	
PD239 Asset	Power distribution	iscape lighting	Lightning Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo	derate Low	2/minor 2/minor	Unlikely but can have devastating effects	2/minor 2/minor	Low 2/minor	2/minor	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD24 Asset	Power distribution	V cables/ switchgear	Extreme hot temperatures Direct	Wales &	Western Wales & Western Professi Power I	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	derate Medium		Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 6/moderate	Low 4/moderate	6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD240 Asset	Power distribution	scape lighting	Lightning Indired	ct Wales &	Western Wales & Western Professi Power I	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	n This is a risk across the country	2/minor High 4/mo	derate High	2/minor 2/minor	More likely than a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/minor	3/minor	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD241 Asset	Power distribution	VAC changeover panel	Flooding Direct	Wales &	Western Wales & Western Profess	nal Head of RAM stribution HV/LV Electricfica	ation Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 4/moderate High 6/mo	derate High	6/moderate 6/moderate	Current typical flood levels are known and accounted for	4/moderate 6/moderate	Medium 4/moderate	6/moderate	Medium Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD242 Asset	Power distribution	VAC changeover panel	Lightning Direct	Wales &	Wortern Wales & Wortern Professi	nal Head of RAM stribution HV/LV Electricfica	Lisked to trigger level for investment which is prest condition		2/minor Low 4/mo	derate Low	2/minor 2/minor	Unlikely but can have devastating effects	2/minor 2/minor	low 2/minor	2/minor	low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lighting	
PD243 Accet	Power J	unction lighting	Lightning Direct	Wales 0.	Western Wales & Western	nal Head of RAM	Liokad to trianor level for levertment which is prost condition		2/minor Low 4/mo	derate Low	2/minor 2/minor	Unlikely but can have devastating effects	2/minor 2/minor	Low 2/minor	2/minor	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high	
m3361	distribution Power				Wortern Wales & Wortern Professi	nal Head of RAM	Liokad to trianor level for levertment which is prost condition	(TURRETS COTTS										winds, lightning Risk to transport from high and low temperatures, high	
PU244 Asset	distribution	unction lighting	Lightning Indired		Western Wales & Western Power I	nal Head of RAM		There is a sick access the country although the sick will be bisher in the Marth Wart and access	2/minor High 4/mo	derate High		More likely than a direct strike, but far easier to repair	2/minor 3/minor	Medium 2/minor			No Variation	winds, lightning	
PD245 Asset	distribution	lavigation lighting	Ice/Hail Direct	Wales &	Western Wales & Western Power I	stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	n where rainfall levels will be higher	4/moderate Medium 4/mo	derate Medium	6/moderate 2/minor	Structures are designed to withstand current weather extremes	4/moderate 2/minor	Low 4/moderate	2/minor	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high which, lightning	
PD246 Asset	Power distribution	lavigation lighting	Snow/ice Direct	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	where rainian levels will be righer	4/moderate Medium 4/mo	derate Medium	4/moderate 4/moderate	Structures are designed to withstand current weather extremes	4/moderate 2/minor	Low 4/moderate	2/minor	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high which, lightning	
PD247 Asset	Power distribution	lavigation lighting	Large diurnal temperature range	Wales &		nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/n	ninor Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	1/minor 2/minor	Low 1/minor	2/minor	Low Assuming current manufacturing techniques and materials	No Variation	Rick to transport from high and low temperatures, high winds, lightning	
PD248 Asset	Power distribution	lavigation lighting	Long hot, dry Direct summer	Wales &	Western Wales & Western Professi Power I	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/n	ninor Medium	2/minor 4/moderate	Structures are designed to withstand current weather extremes	2/minor 4/moderate	Low 2/minor	4/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk wi increase in the absence of action	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD249 Asset	Power distribution	lavigation lighting	Long wet winter/spring	Wales &	Western Wales & Western Professi Power t	nal Head of RAM stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	⁵ 4/moderate Medium 6/mo	derate Medium	6/moderate 6/moderate	Structures are designed to withstand current weather extremes	4/moderate 6/moderate	Low 4/moderate	6/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk wi	No Variation	Rikis to infrastructure services from river, surface water and groundwater flooding	
PD25 Asset	Power distribution	V cables	Heat wave Cumul	lative Wales &	Western Wales & Western Professi Power I	nal Head of RAM stribution HV/LV Electricfica	ation Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medium 4/mo	derate Medium		Current asset condition is known and generally capable of withstanding current range of high temperatures	4/moderate 6/moderate	Low 4/moderate	6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD250 Asset	Power distribution	VAC changeover panel	Lightning Indires	ct Wales &	Worten Wales & Worten	nal Head of RAM stribution HV/LV Electricfica	Listed to trigger level for investment which is send condition		6/moderate High 8/mo	derate High		More likely than a direct strike, but far easier to repair	6/moderate 9/moderate	Medium 6/moderate	9/moderate	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD251 Asset	Power	lavigation lighting	Heavy		Worten Wales & Worten Professi	nal Head of RAM	Linked to trioner level for investment which is sent condition	There is a risk across the country although the risk will be higher in the North West and areas		derate Medium		Structures are designed to withstand current weather extremes	4/moderate 6/moderate		6/moderate	We have low confidence in the risk rating but we have high confidence that the risk wi	No Variation	Risks to infrastructure services from river, surface water and	
11000	distribution Power		rain/cloudburst		Wortern Wales & Wortern Professi	nal Head of RAM	Liokod to trianor loval for lowertmost which is prost condition	where ramain levels will be righter There is a sick access the country although the sick will be bisher in the Marth Mart and access								Low Increase in the absence of action	No vanation	proundwater flooding Risks to infrastructure services from river, surface water and	
PUZ5Z Asset	distribution	lavigation lighting	High soil moisture Direct	Wales &		stribution HV/LV Electricfica	Linked to trigger level for investment which is asset condition	where rainfall levels will be higher	4/moderate Medium 4/mo	derate Medium	Armoderate 4/moderate	Structures are designed to withstand current conditions	4/moderate 6/moderate	Low 4/moderate	6/moderate	Low Increase in the absence of action	wenduon	groundwater flooding	

			Professional Head of													
PD253 Asset	Power Navigation lighting	Low soil moisture Direct	Wales & Western Wales & Western An RAM Beaching And An RAM Beaching And An RAM Beck Control Co	Unked to trigger level for investment which is asset condition This is a risk across the country, particularly in areas where the asset is on earthworks	4/moderate Medium 4/mo	oderate Medium	4/moderate 6/modera	ate Structures are designed to withstand current weather extremes	4/moderate	6/moderate	Low 4/moderate 6/moderate	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD254 Asset	Power distribution Navigation lighting	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 6/ma	oderate Medium	6/moderate 6/modera	ate Current typical flood levels are known and accounted for	4/moderate	6/moderate	Low 4/moderate 6/moderate	Low	Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD255 Asset	Power distribution	Erosion Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Unked to trigger level for investment which is asset condition This is a risk across the country, particularly in areas where the asset is on earthworks	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/modera	ate Current asset condition known, mitigations generally effective	4/moderate	6/moderate	Low 4/moderate 6/moderate	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD256 Asset	Power Navigation lighting	Lightning Direct	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition This is a risk across the country although the risk will be higher in areas with more thunderstorms	4/moderate Low 6/mo	oderate Low	4/moderate 6/modera	te Unlikely but can have devastating effects	4/moderate	4/moderate	Low 4/moderate 4/moderate	Low	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD257 Asset	Power distribution	Lightning Indirect	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition This is a risk across the country	4/moderate High 6/mo	oderate High	4/moderate 6/modera	ate More likely than a direct strike, but far easier to repair	4/moderate	6/moderate	Medium 4/moderate 6/moderat	Medium	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD258 Asset	Power distribution lighting	High winds Direct	Wales & Western Wales & Western And Market Wales & Western And Market Wales & Western And RAM	Unked to trigger level for investment which is asset condition This is a risk across the country, particularly in areas where the asset is exposed	4/moderate Medium 4/mo	oderate Medium	6/moderate 2/minor	Structures are designed to withstand current weather extremes	4/moderate	6/moderate	Low 4/moderate 6/moderate	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD259 Asset	Power distribution Navigation lighting	Storms Direct	Wales & Western Wales & Western and RAM RAM	Linked to trigger level for investment which is asset condition This is a risk across the country, particularly in areas where the asset is on earthworks	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/modera	te Structures are designed to withstand current weather extremes	4/moderate	6/moderate	Low 4/moderate 6/moderate	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	Risk to transport from high and low temperatures, high winds, lightning
PD26 Asset	Power distribution	Large diurnal temperature range	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/m	ninor Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor	4/moderate	Low 2/minor 4/moderate	Low	Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD260 Asset	Power distribution	Ice/Hail Direct	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Flectricification	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medium 2/n	ninor Medium	4/moderate 2/minor	Structures are designed to withstand current weather extremes	2/minor	1/minor	Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD261 Asset	Power HV cable route	Large diurnal Cumulative	Wales & Western Wales & Western Professional Head of RAM		2/minor Medium 2/n	ninor Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor	4/moderate	Low 2/minor 4/moderat	Low	Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high	
PD262 Asset	Power Route floodlighting	Snow/ice Direct	Wales & Western Wales & Western Professional Head of RAM	Unked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where is a risk across the country although the risk will be higher in the North West and areas	2/minor Medium 2/n	ninor Medium	2/minor 2/minor	Structures are designed to withstand current weather extremes	2/minor		Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	winds, lightning Risk to transport from high and low temperatures, high	
	Davies	Large diurnal	Power Distribution HV/LV Electricitation	There is a risk across the country although the risk will be higher in the South East and areas		ninor Medium		-							winds, lightning Risk to transport from high and low temperatures, high	
PD203 ASSEL	distribution Route rooungruing	Long hot, dry	Power Distribution HV/LV Electricfication	Linke to utger inversion messions which is assess contaction where the temperature will be higher the country abhorate the risk will be blocke in the South Sort and assess	2/million Wealdin 2/m	-		Asset is generally capable of withstanding current range of temperatures	1/minor		Low 1/minor 1/minor		Assuming current manufacturing techniques and materials We have low confidence in the risk rating but we have high confidence that the risk v	No Variation	winds, lightning	
PD264 Asset	distribution Route floodlighting	summer	Wales & Western Wales & Western Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition Where is a risk across the country although the risk will be higher There is a risk across the country although the risk will be higher in the North West and areas	2/minor Medium 2/m	ninor Medium		Structures are designed to withstand current weather extremes	2/minor		Low 2/minor 4/moderati	Low	increase in the absence of action	No variation	winds, lightning	
PD265 Asset	Power Route floodlighting	Long wet Direct winter/spring	Wales & Western Wales & Western Power Distribution HV/LV Electricfication	unked to rigger lever for investment, which is asset conduction where rainfall levels will be higher	2/minor Medium 4/me	oderate Medium	4/moderate 4/modera	ate Structures are designed to withstand current weather extremes	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	NO VARIADON	groundwater flooding	
PD266 Asset	Power distribution Route floodlighting	Heavy rain/cloudburst Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medium 4/mo	oderate Medium	4/moderate 4/modera	ate Structures are designed to withstand current weather extremes	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD267 Asset	Power distribution Route floodlighting	High soil moisture Direct	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medium 2/n	ninor Medium	2/minor 2/minor	Structures are designed to withstand current conditions	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD268 Asset	Power distribution Route floodlighting	Low soil moisture Direct	Wales & Western Wales & Western Power Distribution HV/LV RAM Electricfication	Unked to trigger level for investment which is asset condition This is a risk across the country, particularly in areas where the asset is on earthworks	2/minor Medium 2/n	ninor Medium	2/minor 4/modera	ate Structures are designed to withstand current weather extremes	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD269 Asset	Power distribution	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricitation	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor High 4/mo	oderate High	4/moderate 4/modera	te Current typical flood levels are known and accounted for	2/minor	3/minor	Medium 2/minor 3/minor	Medium	Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD27 Asset	Power distribution	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV RAM Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 4/mo	oderate Medium	4/moderate 4/modera	ate Current typical flood levels are known and accounted for	4/moderate	6/moderate	Low 4/moderate 6/moderat	Low	Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD270 Asset	Power distribution	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricitation	Linked to trigger level for investment which is asset condition This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo	oderate Low	2/minor 2/minor	Unlikely but can have devastating effects	2/minor	2/minor	Low 2/minor 2/minor	Low	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD271 Asset	Power distribution HV cable route	Long hot, dry summer Indirect	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricification	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Low 4/mo	oderate Low	2/minor 6/modera	Mitigations designed into overall electrical system	4/moderate	6/moderate	Low 4/moderate 6/moderate	Low	We have low confidence in the risk rating but we have high confidence that the risk v Increase in the absence of action	vill No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD272 Asset	Power distribution	Lightning Indirect	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricitation	Linked to trigger level for investment which is asset condition This is a risk across the country	2/minor High 4/mo	xderate High	2/minor 2/minor	More likely than a direct strike, but far easier to repair	2/minor	3/minor	Medium 2/minor 3/minor	Medium	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD273 Asset		High winds Direct	Wales & Western Wales & Western Professional Head of Professional Head of Power Distribution HV/LV RAM	Linked to trigger level for investment which is asset condition This is a risk across the country, particularly in areas where the asset is exposed	2/minor Medium 2/n	ninor Medium	4/moderate 2/minor	r Structures are designed to withstand current weather extremes	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD274 Accot	Power Boute floodlichting	Storms Direct	Wales & Western Wales & Western Professional Head of RAM	Unked to trigger level for investment which is asset condition This is a risk across the country, particularly in areas where the asset is on earthworks	2/minor Medium 4/mo	oderate Medium	4/moderate 4/modera	ate Structures are designed to withstand current weather extremes	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk v	vill No Variation	Risks to infrastructure services from river, surface water an	
PD275 Asset	Power	Long wet	and RAM Electricitation Wales & Western Wales & Western Porfessional Head of Power Distribution HV/LV Electricitation	Linkert to triaser level for investment which is asset monthing. There is a risk across the country although the risk will be higher in the North West and areas		oderate Low		ate Mitigations designed into overall electrical system	3/minor		Low 3/minor 6/moderati		Increase in the absence of action We have low confidence in the risk rating but we have high confidence that the risk v	vill No Variation	groundwater flooding Risks to infrastructure services from river, surface water an	winds, lightning
	Power	winter/spring	and room	wiele samain even win ve ingine Thara is a risk arrors tha rountru although the risk will be kinber in the North Wast and assas		_				_			increase in the absence of action		groundwater flooding Risks to infrastructure services from river, surface water an	
PD276 Asset	Siding lighting	Flooding Direct	Power Distribution HV/LV Electricfication	Linke u u ugge kren un intesuiens winch is asset uniquum where rainfall levels will be higher	2/minor High 4/mo	xderate High	4/moderate 4/modera	Lurrent typical flood levels are known and accounted for	2/minor	3/minor	Medium 2/minor 3/minor	Medium	Assuming current drainage strategies persist	No Variation	groundwater flooding	
PD277 Asset	distribution Siding lighting	Lightning Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricitation	Linked to trigger level for investment which is asset condition This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo	oderate Low	2/minor 2/minor	r Unlikely but can have devastating effects	2/minor	2/minor	Low 2/minor 2/minor	Low	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD278 Asset	Power Siding lighting	Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition This is a risk across the country	2/minor High 4/mo	oderate High	2/minor 2/minor	More likely than a direct strike, but far easier to repair	2/minor	3/minor	Medium 2/minor 3/minor	Medium	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD279 Asset	Power distribution Tunnel heating equipment	High average rainfall over Indirect several days	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Low 4/mo	oderate Low	4/moderate 4/modera	ate Event unlikely, current controls mostly effective	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD28 Asset	Power distribution	Erosion Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Unked to trigger level for investment which is asset condition This is a risk across the country, particularly in areas where the asset is incorporated into earthworks	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/modera	ate Current mitigations generally effective	4/moderate	6/moderate	Low 4/moderate 6/moderat	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD280 Asset	Power Tunnel heating equipment	High average rainfall over Indirect season	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Low 2/n	ninor Low	2/minor 2/minor	Event unlikely, current controls mostly effective	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD281 Asset	Power distribution	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor High 4/mo	oderate High	4/moderate 4/modera	ate Current typical flood levels are known and accounted for	2/minor	3/minor	Medium 2/minor 3/minor	Medium	Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD282 Asset	Power distribution AC power supply conditioning	Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Unked to trigger level for investment which is asset condition There is a risk across the country although the severity will be location specific depending on rainfall patterns	4/moderate High 6/mo	oderate High	6/moderate 6/modera	ter Current typical flood levels are known and accounted for	4/moderate	6/moderate	Medium 4/moderate 6/moderat	Medium	Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD283 Asset	Power distribution HV cable route	Heavy rain/cloudburst	Wales & Western Wales & Western and RAM Electricitication	Unked to trigger level for investment which is asset condition Unked to trigger level for investment which is asset condition where rainfall levels will be higher	2/minor Medium 4/mc	oderate Medium	4/moderate 4/modera	te Event unlikely, current controls mostly effective	3/minor	4/moderate	Low 3/minor 4/moderat	Low	We have low confidence in the risk rating but we have high confidence that the risk v Increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD284 Asset	Power distribution	Lightning Indirect	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition This is a risk across the country	2/minor High 4/mo	oderate High	2/minor 2/minor	More likely than a direct strike, but far easier to repair	2/minor	3/minor	Medium 2/minor 3/minor	Medium	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD285 Asset	Power distribution	Ice/Hail Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV RAM	Unked to trigger level for investment which is asset condition Unked to trigger level for investment which is asset condition where rainfall levels will be higher	2/minor Medium 2/n	ninor Medium	4/moderate 2/minor	Current controls are mostly effective	2/minor	1/minor	Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD286 Asset	Power Tuppel lighting	High average rainfall over Indirect	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricification	Linked to trieser level for investment which is accer condition There is a risk across the country although the risk will be higher in the North West and areas	2/minor Low 4/mo	oderate Low	4/moderate 4/modera	Event unlikely, current controls mostly effective	2/minor	3/minor	Low 2/minor 3/minor	Low	We have low confidence in the risk rating but we have high confidence that the risk v	vill No Variation	Risks to infrastructure services from river, surface water ar	
PD287 Asset	Power Tuppel lighting	several days High average rainfall over Indirect	Wales & Western Wales & Western Professional Head of RAM	Unked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher in the North West and areas	2/minor Low 2/m	ninor Low	2/minor 2/mino	Event unlikely, current controls mostly effective	2/minor	3/minor	Low 2/minor 3/minor	Low	increase in the absence of action We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	groundwater flooding Risks to infrastructure services from river, surface water an	
PD288 Asset	Power distribution Tunnel lighting	Flooding Direct	Wales & Western Wales & Western Professional Head of RAM	where is an isk across the country although the risk will be higher in the North West and areas		oderate High		Current typical flood levels are known and accounted for	2/minor		Medium 2/minor 3/minor		increase in the absence of action Assuming current drainage strategies persist	No Variation	groundwater flooding Risks to infrastructure services from river, surface water an	
	Power Tunnel lighting		Power Distribution HV/LV Electricitation	where rainfall levels will be higher		-						_			groundwater flooding Risk to transport from high and low temperatures, high	
PD289 Asset	distribution Tunnel lighting	Lightning Indirect	Wales & Western Wales & Western Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition This is a risk across the country This is a risk across the country although the risk will be higher in areas with more This is a risk across the country although the risk will be higher in areas with more	2/minor High 4/mo	oderate High		More likely than a direct strike, but far easier to repair	2/minor		Medium 2/minor 3/minor		Assuming general increase in storm frequency and severity	No Variation	winds, lightning Risk to transport from high and low temperatures, high	
PD29 Asset	distribution LV Cables Train shore supplies - 3 phase 400V AC and	Lightning Direct	Wales & Western Wales & Western Power Distribution HV/LV Electricfication	United to utget inventor integrations which is asset controllow thunderstorms There is a risk arrows the notional than its will be blacker in the North Maet and asset		oderate Low		Unlikely but can have devastating effects	4/moderate		Low 4/moderate 4/moderat			No Variation	Nok to transport from high and low temperatures, high winds, lightning Risk to transport from high and low temperatures, high	
PD290 Asset	Power distribution supplies) Train shore supplies - 3 phase 400V AC and	Snow Direct	Wales & Western Wales & Western And And And And And And And And And An	unice to trigger revertor investment which is asset conduction where rainfall levels will be higher	Z/minor Medium 4/me	oderate Medium		Shore supplies generally used in non-operational times and places	2/minor	1/minor	Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	winds, lightning	
PD291 Asset		Ice/Hail Direct	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricitation	Linked to trigger level for investment which is asset condition There is a rick across the country although the risk will be higher in the North West and areas where rainfall levels will be higher		ninor Medium	4/moderate 2/minor	Shore supplies generally used in non-operational times and places	2/minor	1/minor	Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD292 Asset	distribution single phase 850V AC (Excl. 750 V DC supplies)	Snow/ice Direct	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricitation	Unked to trigger level for investment which is asset condition There is a fisk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medium 2/n	ninor Medium	2/minor 2/minor	Shore supplies generally used in non-operational times and places	2/minor	1/minor	Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD293 Asset	Power distribution Train shore supplies - 3 phase 400V AC and single phase 850V AC (Excl. 750 V DC supplies)	temperature range	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medium 2/n	ninor Medium	2/minor 2/minor	Asset is generally capable of withstanding current range of temperatures	2/minor	4/moderate		_	Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD294 Asset	Power distribution HV cable route	High average rainfall over Direct several days	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Unked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/modera	ate Current controls mostly effective	4/moderate	6/moderate	Low 4/moderate 6/moderat	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD295 Asset	Power distribution Train shore supplies - 3 phase 400V AC and single phase 850V AC (Excl. 750 V DC supplies)	d Heavy Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/modera	the Shore supplies generally used in non-operational times and places	4/moderate	6/moderate	Low 4/moderate 6/moderat	Low	We have low confidence in the risk rating but we have high confidence that the risk v increase in the absence of action	vill No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD296 Asset	Power Train shore supplies - 3 phase 400V AC and single phase 850V AC (Excl. 750 V DC supplies)	d Flooding Direct	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricfication	Unked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate High 6/mo	oderate High	6/moderate 6/modera	te Current typical flood levels are known and accounted for	4/moderate	6/moderate	Medium 4/moderate 6/moderat	Medium	Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water an groundwater flooding	
PD297 Asset	Power distribution distribution Train shore supplies - 3 phase 400V AC and single phase 850V AC (Excl. 750 V DC supplies)	d Lightning Direct	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition This is a risk across the country although the risk will be higher in areas with more thunderstorms	2/minor Low 4/mo	oderate Low	2/minor 2/minor	Unlikely but can have devastating effects	2/minor	2/minor	Low 2/minor 2/minor	Low	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD298 Asset	Power distribution distribution Train shore supplies - 3 phase 400V AC and single phase 850V AC (Excl. 750 V DC supplies)	d Lightning Indirect	Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Electricitation	Unked to trigger level for investment which is asset condition This is a risk across the country	2/minor Medium 4/mo	oderate Medium	2/minor 2/minor	Shore supplies generally used in non-operational times and places	2/minor	3/minor	Low 2/minor 3/minor	Low	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD299 Asset	Power distribution Shore supplies (line side)	Snow Direct	Wales & Western Wales & Western Power Distribution HV/LV Electricitation	Unked to trigger level for investment which is asset condition There is a risk across the country although the risk will be higher where rainfail levels will be higher	2/minor Medium 4/mc	oderate Medium	4/moderate 2/minor	Shore supplies generally used in non-operational times and places	2/minor	1/minor	Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
		Lightning Indirect	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricitation	Linked to trigger level for investment which is asset condition This is a risk across the country	4/moderate High 6/mo	oderate High	4/moderate 6/modera	More likely than a direct strike, but far easier to repair	4/moderate	6/moderate	Medium 4/moderate 6/moderat	Medium	Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD30 Asset	Power distribution						4/moderate 2/minor	Shore supplies generally used in non-operational times and places		1/minor	Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD30 Asset PD300 Asset	Power chore supplier (line ride)	Ice/Hail Direct	Wales & Western Wales & Western Professional Head of RAM Power Distribution HV/LV Electricfication	Linked to trigger level for investment which is asset condition Where is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medium 2/n	ninor Medium			2/minor	27111101						
PD30 Asset PD300 Asset PD301 Asset	Power supplies (line side) Power supplies (line side) Power shore supplies (line side)	Ice/Hail Direct	Wales & Western Wales & Western Power Distribution HV/LV Electricification	unded utuiger inter ou interactions sast unique inter rainfall levels will be higher histories fund for interactional table is anot needline. There is a risk across the country although the risk will be higher in the North West and areas		ninor Medium	2/minor 2/minor	Shore supplies generally used in non-operational times and places	2/minor 2/minor		Low 2/minor 1/minor	Low	Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high	
PD300 Asset	Power Shore supplies (line side)	Large diurnal	Wales & Western Wales & Western Power Distribution HV/VV Electricitation Wales & Western Wales & Western Professional Head of Power Distribution HV/IV RAM Wales & Western Professional Head of Distribution HV/IV RAM Wales & Western Professional Head of Distribution HV/IV RAM	Unked to trigger level for investment which is asset condition. There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher in the North West and areas to be a subserved on the subserved o	2/minor Medium 2/m	ninor Medium			2/minor	1/minor	Low 2/minor 1/minor				winds, lightning Risk to transport from high and low temperatures, high	
PD300 Asset	Power supplies (line side) Power supplies (line side) Power shore supplies (line side)		Wales & Western Wales & Western Power Distribution HV/LV Electricitation Wales & Western Wales & Western Power Distribution HV/LV Electricitation Electricitation	Unked to trigger level for investment which is asset condition. There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher.	2/minor Medium 2/minor 2/minor Medium 2/minor	-	2/minor 2/minor	Shore supplies generally used in non-operational times and places Asset is generally capable of withstanding current range of temperatures Shore supplies generally used in non-operational times and places		1/minor 4/moderate		Low		No Variation	winds, lightning	

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| PD304 Asset Power
distribution Shore supplies (line side)

 | Flooding Direct | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the North West and areas
where rainfall levels will be higher
 | 4/moderate High 6/m | noderate High
 | 6/moderate 6/moderat
 | Current typical flood levels are known and accounted for | 4/moderate | 6/moderate Mediu
 | n 4/moderate 6/moderate | Medium Assuming current drainage strategies persist |
 | Risks to Infrastructure services from river, surface water and
groundwater flooding |
| PD305 Asset Power
distribution HV cable route

 | High average
rainfall over Direct
season | Wales & Western Wales & Western Power Distribution HV/LV
and RAM | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the North West and areas
where rainfall levels will be higher
 | 2/minor Medium 2/1 | /minor Medium
 | 2/minor 2/minor
 | Current controls mostly effective | 2/minor | 3/minor Low
 | 2/minor 3/minor | Low We have low confidence in the risk rating but we have high confidence that the risk will
increase in the absence of action | No Variation
 | Riska to infrastructure services from river, surface water and groundwater flooding |
| PD306 Asset Power
distribution Shore supplies (line side)

 | Lightning Direct | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Linked to trigger level for investment which is asset condition

 | This is a risk across the country although the risk will be higher in areas with more
 | 2/minor Low 4/m | noderate Low
 | 2/minor 2/minor
 | Unlikely but can have devastating effects | 2/minor | 2/minor Low
 | 2/minor 2/minor | Low Assuming general increase in storm frequency and severity |
 | Risk to transport from high and low temperatures, high |
| Bauar

 | | Defendent linet of |

 |
 | |
 |
 | | 2/minor | 3/minor Low
 | | |
 | winds, lightning Rikk to transport from high and low temperatures, high |
| PD307 Asset distribution Shore supplies (line side)

 | | Power Distribution HV/LV |

 | This is a risk across the country
 | 2/minor Medium 4/m | noderate Medium
 | 2/minor 2/minor
 | Shore supplies generally used in non-operational times and places | 2/minor | 3/minor Low
 | 2/minor 3/minor | Low Assuming general increase in storm frequency and severity |
 | winds, lightning |
| PD308 Asset Power
distribution HV cable route/ HV URX/UTX

 | Flooding Direct | Wales & Western Wales & Western Power Distribution HV/LV
and RAM | Electricfication Linked to trigger level for investment which is asset condition

 | There is a risk across the country although the risk will be higher in the North West and areas
where rainfall levels will be higher
 | 4/moderate Medium 4/m | noderate Medium
 | 4/moderate 4/moderat
 | Current typical flood levels are known and accounted for | 4/moderate | 6/moderate Low
 | 4/moderate 6/moderate | | No Variation
 | Risks to infrastructure services from river, surface water and groundwater flooding |
| PD309 Asset Power
distribution HV/LV and 3rd rail cables and eart

 | h bonds Erosion Direct | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | This is a risk across the country, particularly in areas where the asset is incorporated into
earthworks
 | 4/moderate Medium 6/m | noderate Medium
 | 6/moderate 6/moderat
 | Mitigations designed into overall electrical system | 4/moderate | 6/moderate Low
 | 4/moderate 6/moderate | Low We have low confidence in the risk rating but we have high confidence that the risk will
increase in the absence of action | No Variation
 | Risks to infrastructure services from river, surface water and
groundwater flooding |
| PD31 Asset Power
distribution LV switchgear

 | Heat wave Cumulative | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 4/moderate Medium 4/m | noderate Medium
 | 2/minor 6/moderat
 | Current asset condition is known and generally capable of withstanding current range o
high temperatures | f 4/moderate | 6/moderate Low
 | 4/moderate 6/moderate | Low Assuming current manufacturing techniques and materials |
 | Risk to transport from high and low temperatures, high winds, lightning |
| PD310 Asset Power
distribution HV URX/UTX

 | Large diurnal
temperature range | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 2/minor Medium 2/1 | /minor Medium
 | 2/minor 2/minor
 | Asset is generally capable of withstanding current range of temperatures | 2/minor | 4/moderate Low
 | 2/minor 4/moderate | Low Assuming current manufacturing techniques and materials | No Variation
 | Risk to transport from high and low temperatures, high winds, lightning |
| PD311 Asset Power
distribution HV URX/UTX

 | Heavy
rain/cloudburst Direct | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | RAM
Einstelfestion Linked to trigger level for investment which is asset condition

 | There is a risk across the country although the risk will be higher in the North West and areas
where rainfall levels will be higher
 | 1/minor Medium 4/m | noderate Medium
 | 4/moderate 4/moderat
 | Event unlikely, current controls mostly effective | 1/minor | 2/minor Low
 | 1/minor 2/minor | Low We have low confidence in the risk rating but we have high confidence that the risk will
increase in the absence of action | No Variation
 | Risks to infrastructure services from river, surface water and groundwater flooding |
| Power

 | High average
rainfall over Direct | Waler & Water Waler & Water Professional Head of | RAM Linked to trigger local for investment which is sent condition

 | There is a risk across the country although the risk will be higher in the North West and areas
 | 4/moderate Medium 6/m | noderate Medium
 | Elmoderate Elmoderat
 | Current controls mostly effective | Almodorato | 6/moderate Low
 | 4/moderate 6/moderate | We have low confidence in the cirk ratios but we have hisk confidence that the cirk will | No Variation
 | Risks to infrastructure services from river, surface water and |
| distribution

 | several days High average | Power Distribution HV/LV | Electricfication

 | where rainfall levels will be higher
There is a risk across the country although the risk will be higher in the North West and areas
 | Aymouerate Webdum Oym | Weddin
 | oynoderate oynoderat
 | | 4/moderate | Confidentiale
 | Aymodelate Oymodelate | |
 | groundwater flooding Riks to Infrastructure services from river, surface water and |
| PD313 Asset distribution HV URX/UTX

 | rainfall over Direct season | Wales & Western Wales & Western Power Distribution HV/LV | Electricfication Linked to trigger level for investment which is asset condition

 | where rainfall levels will be higher
 | 2/minor Medium 2/m | /minor Medium
 | 2/minor 2/minor
 | Current controls mostly effective | 2/minor | 3/minor Low
 | 2/minor 3/minor | Low Increase in the absence of action |
 | raks to similatio cube services inon men, sunsee water and
groundwater flooding |
| PD314 Asset Power
distribution AC power supply conditioning

 | Lightning Direct | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | This is a risk across the country although the risk will be higher in areas with more
thunderstorms
 | 6/moderate Low 8/m | noderate Low
 | 6/moderate 6/moderat
 | Unlikely but can have devastating effects | 6/moderate | 6/moderate Low
 | 6/moderate 6/moderate | Low Assuming general increase in storm frequency and severity |
 | Risk to transport from high and low temperatures, high winds, lightning |
| PD315 Asset Power
distribution SCADA (all)

 | Extreme hot
temperatures | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 4/moderate Medium 4/mo | noderate Medium
 | 3/minor 6/moderat
 | Current asset condition is known and generally capable of withstanding current range o
high temperatures | f 4/moderate | 4/moderate Low
 | 4/moderate 4/moderate | Low Assuming current manufacturing techniques and materials |
 | Risk to transport from high and low temperatures, high
winds, lightning |
| PD316 Asset Power
distribution SCADA (all)

 | Heat wave Cumulative | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 4/moderate Medium 4/m | noderate Medium
 | 2/minor 6/moderat
 | Current asset condition is known and generally capable of withstanding current range o
high temperatures | f 4/moderate | 6/moderate Low
 | 4/moderate 6/moderate | Low Assuming current manufacturing techniques and materials |
 | Risk to transport from high and low temperatures, high
winds, lightning |
| PD317 Asset Power
distribution SCADA (all)

 | Flooding Direct | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the North West and areas
where rainfall levels will be higher
 | 4/moderate High 6/m | noderate High
 | 6/moderate 6/moderat
 | Current typical flood levels are known and accounted for | 4/moderate | 6/moderate Mediu
 | n 4/moderate 6/moderate | Medium Assuming current drainage strategies persist |
 | Risks to infrastructure services from river, surface water and groundwater flooding |
| PD318 Asset Power
distribution SCADA (all)

 | Lightning Direct | Wales & Western Wales & Western | RAM
Linked to trigger level for investment which is asset condition

 | This is a risk across the country although the risk will be higher in areas with more
 | 2/minor Low 4/mi | noderate Low
 | 2/minor 2/minor
 | Unlikely but can have devastating effects | 2/minor | 2/minor Low
 | 2/minor 2/minor | Low Assuming general increase in storm frequency and severity | No Variation
 | Risk to transport from high and low temperatures, high |
| Power

 | | Power Distribution Hv/cv | Pam

 | thunderstorms
 | |
 |
 | | |
 | | |
 | winds, lightning Risk to transport from high and low temperatures, high |
| PD319 Asset distribution SCADA (all)

 | Lightning Indirect | Wales & Western Power Distribution HV/LV | Electricitication Linked to trigger level for investment which is asset condition

 | This is a risk across the country
 | 6/moderate High 8/m | noderate High
 | 6/moderate 6/moderat
 | More likely than a direct strike, but far easier to repair | 6/moderate | 9/moderate Mediu
 | n 6/moderate 9/moderate | Medium Assuming general increase in storm frequency and severity |
 | winds, lightning |
| PD32 Asset Power
distribution LV switchgear

 | Large diurnal
temperature range | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 4/moderate Medium 4/m | noderate Medium
 | 4/moderate 4/moderat
 | Asset is generally capable of withstanding current range of temperatures | 4/moderate | 6/moderate Low
 | 4/moderate 6/moderate | Low Assuming current manufacturing techniques and materials |
 | Risk to transport from high and low temperatures, high winds, lightning |
| PD320 Asset Power
distribution DC grid supply point/Functional St

 | upply Points Extreme hot
temperatures Cumulative | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 4/moderate Medium 4/m | noderate Medium
 | 3/minor 6/moderat
 | Current asset condition is known and generally capable of withstanding current range on high temperatures | f 4/moderate | 6/moderate Low
 | 4/moderate 6/moderate | Low Assuming current National Grid trends continue |
 | Risk to transport from high and low temperatures, high
winds, lightning |
| PD321 Asset Power
distribution DC grid supply point

 | Heat wave Cumulative | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 4/moderate Medium 4/m | noderate Medium
 | 2/minor 6/moderat
 | Current asset condition is known and generally capable of withstanding current range o
high temperatures | f 4/moderate | 6/moderate Low
 | 4/moderate 6/moderate | Low Assuming current manufacturing techniques and materials | No Variation
 | Risk to transport from high and low temperatures, high winds, lightning |
| PD322 Asset Power
distribution DC grid supply point

 | Large diurnal
temperature range | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 2/minor Medium 2/1 | /minor Medium
 | 2/minor 2/minor
 | Asset is generally capable of withstanding current range of temperatures | 2/minor | 4/moderate Low
 | 2/minor 4/moderate | Low Assuming current manufacturing techniques and materials |
 | Risk to transport from high and low temperatures, high whichs, lightning |
| Power DC grid supply point

 | Flooding Direct | Wales & Western Wales & Western Professional Head of | RAM Linked to trigger level for investment which is asset condition

 | There is a risk across the country although the risk will be higher in the North West and areas
 | 4/moderate High 6/mi | noderate Hish
 | 6/moderate 6/moderat
 | Current typical flood levels are known and accounted for | 4/moderate | 6/moderate Mediu
 | n 4/moderate 6/moderate | Medium Assuming current drainage strategies persist |
 | Risks to infrastructure services from river, surface water and |
|

 | | Power Distribution HV/LV |

 | where rainfall levels will be higher
This is a risk across the country although the risk will be higher in areas with more
 | |
 |
 | | |
 | | |
 | groundwater flooding Risk to transport from high and low temperatures, high |
| PD324 Asset distribution DC grid supply point

 | Lightning Direct | Wales & Western Wales & Western Power Distribution HV/LV | Electricfication

 | thunderstorms
 | 8/moderate Low 10/ | D/major Low
 | 8/moderate 10/major
 | Unlikely but can have devastating effects | 8/moderate | 8/moderate Low
 | 8/moderate 8/moderate | Low Assuming general increase in storm frequency and severity | No variation
 | winds, lightning |
| PD325 Asset Power
distribution AC power supply conditioning

 | Lightning Indirect | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |

 | This is a risk across the country although the risk will be higher in areas with more
thunderstorms
 | 6/moderate High 6/m | noderate High
 | 6/moderate 6/moderat
 | More likely than a direct strike, but far easier to repair | 6/moderate | 9/moderate Mediu
 | n 6/moderate 9/moderate | Medium Assuming general increase in storm frequency and severity |
 | Risk to transport from high and low temperatures, high winds, lightning |
| PD326 Asset Power
distribution DC grid supply point

 | Lightning Interdependen
(us on them) | | RAM
Electricfication

 | This is a National Grid dependency across the country
 | 6/moderate Medium 6/m | noderate Medium
 | 6/moderate 6/moderat
 | Unlikely. Mitigations generally effective, where applied | 9/moderate | 12/major Low
 | 9/moderate 12/major | Low Assuming general increase in storm frequency and severity |
 | Risk to transport from high and low temperatures, high
winds, lightning |
| PD327 Asset Power
distribution 3rd Rail DC switchgear & disconne

 | ctors Extreme hot
temperatures Cumulative | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 6/moderate Medium 6/m | noderate Medium
 | 4/moderate 9/moderat
 | Current asset condition is known and generally capable of withstanding current range o
high temperatures | f 4/moderate | 4/moderate Low
 | 4/moderate 4/moderate | Low Assuming current manufacturing techniques and materials |
 | Risk to transport from high and low temperatures, high winds, lightning |
| PD328 Asset Power
distribution 3rd Rail DC/ HV switchgear

 | Heat wave Cumulative | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | RAM
Electricfication

 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher
 | 6/moderate Medium 6/m | noderate Medium
 | 4/moderate 8/moderat
 | Current asset condition is known and generally capable of withstanding current range o
high temperatures | f 6/moderate | 9/moderate Low
 | 6/moderate 9/moderate | Low Assuming current manufacturing techniques and materials | No Variation
 | Risk to transport from high and low temperatures, high whichs, lightning |
| PD329 Asset Power 3rd Rail DC switchgear & disconne

 | ctors Flooding Direct | Wales & Wastern Wales & Wastern Professional Head of | RAM Linked to triange level for investment which is sent condition

 | There is a risk across the country although the risk will be higher in the North West and areas
 | 4/moderate High 6/mi | noderate High
 | 6/moderate 6/moderat
 | Current typical flood levels are known and accounted for | 4/moderate | 6/moderate Mediu
 | n 4/moderate 6/moderate | Medium Assuming current drainage strategies persist | No Variation
 | Risks to infrastructure services from river, surface water and |
|

 | large diurnal | Wales & Western Wales & Western Power Distribution HV/LV | RAM
Linked to trigger level for investment which is asset condition

 | Where raiman ievers will be righter
 | |
 |
 | Asset is generally capable of withstanding current range of temperatures | |
 | | |
 | groundwater flooding Risk to transport from high and low temperatures, high |
|

 | | |

 |
 | |
 |
 | | |
 | | |
 | |
| PD33 Asset Power
distribution Auxiliary transformer

 | temperature range | Power Distribution HV/LV |

 | where the temperature will be higher
 | |
 | 2/1110
 | | 2,1110 | 4/moderate Low
 | 2/minor 4/moderate | Low Assuming current manufacturing techniques and materials |
 | winds, lightning |
| PD33 Asset ^{obver}
distribution Auxiliary transformer
PD330 Asset Power
distribution 3rd rail DC switchgear & disconne

 | temperature range | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV |

 | where the temperature will be higher
This is a risk across the country although the risk will be higher in areas with more
thunderstorms
 | 8/moderate Low 10/ |
 |
 | Unlikely but can have devastating effects | | 8/moderate Low
 | | Low Assuming current manufacturing techniques and materials Low Assuming general increase in storm frequency and severity | No Variation
 | winds, lightning Image: Constraint of the second |
| Power and public substance & dimension

 | temperature range | Power Distribution HV/LV | RAM
Electricitication
RAM
Linked to trigger level for investment which is asset condition

 | where the temperature will be higher
 | |
 | 8/moderate 10/major
 | | 8/moderate |
 | 8/moderate 8/moderate | Low Assuming general increase in storm frequency and severity | No Variation
 | winds, lightning Risk to transport from high and low temperatures, high |
| P0330 Asset Power 3rd rail DC switchgear & disconne

 | temperature range Direct tors Lightning Direct tors Lightning Indirect | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Professional Head of Power Distribution HV/LV | RAM
Electricfication
Linked to trigger level for investment which is asset condition
RAM
Electricfication
Linked to trigger level for investment which is asset condition
RAM

 | where the temperature will be higher This is a risk across the country although the risk will be higher in areas with more thunderstorms This is a risk across the country This is a risk across the country Theore is a risk across the country
 | 8/moderate Low 20)
6/moderate High 6/m | Vinajor Low
 | 3/moderate 3D/major
6/moderate 6/moderat
 | Unlikely but can have devastating effects | 8/moderate
6/moderate | 8/moderate Low
 | 8/moderate 8/moderate | Low Assuming general increase in storm frequency and severity | No Variation
 | winds, lightning Image: Constraint of the second |
| P0330 Asset Power
distribution 3rd rail DC switchgear & disconne P0331 Asset Power
distribution 3rd rail DC switchgear & disconne P0332 Asset Power
distribution 3rd rail DC switchgear & disconne

 | temperature range Universe
tors Lightning Direct
tors Lightning Indirect
tors Large diurnal
temperature range Cumulative | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Professional Head of Power Distribution HV/LV | RAM Unked to trigger level for investment which is asset condition RAM Electricification Unked to trigger level for investment which is asset condition RAM Electricification Unked to trigger level for investment which is asset condition RAM Electricification Unked to trigger level for investment which is asset condition

 | where the temperature will be higher This is a risk across the country although the risk will be higher in areas with more thunderstorms This is a risk across the country There is a risk across the country There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher
There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher | 8/moderate Low 10/
6/moderate High 6/m
2/minor Medium 2/r | Vmajor Low
noderate High
/minor Medium
 | 3/moderate 3D/major
6/moderate 6/moderat
 | Unlikely but can have devastating effects Unlikely but can have devastating effects More likely than a direct strike, but far easier to repair Asset is generally capable of withstanding current range of temperatures | 8/moderate
6/moderate
2/minor | 8/moderate Low
9/moderate Mediu
4/moderate Low
 | 8/moderate 8/moderate 6/moderate 9/moderate 2/minor 4/moderate | Low Assuming general increase in storm frequency and severity Medium Assuming general increase in storm frequency and severity | No Variation No Variation No Variation No Variation
 | winds, lightning Image: Construction of the second of th |
| PO330 Asset Power
distribution 3rd rall DC switchgear & disconne P0331 Asset Power
distribution 3rd rall DC switchgear & disconne P0332 Asset Power
distribution 3rd rall DC switchgear & disconne P0332 Asset Power
distribution 3rd rall DC switchgear & disconne P0333 Asset Power
distribution 3rd rall HV cables, transformer/re P0333 Asset Power ard rall HV cables, transformer/re

 | temperature range Universe
ttors Lightning Direct
ttors Lightning Indirect
ttors Large diurnal
temperature range
temperatures ange
temperatures cumulative
temperatures cumulative | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | RAM Unked to trigger level for investment which is asset condition RAM Electricification Unked to trigger level for investment which is asset condition RAM Electricification Unked to trigger level for investment which is asset condition RAM Electricification Unked to trigger level for investment which is asset condition RAM Electricification Unked to trigger level for investment which is asset condition RAM Electricification
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noderate High
/minor Medium
noderate Medium
 | R/moderate 30/major R/moderate 6/moderate 2/minor 2/minor 4/moderate 9/moderate
 | Unlikely but can have devastating effects
More likely than a direct strike, but far easier to repair
Asset is generally capable of withstanding current range of temperatures
Current asset condition is known and generally capable of withstanding current range o
high temperatures | 8/moderate
6/moderate
2/minor
f 6/moderate | &/moderate Low 9/moderate Mediu 4/moderate Low 6/moderate Low
 | 8/moderate 8/moderate 8/moderate 9/moderate 2/mincr 4/moderate 6/moderate 6/moderate | Low Assuming general increase in storm frequency and severity Medium Assuming general increase in storm frequency and severity Low Assuming current manufacturing techniques and materials Low Assuming current manufacturing techniques and materials | No Variation No Variation No Variation No Variation No Variation No Variation
 | winds, lightning Image: Construction of the second of th |
| POwer
distribution 3rd rall DC switchgear & disconne PD330 Asset Power
distribution 3rd rall DC switchgear & disconne PD331 Asset Power
distribution 3rd rall DC switchgear & disconne PD332 Asset Power
distribution 3rd rall DC switchgear & disconne PD333 Asset Power
distribution 3rd rall HV cables, transformer / re
distribution PD334 Asset Power
distribution HV power system protection PD334 Asset Power
distribution HV power system protection

 | temperature range Universe
ttors Lightning Direct
ttors Lightning Indirect
ttors Large diurnal
temperature range Cumulative
temperatures Cumulative
Extreme hot
temperatures Cumulative | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
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Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of | RAM Unked to trigger level for investment which is asset condition RAM Exerticification Unked to trigger level for investment which is asset condition RAM Exerticification Unked to trigger level for investment which is asset condition RAM Exerticification Unked to trigger level for investment which is asset condition RAM Exerticification Unked to trigger level for investment which is asset condition RAM Exerticification
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noderate High
/minor Medium
noderate Medium
noderate Medium
 | k/moderate 30/major k/moderate 6/moderate 2/minor 2/minor 4/moderate 9/moderate 3/minor 6/moderate
 | Unlikely but can have devastating effects More likely than a direct strike, but far easier to repair Asset is generally capable of withstanding current range of temperatures Current asset condition is known and generally capable of withstanding current range o high temperatures Current asset condition is known and generally capable of withstanding current range o high temperatures Current asset condition is known and generally capable of withstanding current range o high temperatures | 8/moderate 6/moderate 2/minor 6/moderate 4 6/moderate | 8/moderate Low 9/moderate Mediu 4/moderate Low 6/moderate Low 4/moderate Low
 | 8/moderate 8/moderate 8/moderate 9/moderate 2/minor 4/moderate 6/moderate 6/moderate 4/moderate 4/moderate | Low Assuming general increase in storm frequency and severity Medium Assuming general increase in storm frequency and severity Low Assuming current manufacturing techniques and materials | No Variation
 | winds, lightning Image: Construction of the second of |
| PO330 Asset Power
distribution 3rd rall DC switchgear & disconne PD331 Asset Power
distribution 3rd rall DC switchgear & disconne PD332 Asset Power
distribution 3rd rall DC switchgear & disconne PD332 Asset Power
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distribution 3rd rall HV cables, transformer / re PD334 Asset Power
distribution HV power system protection PD335 Asset Power
distribution 3rd rall HV cables, transformer / re

 | temperature range Universe
ttors Ughtning Direct
ttors Ughtning Indirect
ttors Large diurnal
temperature range Cumulative
temperatures Cumulative
Extreme hot
temperatures Cumulative
temperatures Cumulative | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
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although the risk will be higher in the South East and areas where the temperature will be higher There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher | 8/moderate Low 80 6/moderate High 6/m 2/minor Medium 2/ 6/moderate Medium 6/m 4/moderate Medium 6/m 6/moderate Medium 6/m | Magor Low
noderate High
/minor Medium
noderate Medium
noderate Medium
 | R/moderate 30/magor R/moderate 6/moderate 2/minor 2/minor 4/moderate 9/moderate 3/minor 6/moderate 4/moderate 8/moderate
 | Unlikely but can have devastating effects More likely but can have devastating effects More likely than a direct strike, but far easier to repair Asset is generally capable of withstanding current range of temperatures Current asset condition is known and generally capable of withstanding current range o ligh temperatures Current asset condition is known and generally capable of withstanding current range o ligh temperatures | &/moderate &/moderate &/moderate &/moderate d &/moderate d &/moderate | 8/moderate Low 9/moderate Media 4/moderate Low 5/moderate Low 9/moderate Low
 | 8/moderate 8/moderate 8/moderate 9/moderate 2/minor 4/moderate 6/moderate 6/moderate 4/moderate 4/moderate 6/moderate 9/moderate | Low Assuming general increase in storm frequency and severity Medium Assuming general increase in storm frequency and severity Low Assuming current manufacturing techniques and materials | No Variation
 | winds, lightning Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high |
| Power Bird rail DC switchgear & disconne PD330 Asset Power distribution 3rd rail DC switchgear & disconne PD331 Asset Power distribution 3rd rail DC switchgear & disconne PD332 Asset Power distribution 3rd rail DC switchgear & disconne PD333 Asset Power distribution 3rd rail DC switchgear & disconne PD333 Asset Power distribution 3rd rail HV cables, transformer/re PD334 Asset Power distribution 3rd rail HV cables, transformer/re PD335 Asset Power distribution 3rd rail HV cables, transformer/re PD336 Asset Power distribution 3rd rail HV cables Tantif HV cables

 | temperature range Universe
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noderate High
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 | R/moderate 30/magor R/moderate 6/moderate 2/minor 2/minor 4/moderate 9/moderate 3/minor 6/moderate 4/moderate 8/moderate | Unlikely but can have devastating effects More likely than a direct strike, but far easier to repair Asset is generally capable of withstanding current range of temperatures Current asset condition is known and generally capable of withstanding current range o high temperatures Current asset condition is known and generally capable of withstanding current range o high temperatures Current asset condition is known and generally capable of withstanding current range o high temperatures
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 |
| PO330 Asset Power
distribution 3rd rall DC switchgear & disconne PD331 Asset Power
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distribution 3rd rall HV cables, transformer/ re

 | temperature range Universe
tors Lightning Direct
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Power Distribution HW/LV Wales & Western Wales & Western Professional Head of
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distribution 3rd rail HV cables, transformer/re
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| PD355 Asset Power Conductor rail heating

 | Lightning Indirect

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | This is a risk across the country | 3/minor High 4/m
 | noderate High
 | 3/minor 4/modera

 | More likely than a direct strike, but far easier to repair

 | 3/minor
 | 5/moderate Medium

 | 3/minor 6/moderate | Medium Ass | ssuming general increase in storm frequency and severity | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD356 Asset Power
distribution Earthing/bonding

 | Extreme hot
temperatures

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 3/minor Medium 3/
 | /minor Medium
 | 3/minor 4/modera

 | Current asset condition is known and generally capable of withstanding current range of
high temperatures

 | 3/minor
 | 3/minor Low

 | 3/minor 3/minor | Low Ass | ssuming current manufacturing techniques and materials | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD357 Asset Power
distribution Earthing/bonding

 | Heat wave Direct

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 3/minor Medium 3,
 | /minor Medium
 | 2/minor 6/modera

 | Current asset condition is known and generally capable of withstanding current range of
high temperatures

 | 3/minor
 | 3/minor Low

 | 3/minor 3/minor | Low Ass | ssuming current manufacturing techniques and materials | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD358 Asset Power
distribution Earthing/bonding

 | Large diurnal
temperature range

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 2/minor Medium 2/
 | /minor Medium
 | 2/minor 2/minor

 | Asset is generally capable of withstanding current range of temperatures

 | 2/minor
 | 4/moderate Low

 | 2/minor 4/moderate | Low Ass | ssuming current manufacturing techniques and materials | No Variation | Risk to transport from high and low temperatures, high which, lightning |

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| PD359 Asset Power
distribution Earthing/bonding

 | Low soil moisture Direct

 | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV |
RAM
Electricfication | This is a risk across the country, particularly in areas where the asset is on earthworks | 3/minor Low 3/
 | /minor Low
 | 3/minor 4/modera

 | This issue aften goes undetected

 | 3/minor
 | 5/moderate Low

 | 3/minor 6/moderate | | e have low confidence in the risk rating but we have high confidence that the risk will
crease in the absence of action | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD36 Asset Power
distribution LV switchgear

 | Lightning Indirect

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | This is a risk across the country | 6/moderate High 8/m
 | noderate High
 | 6/moderate 8/modera

 | More likely than a direct strike, but far easier to repair

 | 6/moderate
 | 9/moderate Medium

 | 6/moderate 9/moderate | Medium Ass | suming general increase in storm frequency and severity | No Variation | Risk to transport from high and low temperatures, high which, lightning |

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| PD360 Asset Power distribution Changeover panels

 | Large diurnal
temperature range

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 2/minor Medium 2/
 | /minor Medium
 | 2/minor 2/minor

 | Asset is generally capable of withstanding current range of temperatures

 | 2/minor
 | 4/moderate Low

 | 2/minor 4/moderate | Low Ass | ssuming current manufacturing techniques and materials | No Variation | Risk to transport from high and low temperatures, high which, lightning |

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| PD361 Asset Power distribution Changeover panels

 | Flooding Direct

 | Wales & Western Wales & Western Professional Head of | RAM Linked to
trigger level for investment which is accet condition | There is a risk across the country although the risk will be higher in the North West and areas | 4/moderate High 6/m
 | noderate High
 | 6/moderate 6/modera

 | te Current typical flood levels are known and accounted for

 | 4/moderate
 | 6/moderate Medium

 | 4/moderate 6/moderate | Medium Ass | ssuming current drainage strategies persist | No Variation | Risks to infrastructure services from river, surface water and |

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| Power characteristic

 | Lightning Direct

 | Wales & Western Wales & Western Professional Head of | RAM Linked to
trigger level for investment which is asset condition | where rainfall levels will be higher
This is a risk across the country although the risk will be higher in areas with more | 2/minor Low 4/m
 | noderate Low
 |

 | te Unlikely but can have devastating effects

 | 2/minor
 | 2/minor Low

 | 2/minor 2/minor | | suming general increase in storm frequency and severity | No Variation | groundwater flooding Risk to transport from high and low temperatures, high |

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| Power provide the second secon

 | Extrame hot

 | Power Distribution HV/LV | PANA
 | thunderstorms There is a risk across the country although the risk will be higher in the South East and areas |
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 | Current prost prediction is because and expensitive carable of withstranding surrent encount

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 | | | | winds, lightning Risk to transport from high and low temperatures, high |

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| PD37 Asset Coven
distribution Non-traction HV switchgear

 | temperatures Cumulative

 | Wales & Western Wales & Western Power Distribution HV/LV | PAM
 | where the temperature will be higher
There is a risk across the country although the risk will be higher in the South East and areas | 4/moderate Medium 4/m
 |
 | 3/minor 6/modera

 | high temperatures

 | 4/moderate
 |

 | 4/moderate 4/moderate | | | ivo valistion | winds, lightning Risk to transport from high and low temperatures, high |

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| PD38 Asset distribution Non traction HV switchgear

 | Heat wave Cumulative

 | Power Distribution HV/LV | Electricfication
Linked to trigger level for investment which is asset condition | where the temperature will be higher | 4/moderate Medium 4/m
 | noderate Medium
 | 2/minor 6/modera

 | high temperatures

 | 4/moderate
 | 5/moderate Low

 | 4/moderate 6/moderate | Low Ass | ssuming current manufacturing techniques and materials | No variation | winds, lightning |

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| PD39 Asset Power
distribution Non traction HV switchgear

 | Large diurnal
temperature range

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 3/minor Low 3/
 | /minor Low
 | 3/minor 3/minor

 | Asset is generally capable of withstanding current range of temperatures

 | 6/moderate
 | 9/moderate Low

 | 6/moderate 9/moderate | Low Ass | ssuming current manufacturing techniques and materials | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD40 Asset Power
distribution Non traction HV switchgear

 | Flooding Direct

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the North West and areas
where rainfall levels will be higher | 4/moderate Medium 6/m
 | noderate Medium
 | 6/moderate 6/modera

 | te Current typical flood levels are known and accounted for

 | 4/moderate
 | 6/moderate Low

 | 4/moderate 6/moderate | Low Ass | ssuming current drainage strategies persist | No Variation | Riskis fulfrastructure services from river, surface water and groundwater flooding |

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| PD41 Asset Power
distribution Non traction HV switchgear

 | Lightning Direct

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | This is a risk across the country although the risk will be higher in areas with more
thunderstorms | 4/moderate Low 8/m
 | noderate Low
 | 4/moderate 8/modera

 | Unlikely but can have devastating effects

 | 4/moderate
 | 4/moderate Low

 | 4/moderate 4/moderate | Low Ass | ssuming general increase in storm frequency and severity. | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD42 Asset Power
distribution Non traction HV switchgear

 | Lightning Indirect

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | This is a risk across the country | 6/moderate Medium 8/m
 | noderate Medium
 | 6/moderate 8/modera

 | More likely than a direct strike, but far easier to repair

 | 6/moderate
 | 9/moderate Low

 | 6/moderate 9/moderate | Low Ass | ssuming general increase in storm frequency and severity | No Variation | Risk to transport from high and low temperatures, high winds, lightning |

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| PD43 Asset Power
distribution Principal supply points

 | Extreme hot
temperatures

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
 | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 4/moderate Medium 4/m
 | noderate Medium
 | 3/minor 6/modera

 | Current asset condition is known and generally capable of withstanding current range of
high temperatures

 | 4/moderate
 | 4/moderate Low

 | 4/moderate 4/moderate | Low Ass | ssuming current manufacturing techniques and materials | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD44 Asset Power
distribution Auxiliary transformer

 | Flooding Direct

 | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the North West and areas
where rainfall levels will be higher | 4/moderate High 6/m
 | noderate High
 | 6/moderate 6/modera

 | te Current typical flood levels are known and accounted for

 | 4/moderate
 | 5/moderate Medium

 | 4/moderate 6/moderate | Medium Ass | ssuming current drainage strategies persist | | Bisk to transport from high and low temperatures, high winds, lightning |

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| PD45 Asset Power
distribution Principal supply points

 | Heat wave Cumulative

 | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 4/moderate Medium 4/m
 | noderate Medium
 | 2/minor 6/modera

 | Current asset condition is known and generally capable of withstanding current range of
high temperatures

 | 4/moderate
 | 6/moderate Low

 | 4/moderate 6/moderate | Low Ass | ssuming current manufacturing techniques and materials | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD46 Asset Power
distribution Principal supply points

 | Large diurnal
temperature range

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 3/minor Medium 3;
 | /minor Medium
 | 3/minor 3/minor

 | Asset is generally capable of withstanding current range of temperatures

 | 3/minor
 | 5/moderate Low

 | 3/minor 6/moderate | Low Ass | ssuming current manufacturing techniques and materials | | Risk to transport from high and low temperatures, high winds, lightning |

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 | | |
| PD47 Asset Power
distribution Principal supply points

 | Low soil moisture Direct

 | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | RAM
 | | 3/minor Low 3,
 | /minor Low
 | 3/minor 4/modera

 | This issue often goes undetected

 | 3/minor
 | 5/moderate Low

 | 3/minor 6/moderate | | e have low confidence in the risk rating but we have high confidence that the risk will
crease in the absence of action | No Variation | Risk to transport from high and low temperatures, high winds, lightning |

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| PD48 Asset Power
distribution Principal supply points

 | Flooding Direct

 | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | RAM
 | There is a risk across the country although the risk will be higher in the North West and areas | 4/moderate High 6/m
 |
 |

 | te Current typical flood levels are known and accounted for

 | 4/moderate
 |

 | | inc. | | | Nikks to infrastructure services from river, surface water and groundwater flooding |

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| PD40 Accet Power Bringing runnlunging

 | - Direct

 | Wales & Western Wales & Western Professional Head of | RAM Linked to
trigger local for investment which is server condition | where rainfall levels will be higher
This is a risk across the country, particularly in areas where the asset is on earthworks |
 |
 |

 | te Current asset condition known, mitigations generally effective

 | 3/minor
 |

 | 3/minor 6/moderate | Low We | e have low confidence in the risk rating but we have high confidence that the risk will | No Variation | Risks to infrastructure services from river, surface water and |

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| distribution

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 | Power Distribution HV/LV | Electricfication
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 | | inc | crease in the absence of action | | groundwater flooding Risk to transport from high and low temperatures, high |

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| PDS0 Asset Power
distribution Principal supply points

 | Lightning Direct

 | Defendent line of a |
NAM
Electricification Linked to trigger level for investment which is asset condition | thunderstorms |
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 |

 | te Unlikely but can have devastating effects

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 | | | | NO Variation | winds, lightning |

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 | | |
| PD51 Asset Power
distribution Principal supply points

 | Lightning Indirect

 | Wales & Western Wales & Western Power Distribution HV/LV | Electricfication
 | This is a risk across the country | 6/moderate High 8/m
 | noderate High
 | 6/moderate 8/modera

 | te More likely than a direct strike, but far easier to repair

 | 6/moderate
 | 9/moderate Medium

 | 6/moderate 9/moderate | | | | Risk to transport from Nigh and low temperatures, Nigh winds, lightning |

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| PD52 Asset Power
distribution Principal supply points

 | High winds Direct

 | Wales & Western Wales & Western Power Distribution HV/LV and RAM |
RAM
Electricfication Linked to trigger level for investment which is asset condition | This is a risk across the country, particularly in areas where the asset is exposed | 6/moderate Medium 6/m
 | noderate Medium
 | 8/moderate 4/modera

 | te Structures are designed to withstand current weather extremes

 | 6/moderate
 | 9/moderate Low

 | 6/moderate 9/moderate | inc | e have low confidence in the risk rating but we have high confidence that the risk will
crease in the absence of action | | Risk to transport from high and low temperatures, high winds, lightning |

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 | | |
| PD53 Asset Power
distribution Principal supply points

 | Storms Direct

 | Wales & Western Wales & Western AMM |
RAM
Electricfication | This is a risk across the country, particularly in areas where the asset is on earthworks | 6/moderate Medium 8/m
 |
 |

 | Structures are designed to withstand current weather extremes

 | 6/moderate
 | 9/moderate Low

 | 6/moderate 9/moderate | Low We | e have low confidence in the risk rating but we have high confidence that the risk will
crease in the absence of action | No Variation | Risk to transport from high and low temperatures, high groundwater flooding groundwater flood |

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| PD54 Asset Power
distribution Remote monitoring interfaces (plant

 | nt) Extreme hot
temperatures Cumulative

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | There is a risk across the country although the risk will be higher in the South East and areas
where the temperature will be higher | 2/minor Medium 2,
 | /minor Medium
 | 2/minor 4/modera

 | Current asset condition is known and generally capable of withstanding current range of
high temperatures

 | 2/minor
 | 2/minor Low

 | 2/minor 2/minor | Low Ass | ssuming current manufacturing techniques and materials | | Risk to transport from high and low temperatures, high winds, lightning |

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| PD55 Accet Power

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 | Desfersional Used of |
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 | | | | | Risk to transport from high and low temperatures, high |

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| PD55 Asset Power Auxiliary transformer

 | Lightning Direct

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV |
RAM
Electricfication | This is a risk across the country although the risk will be higher in areas with more
thunderstorms | 6/moderate Low 8/m
 | noderate Low
 | 6/moderate 8/modera

 | te Unlikely but can have devastating effects

 | 6/moderate
 | 5/moderate Low

 | 6/moderate 6/moderate | Low Ass | ssuming general increase in storm frequency and severity | | nos. to airsport noningri and ow temperatures, ngri
Winds, lightning |

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| PD55 Asset distribution Auxiliary transformer PD56 Asset Power distribution Remote monitoring interfaces (plant

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 | Wales & Western Wales & Western Protessional mean of
Power Distribution HV/LV Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | Electricication
 | thunderstorms |
 | _
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 | Curlikely but can have devastating effects Current asset condition is known and generally capable of withstanding current range of high temperatures

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 | nt) Heat wave Cumulative

 | Power Distribution HV/LV | Electricification
Cringer level for investment which is asset condition RAM Electricification Unked to trigger level for investment which is asset condition | thunderstorms There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher | 2/minor Medium 2/
 | /minor Medium
 | 2/minor 4/modera

 |

 | 2/minor
 |

 | 2/minor 3/minor | Low Ass | suming current manufacturing techniques and materials | No Variation | winds, lightning Risk to transport from high and low temperatures, high |

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| PD56 Asset Power
distribution Remote monitoring interfaces (plant

 | nt) Heat wave Cumulative tt) Flooding Direct

 | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | Electridication
Unked to trigger level for investment which is asset condition RAM Electridication Unked to trigger level for investment which is asset condition RAM Unked to trigger level for investment which is asset condition RAM Unked to trigger level for investment which is asset condition | thunderstorms There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher There is a risk across the country although the risk will be higher in the North West and areas | 2/minor Medium 2/
4/moderate High 6/m
 | /minor Medium
 | 2/minor 4/moderat
6/moderate 6/modera

 | Current asset condition is known and generally capable of withstanding current range of
high temperatures

 | 2/minor
 | 3/minor Low
5/moderate Medium

 | 2/minor 3/minor
4/moderate 6/moderate | Low Ass
Medium Ass | suming current manufacturing techniques and materials | No Variation | winds, lightning |

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| PD55 Asset Power
distribution Remote monitoring interfaces (plant PD57 Asset Power
distribution Remote monitoring interfaces (plant nn55 Asset Power Remote monitoring interfaces (plant

 | nt) Heat wave Cumulative
tt) Flooding Direct
nt) Lightning Direct

 | Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV
Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV
Wales & Western Wales & Western Professional Head of
Power Distribution HV/LV | Electridication
Linke to trigger level for investment which is asset condition RAM Electridication Linked to trigger level for investment which is asset condition RAM Electridication Linked to trigger level for investment which is asset condition RAM Linked to trigger level for investment which is asset condition RAM Linked to trigger level for investment which is asset condition RAM Linked to trigger level for investment which is asset condition | thunderstorms There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher This is a risk across the country although the risk will be higher in areas with more thunderstorms | 2/minor Medium 2/
4/moderate High 6/m
 | /minor Medium
noderate High
 | 2/minor 4/modera
6/moderate 6/modera
2/minor 4/modera

 | Current asset condition is known and generally capable of withstanding current range of
high temperatures
Current typical flood levels are known and accounted for

 | 2/minor
4/moderate
 | 3/minor Low
5/moderate Medium
2/minor Low

 | 2/minor 3/minor
4/moderate 5/moderate
2/minor 2/minor | Low Ass
Medium Ass
Low Ass | suming current manufacturing techniques and materials
suming current drainage strategies persist
suming general increase in storm frequency and severity | No Variation No Variation No Variation No Variation No Variation | winds, lightning Image: Construction of the services of the serv |

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distribution Remote monitoring interfaces (plant
Remote monitoring interfaces (plant
distribution PD57 Asset Power
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Remote monitoring interfaces (plant
distribution PD59 Asset Power
distribution Remote monitoring interfaces (plant
Remote monitoring interfaces (plant

 | tt) Heat wave Cumulative
tt) Heat wave Cumulative
tt) Flooding Direct
tt) Lightning Direct
tt) Lightning Indirect

 | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | Electridication
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 | minor Medium
noderate High
noderate Low
High
 | 2/minor 4/modera 6/moderate 6/modera 2/minor 4/modera 2/minor 4/modera

 | Current asset condition is known and generally capable of withstanding current range of
high temperatures Current typical flood levels are known and accounted for Unlikely but can have devastating effects More likely than a direct strike, but far easier to repair

 | 2/minor
4/moderate
2/minor
2/minor
 | 3/minor Low
s/moderate Medium
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3/minor Medium

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4/maderate 6/moderate
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2/minor 3/minor | Low Ass
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Medium Ass | suming current manufacturing techniques and materials
suming current drainage strategies persist
suming general increase in storm frequency and severity
suming general increase in storm frequency and severity | No Variation | winds, lightning Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high Risk to transport from high and low temperatures, high Image: Construct from high and low temperatures, high |

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distribution PD60 Asset Power
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 | nt) Heat wave Cumulative nt) Flooding Direct nt) Lightning Direct nt) Lightning Indirect pply Extreme hot
temperatures Direct

 | Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV Wales & Western Wales & Western Professional Head of Power Distribution HV/LV | Electridication
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 | /minor Medium
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 | Current asset condition is known and generally capable of withstanding current range of
high temperatures Current typical flood levels are known and accounted for Unlikely but can have devastating effects

 | 2/minor
4/moderate
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 | 2/minor 3/minor
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 | It) Heat wave Cumulative It) Hooding Direct It) Lightning Direct It) Lightning Indirect uply Extreme hot
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 | Current asset condition is known and generally capable of withstanding current range of
high temperatures Current typical flood levels are known and accounted for
Unlikely but can have devastating effects More likely that a direct strike, but far easier to repair
Current asset condition is known and generally capable of withstanding current range of
high temperatures Asset is generally capable of withstanding current range of temperatures

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winds, lightningImage: services from hiver, surface water and
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groundwater floodingRisk to transport from high and low temperatures, high
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PD85 Asset	Power distribution Cable: signalling	g cable >120V Lig	htning Indirect	Wales & Western Wal	es & Western Professional Head of Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	This is a risk across the country	4/moderate Hig	h <mark>6/moderate</mark> Hig	igh <mark>4/moder</mark>	erate 6/moderate	More likely than a direct strike, but far easier to repair	4/moderate 6/m	oderate Medium	m 4/moderate	6/moderate	Medium Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD86 Asset	Power Lighting support	t structure Ice	/Hail Direct	Wales & Western Wal	es & Western Professional Head of RAM Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medi	um <mark>4/moderate</mark> Med	dium 6/moder	erate 2/minor	Structures are designed to withstand current weather extremes	4/moderate 2/	ninor Low	4/moderate	2/minor	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD87 Asset	Power distribution	t structure Sno	ow/ice Direct	Wales & Western Wal	es & Western Professional Head of RAM Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medi	um 2/minor Med	dium 2/mino	nor 2/minor	Structures are designed to withstand current weather extremes	2/minor 1	ninor Low	2/minor	1/minor	Low Assuming current extreme lows persist	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD88 Asset	Power distribution Battery & charge	ger He	at wave Cumulative	Wales & Western Wal	es & Western Professional Head of RAM	rfleating Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas	6/moderate Medi	um 6/moderate Med	dium 4/moder	erate 8/moderate	Current controls mostly effective, further controls in development	8/moderate 10	major Medium	m 8/moderate	10/major	Medium Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high	
5500 August	Power	lar	rge diumal	Wales & Western Wal	Professional Head of RAM	Linked to trigger level for investment which is asset condition	wirele uie teinpersoure win de inglies					Structures are designed to withstand current weather extremes		oderate Low		4/moderate		No Variation	winds, lightning Risk to transport from high and low temperatures, high	
PD89 Asset	Lighting support	Ler	mperature range		Power Distribution HV/LV Electric	tication	where the temperature will be higher	2/minor Medi	um 2/minor Mea	dium 2/mino	nor 2/minor	structures are designed to withstand current weather extremes	2/minor 4/m	Low	2/minor	4/moderate	Low Assuming current manufacturing techniques and materials . We have low confidence in the risk rating but we have high confidence that the risk will		winds, lightning	
PD90 Asset	Power distribution	t structure Sur	ng hot, dry mmer Direct	Wales & Western Wal	es & Western Power Distribution HV/LV and RAM	cfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	2/minor Medi	um 2/minor Med	dium 2/mine	nor 4/moderate	Structures are designed to withstand current weather extremes	2/minor 4/m	oderate Low	2/minor	4/moderate	Low We have low continence in the risk rating but we have high continence that the risk will increase in the absence of action	No Variation	Risk to transport networks from slope and embankment Risk to transport from high and low temperatures, high failure	
PD91 Asset	Power distribution Lighting support	t structure	ng wet Direct	Wales & Western Wal	es & Western Professional Head of Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	3/minor Medi	um <mark>4/moderate</mark> Med	dium 4/moder	erate 4/moderate	Structures are designed to withstand current weather extremes	3/minor 6/m	oderate Low	3/minor	6/moderate	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD92 Asset	Power distribution	t structure He rai	in/cloudburst Direct	Wales & Western Wal	es & Western Professional Head of Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medi	um <mark>4/moderate</mark> Med	dium 4/moder	erate 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3,	ninor Low	2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD93 Asset	Power distribution	t structure Hig	gh soil moisture Direct	Wales & Western Wal	es & Western Professional Head of Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	2/minor Medi	um <mark>4/moderate</mark> Med	dium 4/moder	erate 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/	ninor Low	2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD94 Asset	Power distribution	t structure Low	w soil moisture Direct	Wales & Western Wal	Professional Head of Power Distribution HV/LV and RAM	cfication Linked to trigger level for investment which is asset condition	This is a risk across the country, particularly in areas where the asset is on earthworks	2/minor Medi	um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Structures are designed to withstand current weather extremes	2/minor 3/	minor Low	2/minor	3/minor	Low We have low confidence in the risk rating but we have high confidence that the risk will increase in the absence of action	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD95 Asset	Power distribution	t structure Flo	boding Direct	Wales & Western Wal	Drefercional Head of PAM	cfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the North West and areas where rainfall levels will be higher	4/moderate Medi	um <mark>6/moderate</mark> Med	dium 6/moder	erate 6/moderate	Current typical flood levels are known and accounted for	4/moderate 6/m	oderate Low	4/moderate	6/moderate	Low Assuming current drainage strategies persist	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PD96 Asset	Power Lighting support	t structure Erc	osion Direct	Wales & Western Wal	Professional Head of RAM			2/minor Medi	um 3/minor Med	dium 3/mino	nor 3/minor	Current asset condition known, mitigations generally effective	2/minor 3/	minor Low	2/minor	3/minor	We have low confidence in the risk rating but we have high confidence that the risk will	No Variation	Risks to infrastructure services from river, surface water and	
	Power				Professional Head of RAM	Induon											inturease in une ausence un action		groundwater flooding Risk to transport from high and low temperatures, high	
PD97 Asset	distribution	t structure Lig	htning Direct	Wales & Western Wal	Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	thunderstorms	2/minor Lov	v 4/moderate Lo	ow 2/mino	nor 4/moderate	Unlikely but can have devastating effects	2/minor 2,	ninor Low	2/minor	2/minor	Low Assuming general increase in storm frequency and severity	No Variation	winds, lightning	
PD98 Asset	Power distribution	t structure Lig	htning Indirect	Wales & Western Wal	es & Western Professional Head of Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	This is a risk across the country	2/minor Medi	um <mark>4/moderate</mark> Med	dium 2/mino	nor 4/moderate	More likely than a direct strike, but far easier to repair	2/minor 3/	ninor Low	2/minor	3/minor	Low Assuming general increase in storm frequency and severity	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PD99 Asset	Power distribution Battery & charge		rge diurnal mperature range	Wales & Western Wal	es & Western Professional Head of Power Distribution HV/LV Electric	cfication Linked to trigger level for investment which is asset condition	There is a risk across the country although the risk will be higher in the South East and areas where the temperature will be higher	4/moderate Medi	um <mark>4/moderate</mark> Med	dium 4/moder	erate 4/moderate	Current controls are mostly effective, new controls in development	4/moderate 6/m	oderate Low	4/moderate	6/moderate	Low Assuming current manufacturing techniques and materials	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PLT1-26 N/A	been referenced Plant - other assessment from	and climate change risks have d from a wider risk m this Asset Function. Risks not been included in this table		Wales & Western Wal	es & Western RAM Pl	lant												No Variation		
	as they refer to Road rail vehicle	not been included in this table non-asset related risks e, demountable machines,	ng wet		Professional Head of Plant		Selection of risk do not affect plant because they are either built to cope or the activity which					Selection of risk does not affect plant because they are either built to cope, or the activity					Plant fit for purpose and able to work in selected conditions if supported activity goes		Risks to infrastructure services from river, surface water and	
PLT27 Asset	Plant - other trailers, trolleys, rail wheels non- Road rail vehicle	s, attachments with 2 or more rail mobile plant e, demountable machines,	nter/spring Direct	Wales & Western Wal	es & Western & Asset Manager RAM Pl	lant N/A	they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit) Selection of risk do not affect plant because they are either built to cope or the activity which	be N/A N/A			A N/A	which they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit) Selection of risk does not affect plant because they are either built to cope, or the activity	N/A	N/A N/A		N/A	N/A ahead Plant fit for numose and able to work in selected conditions if supported artivity poes	No Variation	Risks to intrastructure services from river, surface water and groundwater flooding	
PLT28 Asset	Plant - other trailers, trolleys, rail wheels non-	e, demountable machines, Hig		Wales & Western Wal	a Asset Manager	lant N/A	they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit) Selection of risk do not affect plant because they are either built to cope or the activity which		,,	I/A N/A		which they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit) Selection of risk does not affect plant because they are either built to cope, or the activity	N/A	N/A N/A	N/A	N/A	N/A Plant fit for purpose and able to work in selected conditions if supported activity goes ahead N/A Plant fit for purpose and able to work in selected conditions if supported activity goes	No Variation		
PLT29 Asset	Plant - other trailers, trolleys, rail wheels non-	s, attachments with 2 or more rai	infall over Direct veral days	Wales & Western Wal	& Asset Manager	lant N/A	Selection of risk to mota alreck plant because they are entire built to cope or the activity which they support would be cancelled independent of plant fitness for purpose (plant assumed to b fit) Selection of risk do not affect plant because they are either built to cope or the activity which	e N/A N/	A N/A N/	I/A N/A		Selection of his does not allect plant because they are either built to cope, or the activity which they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit) Selection of risk does not affect plant because they are either built to cope, or the activity	N/A	N/A N/A	N/A	N/A	N/A Plant fit for purpose and able to work in selected conditions if supported activity goes ahead	No Variation	Risks to Infrastructure services from river, surface water and groundwater flooding	
PLT30 Asset	Plant - other trailers, trolleys, rail wheels non-	s, attachments with 2 or more rail -rail mobile plant sea	infall over Direct ason	Wales & Western Wal	& Asset Midflager	lant N/A	Selection of risk do not affect plant because they are either built to cope or the activity which they support would be cancelled independent of plant fitness for purpose (plant assumed to b fit) Selection of risk do not affect plant because they are either built to cope or the activity which		A. N/A N/	I/A N/A		Selection of risk does not affect plant because they are either built to cope, or the activity which they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit) Selection of risk does not affect plant because they are either built to cope, or the activity	N/A	N/A N/A	N/A	N/A	N/A Plant fit for purpose and able to work in selected conditions if supported activity goes ahead	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
PLT31 Asset	Plant - other trailers, trolleys, rail wheels non-	s, attachments with 2 or more rail -rail mobile plant	w average Infall Direct	Wales & Western Wal	es & Western RAM Pi & Asset Manager RAM Pi	lant N/A	they support would be cancelled independent of plant fitness for purpose (plant assumed to b fit)	e N/A N/	A N/A N/	I/A N/A	A N/A	which they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit)		N/A N/A	N/A	N/A	N/A Plant fit for purpose and able to work in selected conditions if supported activity goes ahead	No Variation		
PLT32 Asset	Plant - other trailers, trolleys, rail wheels non-	-rail mobile plant	w soil moisture Indirect	Wales & Western Wal	es & Western & Professional Head of Plant & Asset Manager	lant N/A	Selection of risk do not affect plant because they are either built to cope or the activity which they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit)	e N/A N/A	A N/A N/	I/A N/A	A N/A	Selection of risk does not affect plant because they are either built to cope, or the activity which they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit)	N/A	N/A N/A	N/A	N/A	N/A Plant fit for purpose and able to work in selected conditions if supported activity goes ahead	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PLT33 Asset	Plant - other trailers, trolleys,	e, demountable machines, s, attachments with 2 or more Erc -rail mobile plant	osion Indirect	Wales & Western Wal	es & Western RAM PI & Asset Manager	lant N/A	Selection of risk do not affect plant because they are either built to cope or the activity which they support would be cancelled independent of plant fitness for purpose (plant assumed to b fit) - Hazard is specifically mentioned in clause 1.5.6 Fire of Machinery Directive 2006/42/EC	ne N/A N/	A N/A N/	i/A N/A	A N/A	Selection of risk does not affect plant because they are either built to cope, or the activity which they support would be cancelled independent of plant fitness for purpose (plant assumed to be fit)		N/A N/A	N/A	N/A	N/A Plant fit for purpose and able to work in selected conditions if supported activity goes ahead	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
							 - Hazard is specifically mentioned in clause 1.5.b He of Machinery Unrective 2006/42/EC - Clause 5.30 Fire prevention in RIS-IS30-PLT issue 6 - Rail Industry Standard for Technical Requirements for On-Track Plant and their associated Equipment and Trolleys - Hazard is not covered in BS EN ISO 474-1-2006+A6-2019. Earth moving machinery 													
PLT34 Asset	On-track - plant & mobile plant railers, trolleys, rail wheels non-	e, demountable machines, s, attachments with 2 or more -rail mobile plant	treme hot mperatures Direct	Wales & Western Wal	es & Western Rofessional Head of Plant & Asset Manager	Engine overheat limit specific to engine type; fire prevention requirements set in standard	(1) BS EN 15746-2:2010+A1:2011 - Nailway applications - Track - Koad rail machines and their associated equipment - Part 2: General Safety requirements	2/minor Medi	um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Hazard is specifically covered in standards	2/minor 2/	ninor Medium	m 2/minor	2/minor	Medium Track more likely to be affected before machine breakdown occurs	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
							 (2) BS EN 15954-22013 - Railway applications - Track - Trailers and associated equipment. General safety requirements (3) BS EN 15955-2:2013 - Railway applications. Tracks Demountable machines and associated equipment. General safety requirements 													
							- Hazard is specifically mentioned in clause 1.5.6 Fire of Machinery Directive 2006/42/EC - Clause 5.30 Fire prevention in RIS-1530-PLT issue 6 - Rail Industry Standard for Technical Requirements for On-Track Plant and their associated Equipment and Trolleys													
PLT35 Asset	On-track - plant & mobile plant rail wheels non-	e, demountable machines, s, attachments with 2 or more He -rail mobile plant	at wave Direct	Wales & Western Wal	es & Western & Asset Manager	Engine overheat limit specific to engine type; fire prevention requirements set in standard	- Hazard is not covered in BS EN ISO 474-1-2006+A6-2019. Earth moving machinery - Fire prevention specifically covered in: (1) BS EN 15745-2:2010+A1:2011 - Railway applications - Track - Road rail machines and their associated equipment - Part 2: General Safety requirements	2/minor Medi	um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Hazard is specifically covered in standards	2/minor 2/	ninor Medium	m 2/minor	2/minor	Medium Track more likely to be affected before machine breakdown occurs	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
							 [2] BS EN 15954-2:2013 - Railway applications - Track - Trailers and associated equipment. General safety requirements [3] BS EN 15955-2:2013 - Railway applications. Tracks 													
							Demountable machines and associated equipment. General safety requirements - Hazard is specifically mentioned in clause 1.5.6 Fire of Machinery Directive 2006/42/EC - Clause 5.30 Fire prevention in RIS-1530-PLT issue 6 - Rail Industry Standard for Technical Requirements for On-Track Plant and their associated Equipment and Trolleys.													
PLT36 Asset	On-track - plant & mobile plant	e, demountable machines, s, attachments with 2 or more -rail mobile plant	gher average mperature	Wales & Western Wal	es & Western & Professional Head of Plant & Asset Manager	Engine overheat limit specific to engine type; fire prevention requirements set in standard	Hazard is not covered in BS EN ISO 474-1-2006+A6-2019. Earth moving machinery. Fire prevention specifically covered in: [1] BS EN 15746-2:2010+A1:2011 - Railway applications - Track - Road rail machines and their	2/minor Medi	um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Hazard is specifically covered in standards	2/minor 2/	ninor Medium	m 2/minor	2/minor	Medium Track more likely to be affected before machine breakdown occurs	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
	rail wheels non-	-rail mobile plant	npenduce		a react manager		associated equipment - Part 2: General Safety requirements. (2) BS EN 15954-22013 - Railway applications - Track - Trailers and associated equipment. General safety requirements. (3) BS EN 15955-22013 - Railway applications. Tracks. Demountable machines and associated												annes desented	
							equipment. General safety requirements - Hazard is specifically mentioned in clause 1.5.6 Fire of Machinery Directive 2006/42/EC - Clause 5.30 Fire prevention in RIS-1530-PLT issue 6 - Rail Industry Standard for Technical													
PLT37 Asset	On-track - plant Road rail vehicle	e, demountable machines,	ng hot, dry Direct	Wales & Western Wal	es & Western & Professional Head of Plant & Asset Manager	Engine overheat limit specific to engine type; fire prevention	Requirements for On-Track Plant and their associated Equipment and Trolleys. - Hazard is not covered in BS EN ISO 474-1-2006+A6-2019. Earth moving machinery. - Fire prevention specifically covered in: (1) BS EN 15746-2-2010-A1-2011 - Railway applications - Track - Road rail machines and their	2/minor Medi	um 2/minor Med	dium 2/mino	nor 4/moderate	Hazard is specifically covered in standards	2/minor 2/	pinor Medium	n 2/minor	2/minor	Medium Track more likely to be affected before machine breakdown occurs	No Variation	Risk to transport from high and low temperatures, high	
	& mobile plant rail wheels non-	e, demountable machines, s, attachments with 2 or more -rail mobile plant	mmer		& Asset Manager	requirements set in standard	associated equipment - Part 2: General Safety requirements. (2) BS EN 15954-2:2013 - Railway applications - Track - Trailers and associated equipment. General safety requirements.												winds, lightning	
							(3) BS EN 15955-2:2013 - Railway applications. Tracks. Demountable machines and associated equipment. General safety requirements										 Plant Asset Manager monitors component failure trends and increase in volume of consumables 			
PLT38 Asset	On-track - plant & mobile plant rail wheels non-	e, demountable machines, s, attachments with 2 or more -rail mobile plant	treme hot Direct Direct	Wales & Western Wal	es & Western & Asset Manager	None	Decision threshold criteria does not apply, diurnal temperature range is already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes	2/minor Medi	um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Operational & Storage thermal duty cycle already forms part of specification writing process	2/minor 2/	minor Medium	m 2/minor	2/minor	Medium Medium (3) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire rate (3) Plant Assett Manager and Supplier has set up availability, reliability and early warning indicators (Min	NO Variation	Risk to transport from high and low temperatures, high winds, lightning	
		e, demountable machines,		W-l 0	Professional Head of Plant	Non	Decision threshold criteria does not apply, diurnal temperature range is already considered as	2/-1-2		dum .		Operational & Storage thermal duty cycle already forms part of specification writing process	3/01-02	ning		264	Indicator KPIs (1) Plant Asset Manager monitors component failure trends and increase in volume of consumables (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire Modulum	No Variation	Risk to transport from high and low temperatures, high	
PLT39 Asset	& mobile plant railers, trolleys, rail wheels non-	s, attachments with 2 or more He -rail mobile plant	at wave Direct	Wales & Western Wal	es & Western & Asset Manager	None	part of the design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes	2/minor Medi	um 2/minor Med	dium 2/mino	nor 4/moderate	process	2/minor 2/	minor Medium	m 2/minor	2/minor	weauum rate (3) Plant Asset Manager and Supplier has set up availability, reliability and early warnin indicator KPIs	NO Variation	No. Lu La laplat i don mgi ana low temperatures, mgi winda, lightning	
PLT40 Asset	On-track - plant & mobile plant	e, demountable machines, s, attachments with 2 or more ter -rail mobile plant	gher average mperature	Wales & Western Wal	es & Western & Professional Head of Plant & Asset Manager	None	Decision threshold criteria does not apply, diurnal temperature range is already considered as part of the design, A larger range will simply shorten plant asset lfespan and require more for our or the construction of the more more that the device the second	2/minor Medi	um <mark>2/minor</mark> Med	dium 2/mine	nor 4/moderate	Operational & Storage thermal duty cycle already forms part of specification writing process	2/minor 2/	ninor Medium	m 2/minor	2/minor	 Plant Asset Manager monitors component failure trends and increase in volume of consumables Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire rate 	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
							frequent replacement unless asset management strategy changes										(3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs (1) Plant Asset Manager monitors component failure trends and increase in volume of			
PLT41 Asset	On-track - plant & mobile plant rail wheels non-	e, demountable machines, s, attachments with 2 or more -rail mobile plant	ng hot, dry mmer Direct	Wales & Western Wal	es & Western & Professional Head of Plant & Asset Manager	None	Decision threshold criteria does not apply, diurnal temperature range is already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes	2/minor Medi	um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Operational & Storage thermal duty cycle already forms part of specification writing process	2/minor 2/	ninor Medium	m 2/minor	2/minor	consumables (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire rate (3) Plant Asset Manager and Supplier has set up availability, reliability and early warning	No variation	Risk to transport from high and low temperatures, high winds, lightning	
							Decision threshold criteria does not apply, diurnal temperature range is already considered as										indicator KPIs (1) Plant Asset Manager monitors component failure trends and increase in volume of consumables			
PLT42 Asset	& mobile plant rail wheels non-	e, demountable machines, s, attachments with 2 or more -rail mobile plant	nge diurnal mperature range	Wales & Western Wal	es & Western & Asset Manager	None	per continues into a construction of the set of the payr, unait temper state it ongets an attempt considered as part of the design, A larger range will simply shorten plant asset if the pan and require more frequent replacement unless asset management strategy changes	2/minor Medi	um 2/minor Med	dium 2/mino	nor 2/minor	Operational & Storage thermal duty cycle already forms part of specification writing process	2/minor 2/	ninor Medium	m 2/minor	2/minor	Medium (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire rate (3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs	NO VALIACIÓN	Risk to transport from high and low temperatures, high winds, lightning	
							Hazard is specifically mentioned in clause 1.5.16 Lightning of Machinery Directive 2006/42/E Hazard is not covered in BS EN ISO 474-1-2006+A6-2019. Earth moving machinery. Hazard not covered in:	EC												
PLT43 Asset	On-track - plant k mobile plant trailers, trolleys,	e, demountable machines, s, attachments with 2 or more Lig -rail mobile plant	htning Direct	Wales & Western Wal	es & Western & Professional Head of Plant & Asset Manager	Lightning warning	 BS EN 15746-2:2010+A1:2011 - Railway applications - Track - Road rail machines and their associated equipment - Part 2: General Safety requirements BS EN 15954-2:013 - Railway applications - Track - Trailers and associated equipment. 		um <mark>4/moderate</mark> Med	dium 3/mino	nor 4/moderate	Reliance on plant converter/ manufacturer and supplier to have devised an engineering means to address lightning	3/minor 3,	ninor Low	3/minor	3/minor	(1)The frequency of this risk changes based on regions and season (2) Network Ral Shift planning process includes consideration of extreme weather condition. Therefore mobile plant is unlikely to be working because safety concern for operators should lead to shift cancellation		Risk to transport from high and low temperatures, high winds, lightning	
	rail wheels non-	-rail mobile plant					General safety requirements. (3) BS EN 15955-2:2013 - Railway applications. Tracks Demountable machines and associated equipment. General safety requirements (4) BS EN 13977-2011 - Railway applications. Track. Safety requirements for portable machine:										(3) If discovered and deemed practical, means of making plant lightning proof will lead amendment of NR shift planning process	0		
							and trolleys for construction and maintenance Hazard is specifically covered for MEWPs in BS EN 280: 2013+A1:2015 (Mobile Elevated workin	ng				There is an existing stablished process for avoiding this scenario also used for shift								
PLT44 Asset	On-track - plant & mobile plant railers, trolleys, rail wheels non-	e, demountable machines, s, attachments with 2 or more Hig -rail mobile plant	gh winds Direct	Wales & Western Wal	es & Western Professional Head of Plant and RAM	Wind speed	platforms, design calculations. stability criteria. construction. safety. examinations and tests). 28mph (12.5m/s) - BS 7121[Code of practice for safe use of cranes] Manbaskets windspeed exceeding 25mph (11.5m/s)	Almodorate Mod	um <mark>6/moderate</mark> Med	dium 6/moder	erate 2/minor	planning. Increase chance of implementation because of broader coverage of procedure Mobile or On-Track Plant MEWPs normally work alone and are more susceptible to wind loading unlike OTMs which are normally permanently couple to other non-MEWP in	4/moderate 4/m	oderate Medium	m 4/moderate	4/moderate	Medium Medium Medium Int the sustainability programmes Modest wind speed increase does not require increase in current working wind speed limit	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
PLT45 Asset	On-track - plant k mobile place	e, demountable machines, s, attachments with 2 or more Sto -rail mobile plant	orms (them on us)	ncy Wales & Western Wal	es & Western & Professional Head of Plant & Asset Manager	Storm warning	Mobile Cranes normally 31mph (13.5m/s) - Duty charts should specify from each manufacture On track plant can work in storms but may not be able to because of risk of railway furniture		um <mark>4/moderate</mark> Med	dium 4/moder		working mode There is an existing stabilished process for avoiding this scenario also used for shift aboving increase chance of implementation because of broader coverage of procedure	2/minor 2/	minor Medium	m 2/minor	2/minor	Network Rail procedure adhered to and improved as part of overall climate change and Medium sustainability programmes	No Variation	Risks to infrastructure services from river, surface water and Risk to transport from high and low temperatures, high encodestate flootine which internation	
	Tampers & regu train, stone blo	ulators, mobile maintenance owers, rail grinders, overhead					striking the workforce(a track issue). It is especially unsafe when lifting or transporting assets - Hazard is specifically mentioned in clause 15.6 Fire of Machinery Directive 2006/42/EC - Hazard is not covered in RIS-1702-PLT issue 2 (Rail Industry Standard for the Design of On-					planning. Increase chance of implementation because of broader coverage of procedure					Track WRCCA has addressed the risk of storms		groundwater flooding winds, lightning	
PLT46 Asset	On-track - condition renew machines - all cranes, high out	wal fleet, HOPS, breakdown tput fleet, snow fleet, rail t train, snow & ice treatment	treme hot Direct Direct	Wales & Western Wal	es & Western & Asset Manager	Engine overheat limit specific to engine type; fire prevention requirements set in standard	 Hazard is not covered in RIS-1702.PLT Issue 2 (Pail Industry Standard for the Design of On- Track Machines in Travelling and Working Mode.) but is covered in referenced BS EN 14033 -2. 2017 (Railway application - Track - Railbound construction and maintenance machine Part 2.) Hazard is not covered in BS EN ISO 474-1-2006+A6-2019. Earth moving machinery 		um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Hazard is specifically covered in standards	2/minor 2/	ninor Medium	m 2/minor	2/minor	Medium Based on current machine designs that are international, machinery is assumed to cope with the projected changes in UK.	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
	train, stone blo	ulators, mobile maintenance owers, rail grinders, overhead					Hazard is specifically mentioned in clause 1.5.6 Fire of Machinery Directive 2006/42/EC Hazard is not covered in PIS-1702.01 T Issue 2 (Bail Industry Standard for the Design of On-													
PLT47 Asset	On-track - condition renew machines - all cranes, high out	wal fleet, HOPS, breakdown	at wave Direct	Wales & Western Wal	es & Western & Asset Manager	Engine overheat limit specific to engine type; fire prevention requirements set in standard	Hazard is not covered in RIS-1702-PLT Issue 2 (Pail Industry Standard for the Design of On- Track Machines in Travelling and Working Mode.) but is covered in referenced BS EN 14033 -2- 2017 (Railway application - Track - Railbound construction and maintenance machine Par 2.) Hazard is not covered in BS EN ISO 474-1-2006+A6-2019. Earth moving machinery		um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Hazard is specifically covered in standards	2/minor 2,	ninor Medium	m 2/minor	2/minor	Medium Based on current machine designs that are international, machinery is assumed to cope with the projected changes in UK.	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
	train, stone blo	ulators, mobile maintenance owers, rail grinders, overhead					Hazard is specifically mentioned in clause 1.5.6 Fire of Machinery Directive 2006/42/EC													
PLT48 Asset	On-track - condition renew machines - all cranes, high out	wal fleet, HOPS, breakdown tput fleet, snow fleet, rail t train, snow & ice treatment	ng hot, dry mmer Direct	Wales & Western Wal	es & Western & Asset Manager	Engine overheat limit specific to engine type; fire prevention requirements set in standard	- Hazard is not covered in RIS-1702.PT I ssue 2 (Rail Industry Standard for the Design of On- Track Machines in Travelling and Working Mode.) but is covered in referenced BS EN 14033 -2. 2017 (Railway application - Track - Railbound construction and maintenance machine Prat 2.) - Hazard is not covered in BS EN ISO 474-1-2006+A6-2019. Earth moving machinery		um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Hazard is specifically covered in standards	2/minor 2/	ninor Medium	m 2/minor	2/minor	Medium Based on current machine designs that are international, machinery is assumed to cope with the projected changes in UK.	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
	train, stone blo	ulators, mobile maintenance owers, rail grinders, overhead					Hazard is specifically mentioned in clause 1.5.6 Fire of Machinery Directive 2006/42/EC Hazard is not counted in Bit 1202 Bit Locus 2 Bit Inductor Standard for the Decise of On													
PLT49 Asset	On-track - condition renew machines - all cranes, high out	wal fleet, HOPS, breakdown tput fleet, snow fleet, rail t train, snow & ice treatment	gher average mperature Direct	Wales & Western Wal	es & Western & Asset Manager	Engine overheat limit specific to engine type; fire prevention requirements set in standard	 Hazard is not covered in RIS-1702-PLT Issue 2 (Rail Industry Standard for the Design of On- Track Machines in Travelling and Working Mode.) but is covered in referenced BS EN 14033-2- 2017 (Railway application - Track - Railbound inconstruction and maintenance machine Part 2.) Hazard Is not covered in BS EN ISO 474-1-2006+46-2019. Earth moving machinery 		um <mark>2/minor</mark> Med	dium 2/mino	nor 4/moderate	Hazard is specifically covered in standards	2/minor 2/	ninor Medium	m 2/minor	2/minor	Medium Based on current machine designs that are international, machinery is assumed to cope with the projected changes in UK.	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
	train					I														

Tampers & regulators, mobile maintenance train, stone blowers, rail grinders, overhead	head											Network Ball procedure adhered to and improved as part of overall climate change and		
On-track - condition renewal fleet, HOPS, breakdown machines - all cranes, high output fleet, snow fleet, rail head treatment train, snow & ice treatment train	wn Storms Interdependence (them on us)		Storm Warning	On-track machinery can not work in storms because of risk of railway furniture striking the workforce. It is especially unsafe when lifting or transporting assets	1/minor Medium	4/moderate Medium	4/moderate 4/mode	derate There is an existing stablished process for avoiding this scenario also used for shift planning. Increase chance of implementation because of broader coverage of procedure	1/minor 1	/minor Medium	1/minor 1/minor	Network Rail procedure adhered to and improved as part of overall climate change and Medium sustainability programmes Track WRCCA has addressed the risk of storms	Variation Risks to infrastructure services from river, surface water and Risk to transport from high and lo groundwater flooding	temperatures, high
train Tampers & regulators, mobile maintenance train, stone blowers, rail grinders, overhead	head			Hazard is specifically mentioned in clause 1.5.16 Lightning of Machinery Directive 2006/42/EC Hazard is oper coursed in 85 FW IG0 473.1.2006/48,2008. Sorth movine prochame.				- 1				(1)The frequency of this risk changes based on regions and season (2) Network Rail Shift planning process includes consideration of extreme weather		
On-track - condition renewal fleet, HOPS, breakdown machines - all craes, high output fleet, snow fleet, rail head treatment train, snow & ice treatment	wn Lightning Direct	Wales & Western Wales & Western & Professional Head of Plant & Asset Manager	Lightning warning	- Hazard is not covered in BIS-IN ISO 474-1-2006-K6-2019. Earth moving machinery - Hazard not covered in RIS-1702-PLT Issue 2(Rail Industry Standard for the Design of On-Track Machines in Travelling and Working Mode). or referenced BIS EN 14033-2-2017 - Railway	3/minor Low	4/moderate Low	3/minor 4/mod	derate Reliance on plant converter/manufacturer and supplier to have devised an engineering means to address lightning	3/minor 3/	/minor Low	3/minor 3/minor	Low condition. Therefore mobile plant is unlikely to be working because safety concern for operators should lead to shift cancellation (3) If discovered and deemed practical, means of making plant lightening proof will lead	Variation Risk to transport from high and low temperatures, high winds, lightning	
train On-track -		Performant land of Track		application - Track - Railbound construction and maintenance machine Part 2	<u> </u>	—		the second standard standard standard for shift planning		<mark></mark> '		to amendment of NR shift planning process Network Rail procedure adhered to and improved as part of overall climate change and		
machines - Stone blowers track treatment	Flooding Interdependence (them on us)	ency Wales & Western Wales & Western & Region	Flood Warning	Not a machine specific hazard	1/minor Medium	4/moderate Medium	4/moderate 4/mode	derate There is an established process for avoiding this scenario also used for shift planning. Increase chance of implementation because of broader coverage of procedure	2/minor 2/	/minor Medium	2/minor 2/minor		Variation Risks to infrastructure services from river, surface water and groundwater flooding	
On-track - machines - Rail grinders track treatment	Extreme hot Interdependence temperatures (us on them)		None	Risk of ignition depends on state of vegetation and level of pollution on the infrastructure within the vicinity of grind spark generated	2/minor Medium	Medium	2/minor 4/mod	This is an existing risk and mitigation has proven to be adequate. Creation of hot by product is inherent to this process and the grinder fleet are all already heavily guarded to prevent sparks igniting lineside vegetation and assets	2/minor 2/	/minor Medium	2/minor 2/minor	Network Rail procedure adhered to and improved as part of overall climate change and sustainability programmes Plant Asset Manager keeps fire suppression system fit for purpose	Risk to transport from high and low temperatures, high winds, lightning	
On-track - machines - Rail grinders	Heat wave (us on them)		None	Bisk of ignition depends on state of vegetation and level of pollution on the infrastructure within a track execution.	2/minor Medium	Medium	2/minor 4/mode	This is an existing risk and mitigation has proven to be adequate. Creation of hot by product is inherent to this process and the grinder fleet are all already derate book an added to concert contribution like like interactions and scretc	2/minor	/minor Medium	2/minor 2/minor	Network Rail procedure adhered to and improved as part of overall climate change and Medium sustainability programmes No	Variation Risk to transport from high and low temperatures, high	
niachines - Kaligrinders track treatment On-track -	(us on them)	Asset Operator	Nurre	the vicinity of grind spark generated				heavily guarded to prevent sparks igniting lineside vegetation and assets This is an existing risk and mitigation has proven to be adequate.	2/111101 2/		2) theory	weeduum sassainauunity programmes weeduum plant Asset weeduum w	variation winds, lightning	
On-track - machines - Rail grinders track treatment	Long hot, dry Interdependenc summer (us on them)		None	Risk of ignition depends on state of vegetation and level of pollution on the infrastructure within the vicinity of grind spark generated	2/minor Medium	Medium	2/minor 4/mode	derate Creation of hot by product is inherent to this process and the grinder fleet are all already heavily guarded to prevent sparks igniting lineside vegetation and assets	2/minor 2/	/minor Medium	2/minor 2/minor	Network Rail procedure adhered to and improved as part of overall climate change and Sustainability programmes Plant Asset Manager keeps fire suppression system fit for purpose	Variation Risk to transport from high and low temperatures, high winds, lightning	
On-track - machines - Rail grinders track treatment	Higher average Interdependenc temperature (us on them)		None	Risk of ignition depends on state of vegetation and level of pollution on the infrastructure within the vicinity of grind spark generated	2/minor Medium	Medium	2/minor 4/mode	This is an existing risk and mitigation has proven to be adequate. Creation of hot by product is inherent to this process and the grinder fleet are all already heavily guarded to prevent sparks igniting lineside vegetation and assets	2/minor 2	/minor Medium	2/minor 2/minor	Network Rail procedure adhered to and improved as part of overall climate change and sustainability programmes Medium Plant Asset Manager keeps fire suppression system fit for purpose	Risk to transport from high and low temperatures, high winds, lightning	
track treatment				Hazardi is specifically covered for MEWPs in BS EN 280: 2013+A1:2015 (Mobile Elevated working platforms, design calutations. stability oriteria. construction. safety. examinations and tests).				There is an existing stablished process for avoiding this scenario also used for shift				Plant Asset Manager keeps fire suppression system fit for purpose Network Rail procedure adhered to and improved as part of overall climate change and		
On-track - machines - Overhead Condition Renewal Fleet renewals	High winds Direct	Wales & Western Wales & Western and RAM	Wind speed	platforms, design calculations stability criteria. construction. safety. examinations and tests). 28mph [12.5m/s] - BS 7121[Code of practice for safe use of cranes] Manbaskets windspeed exceeding 25mph [11 Sm/s]	1/minor Medium	Medium	2/minor 1/min	planning. Increase chance of implementation because of broader coverage of procedure ninor OTMs are less susceptible to effects of wind because they are normally permanently coupled with another vehicle in working mode. This is unlike Mobile or On-Track Plant	1/minor 1/	/minor Medium	1/minor 1/minor	Medium Sustainability programmes Modest wind speed increase does not required increase in current working wind speed No 1	Risk to transport from high and low temperatures, high winds, lightning	
				(11.5m/s) - Mobile Cranes normally 31mph (13.5m/s) - Duty charts should specify from each manufacturer Usered is considerable sensed for MEMPL in B SEX 300, 2013; A1-2015 (Mobile Educated working				MEWPs which normally alone				limit unless specifically requested by NR frontline of Principal Contractors		
On-track - machines - HOPS	High winds Direct	Wales & Western Wales & Western and 6 MM	Wind speed	Hazard is specifically covered for MEWPs in BS EN 280: 2013-A12.1021 [Mobile Elevated working platforms, design calculations. stability criteria.construction.safety.examinations and tests]. 28mph (12.5m/s) -BS 71221(Code of practice for safe use of cranes) Manbaskets windspeed exceeding 25mph	1/minor Medium	Medium	2/minor 1/min	There is an existing stablished process for avoiding this scenario also used for shift planning. Increase chance of implementation because of broader coverage of procedure mor OTMs are less susceptible to effects of wind because they are normally permanently	1/minor 1/	/minor Medium	1/minor 1/minor	Network Rail procedure adhered to and improved as part of overall climate change and sustainability programmes:	Variation Risks to subterranean and surface infrastructure from	
renewals		and KAw		- B5 7121[Code of practice for safe use of cranes] Manbaskets windspeed exceeding 25mph (11.5m/s) - Mobile Cranes normally 31mph (13.5m/s) - Duty charts should specify from each manufacturer				coupled with another vehicle in working mode. This is unlike Mobile or On-Track Plant MEWPs which normally alone				Modest wind speed increase does not required increase in current working wind speed limit unless specifically requested by NR frontline of Principal Contractors	subsidence	
On-track -		Professional Hard of Plant		Hazard is specifically covered for MEWPs in B5 EN 280: 2013+A1:2015 (Mobile Elevated working platforms, design calculations, stability criteria, construction, safety, examinations and tests). 28moh (12 5 m/s)				There is an existing stablished process for avoiding this scenario also used for shift planning. Increase chance of implementation because of broader coverage of procedure				Network Rail procedure adhered to and improved as part of overall climate change and sustainability programmes.	And a second of first high had four transportinger high	
machines - seasonal & incident	High winds Direct	Wales & Western Wales & Western and RAM	Wind speed	28mph (12.5m/s) -B5 7121(Code of practice for safe use of cranes) Manbaskets windspeed exceeding 25mph (11.5m/s) - Mobile (cranes normality 31mph (13 cm/s), Duty charts should specify from each manufacture	1/minor Medium	Medium	2/minor 1/min	OTMs are less susceptible to effects of wind because they are normally permanently coupled with another vehicle in working mode. This is unlike Mobile or On-Track Plant MEWPs which normally alone	1/minor 1/	/minor Medium	1/minor 1/minor	Medium Sustainability programmes Modest wind speed increase does not required increase in current working wind speed limit unless specifically requested by NR frontline of Principal Contractors	Risk to transport from high and low temperatures, high winds, lightning	
On-track - machines - Segur floot	Direct	Water & Water & Water & Professional Head of Plant		- Mobile Cranes normally 31mph (13.5m/5) - Duty charts should specify from each manufacturer - Secure Elect hous a minimum and maximum working limit Birk is constrained			2/4	There is an established process for avoiding this scenario also used for shift planning.			Jiminar	Network Bail Shift planning process includes consideration of extreme weather condition.	Risk to transport from high and low temperatures, high	
seasonal & Snow fleet incident On-track -	Snow Direct	Wales & Western Wales & Western & Asset Manager	Predicted Snow fall rate	Snow Fleet have a minimum and maximum working limit. Risk is operational	2/minor Medium	Medium	4/moderate 2/mm	Inner en ant essentialited process for advocung uns sections also used for such pairining. Increase chance of implementation because of broader coverage of procedure	2/minor 2/	/minor Medium	2/minor 2/minor	tactically operated during times of heavy snowfall	Variation hosts to that point in the rate of the weight and the second s	
machines - machines - seasonal & incident	Snow/ice Indirect	Wales & Western Wales & Western & Asset Manager	Predicted Snow fall rate and ice formation	Snow Fleet have a minimum and maximum working limit. Risk is operational	2/minor Medium	Medium	2/minor 2/min	There is an established process for avoiding this scenario also used for shift planning. Increase chance of implementation because of broader coverage of procedure	2/minor 2/	/minor Medium	2/minor 2/minor	Network Rall Shift planning process includes consideration of extreme weather condition. Medium Therefore plan is likely to be working because fleet will be strategically distributed and No ⁺ tactically operated during times of heavy snowfall	Variation Risk to transport from high and low temperatures, high winds, lightning	
Plant -	R Extreme hot Direct	Wales & Western Wales & Western Professional Head of Plant	Engine overheat limit specific to engine type; fire prevention	- Hazard is specifically mentioned in clause 1.5.6 Fire of Machinery Directive 2006/42/EC - Hazard is not covered in RIs-T01P-LT Issue 2.7.8all Industry Standard for the Design of On- Track Machines in Tracelling and Working Mode	1/minor Medium	Medium	1/minor 2/m	ninor Hazard is specifically covered in legislation only	1/minor 1/	/minor Medium	1/minor 1/minor	Medium Mochine Operator stores plant equipment correctly and refuels engine driven equipment No	Variation Risk to transport from high and low temperatures, high	
ortable/transp ortable	temperatures	Wales & Western Wales & Western & Asset Manager	requirements set in standard	Hazard is not covered in BS EN 33977:2011 - Railway applications. Track. Safety requirements for portable machines and trolleys for construction and maintenance			170000	NOT Production is specificany coveries in registronic only	1/11	hilde	1/flenor	correctly	winds, lightning	
Plant - portable/transp rigs, track jacks	g Higher average Direct	Wales & Western Wales & Western & RAM Plant & RAM Plant	None	Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes. In addition these machines are not	1/minor Medium	Medium	1/minor 4/mor	Operational & storage thermail duty cycle already forms part of specification writing	1/minor		1/minor 1/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables. (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire rate rate. No	Variation Risk to transport from high and low temperatures, high winds liabtning	
ortable rigs, track jacks	temperature	di Abbeti miningeri		made only for the UK but also for countries with higher temperature such as Italy, North America and North Africa				process				 (3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs 	winds, lightning	
Plant - portable/transp rdtbl/e	^{1g} Heat wave Direct	Wales & Western Wales & Western & Accol Manager	None	Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset. If lespan and require more frequent replacement unless asset management strategy changes. In addition these machines are not	1/minor Medium	Medium	1/minor 2/m	Operational & storage thermal duty cycle already forms part of specification writing	1/minor 1/	/minor Medium	1/minor 1/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables. (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire Notice that the second seco	Variation Risk to transport from high and low temperatures, high	
ortable rigs, track jacks	Prost #1.1	wales & western wales & western & Asset Manager	PUero.	replacements unless assessment availagement availage (statiges, in available instanting) and made made made in the made only for the UL but also for countries with higher temperature such as Italy, North America and North Africa				process				(3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs	varietuuri winds, lightning	
Plant - portable/transp ortable rigs, track jacks	g Long hot, dry Direct	Wales & Western Wales & Western	Nona	Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes. In addition these machines are not	1/minor Medium	Medium	1/minor 4/mo	Operational & storage thermal duty cycle already forms part of specification writing	1/minor 1/	/minor Medium	1/minor 1/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables. (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire. No	Variation Risk to transport from high and low temperatures, high	
ortable rigs, track jacks	summer	wales & western wales & western & Asset Manager	PUero.	replacements unless assessment a usage of using the subscript of using the subscript of the				process				(3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs	varietuuri winds, lightning	
Plant - portable/transp clear track lack	ng Large diurnal Direct	Wales & Western Wales & Western	None	Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes. In addition these machines are not	1/minor Medium	Medium	1/minor 1/m	Operational & storage thermal duty cycle already forms part of specification writing	1/minor	minor Medium	1/minor 1/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables. (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire. No	Variation Risk to transport from high and low temperatures, high	
ortable ngs, track jacks	temperature range	wales & western wales & western & Asset Manager	NGrie	replacement, unless asset management statategy (nanges, in autonon more machines are not made only for the UL bit also for countries with higher temperature such as Italy, North America and North Africa	1/1000		-	process			2/10/00	rate (3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs	winds, lightning	
Anti-freeze systems, carriage washing machines, cranes, fuelling system, Jacks, turntables, bogle/wheel drop, underframe	me Extreme hot Direct	Wales & Western Wales & Western Professional Head of Plant	Non	Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes. In addition these machines are not	1/minor Medium	Medium	1/minor 2/m	Operational & storage thermal duty cycle already forms part of specification writing	1/minor	/minor Medium	1/minor 1/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables. (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire Medium (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire No	Variation Risk to transport from high and low temperatures, high	
 Plant - depot cleaning system, depot protection, interceptors, shore supplies, wheel lathe an shunter 	temperatures	Wales & Western Wales & Western & Asset Manager RAM Plant	None	replacement unless asset management strategy changes. In addition these machines are not made only for the UL but also for countries with higher temperature such as Italy, North America and North Africa	1/minor		1)mmor	process	1/111110	hinor Provincia	1/100	Medium rate [3] Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs	Variation winds, lightning	
Anti-freeze systems, carriage washing machines, cranes, fuelling system, Jacks, turntables, bogie/wheel drop, underframe		Wales & Western Wales & Western Professional Head of Plant RAM Plant	N	Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset. If lespan and require more frequent replacement unless asset management stratesy changes, In addition these machines are not the strategies of the stratesy changes. In addition these machines are not the stratesy changes.	1/minor Medium	Medium	1/minor 2/m	Operational & storage thermal duty cycle already forms part of specification writing	1 minutes	/minor Medium	1/minor 1/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire Medium	Variation Risk to transport from high and low temperatures, high	
Plant - depot cleaning system, depot protection, interceptors, shore supplies, wheel lathe an shunter	Heat wave Direct	Wales & Western Wales & Western & Asset Manager RAM Plant	None	replacement unless asset management strategy changes. In addition these machines are not a made only for the UK but also for countries with higher temperature such as italy. North America and North Africa	1/minor Meulum	INCOMP.	1/minor	process	1/minos	ninor Preuson	1/minor 1/sumos	Medium rate No (3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs	Variation winds, lightning	
Anti-freeze systems, carriage washing machines, cranes, fuelling system, jacks, turntables, bogie/wheel drop, underframe		Professional Head of Plant		Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent				Operational & storage thermal duty cycle already forms part of specification writing				1) Plant Asset Manager monitors component failure trends and increase in volume of consumables (2) Plant Supplier hires machine that is fit for purpose and reflects increased cost in hire Nedium	Risk to transport from high and low temperatures, high	
	temperature	Wales & Western Wales & Western & Asset Manager	None	replacement unless asset management strategy changes. In addition these machines are not made only for the UL but also for countries with higher temperature such as Italy. North America and North Africa	1/minor Medium	Medium	1/minor 4/mode	Prate process	1/minor ±/	/minor Medium	1/minor 1/minor	Medium rate (3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs	Variation visits, lightning	
Anti-freeze systems, carriage washing machines, cranes, fuelling system, jacks, turntables, bogie/wheel drop, underframe		Professional Head of Plant		Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent				Operational & storage thermal duty cycle already forms part of specification writing				(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables (2) Plant Sungliar birse machine that is fit for number and reflects increased cost in birse	Risk to transport from high and low temperatures, high	
Plant - depot cleaning system, depot protection, interceptors, shore supplies, wheel lathe an shunter	temperature range	Wales & Western Wales & Western & Asset Manager	None	replacement unless asset management strategy changes. In addition these machines are not made only for the UL but also for countries with higher temperature such as Italy, North America and North Africa	1/minor Medium	Medium	1/minor 1/min	process	1/minor 1/	/minor Medium	1/minor 1/minor	Medium (2) rains supplier mice machine that is in too purpose and relieves increased cost in mice No (3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPIs	Variation Rok to Languer trom right and row temperatures, right winds, lightning	
t Plant - depot Anti-freeze systems	Snow/ice Direct	Wales & Western Wales & Western & Asset Manager RAM Plant	Weather Warning	Hazard is not specifically mentioned in Machinery Directive 2006/42/EC 2	2/Minor Medium	Medium	2/Minor 2/Min	Reliance on plant converter/manufacturer and supplier to have devised an engineering means to address hazard	2/minor 1	/minor Medium	2/minor 2/minor	Medium Operational parameters enables effective operation and would therefore would be able No	Variation Risk to transport from high and low temperatures, high winds, lightning	
t Plant - depot Carriage washing machines	Snow/ice Direct	Wales & Western Wales & Western & Asset Manager RAM Plant	Min -20 degrees C	Hazard is not specifically mentioned in Machinery Directive 2006/42/EC Hazard is specifically covered in Section 4.7 Water Storage and supply of NR/L2/RVE/0130, Design and Installation of Carriace Washine Machines	1/Minor Medium	Medium	1/Minor 1/Min	Polizaro on plant conjunctor/manufacturor and cumplior to have deviced an engineering	1/minor 1/	/minor Medium	1/minor 1/minor	Medium That plant suppliers will provide machines that address the hazard No That incidences of snow/ice are projected to reduce No	Variation Risk to transport from high and low temperatures, high winds, lightning	
t Plant - depot Carriage washing machines	Lightning Direct	Wales & Western Wales & Western & Asset Manager RAM Plant	Weather Warning	Design and Installation of Carriage Washing Machines - Hazard is specifically mentioned in clause 1.5.16 Lightning of Machinery Directive 2006/42/EC	2/minor Medium	Medium	2/minor 4/mode	derate Reliance on plant converter/manufacturer and supplier to have devised an engineering means to address lightning	2/minor 2/	/minor Medium	2/minor 2/minor	Medium Carriage Washer adequately earthed No	Variation Risk to transport from high and low temperatures, high winds, lightning	
Plant - depot Winderframe cleaning system, shore supplies wheel lathes and shunters	plies; Flooding Interdependence (them on us)	ency Wales & Worters Wales & Worters Professional Head of Plant	Weather Warning	Building Integrity compromised	2/minor Medium	4/moderate Medium	4/moderate 4/mod	there is an established process for avoiding this scenario also used for shift planning. Increase chance of implementation because of broader coverage of procedure	4/moderate 4/m	noderate Medium	4/moderate 4/moderate	Medium That current process is able to cope with the projected changes in rainfall No	Variation Risks to infrastructure services from river, surface water and groundwater flooding	
t Plant - depot Gas storage	Lightning Direct	Wales & Western Wales & Western & Asset Manager RAM Plant	Weather Warning	- Hazard is specifically mentioned in clause 1.5.16 Lightning of Machinery Directive 2006/42/EC	3/minor Low	4/moderate Low	3/minor 4/mode	Polizero on plant conjunter (manufacturer and cupplier to have douined an engineering	3/minor 3/	/minor Low	3/minor 3/minor	Low Gas storage installed in facility which is lighting proof No	Variation Risk to transport from high and low temperatures, high winds, lightning	
t Plant - fixed Moving bridges	Lightning Direct	Wales & Western Wales & Western & Asset Manager RAM Plant	Weather Warning	Hazard is specifically mentioned in clause 1.5.16 Lightning of Machinery Directive 2006/42/EC	3/minor Low	4/moderate Low	3/minor 4/mode	Peliance on plant converter/manufacturer and supplier to have deviced an engineering	3/minor 3/	/minor Low	3/minor 3/minor	Low Gas storage installed in facility which is lighting proof No	Variation Risk to transport from high and low temperatures, high which, lightning	
t Plant - fixed Gas point Heaters, hydraulic buffers, moving	ovingDirect	Professional Head of Plant	and the althouse		Low Low	In Inv	3/1		3/minor 3/	Medium	3/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables. Medium (2) Protect Manager and Project Engineer program achieves that is fit for number	Variation Risk to transport from high and low temperatures, high	
t Plant - fixed bridge	^a Snow/ice Direct	Wales & Western Wales & Western & Asset Manager	Weather Warning	Hazard is not specifically mentioned in Machinery Directive 2006/42/EC	3/minor Low	2/minor Low	3/minor 3/min	Reliance on plant converter/manufacturer and supplier to have devised an engineering means to address hazard	3/minor 3/	/minor Medium	3/minor 3/minor	Medium (2) Project Manager and Project Engineer procure machine that is fit for purpose No (3) Plant Assat Manager and Supplier has set up availability, reliability and early warning indicator KPIs No No	Variation which the part is the set competitue of the part of the set of the	
et Plant - fixed Gas point Heaters, hydraulic buffers, moving bridge	ving Snow/ice Direct	Wales & Western Wales & Western & Professional Head of Plant RAM Plant	Weather Warning	Hazard is not specifically mentioned in Machinery Directive 2006/42/EC	3/minor Low	2/minor Low	3/minor 3/mi	Reliance on plant converter/manufacturer and supplier to have devised an engineering means to address hazard	3/minor 3/	/minor Medium	3/minor 3/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables. Medium (2) Project Manager and Project Engineer procure machine that is fit for purpose No	Variation Risk to transport from high and low temperatures, high winds, lightning	
				Decision threshold criteria does not apply, these factors are already considered as part of the						<mark></mark> '		(3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPis (1) Plant Asset Manager monitors component failure trends and increase in volume of		
et Plant - fixed Gas point heaters, gas storage, pumps, hydraulic buffers, tunnel ventilation fans, moving bridge		Wales & Western Wales & Western & Buildings/ Structural Asset Manager	Weather Warning	design, A larger range will simply shorten plant asset. If lespan and require more frequent replacement unless asset management strategy changes. In addition these machines are not made only for the UK but also for countries with higher temperature such as Tahy, North	1/minor Medium	1/minor Medium	1/minor 2/mir	Operational & storage thermal duty cycle already forms part of specification writing process	1/minor 1/	/minor Medium	1/minor 1/minor	consumables Medium (2) Project Manager and Project Engineer procure machine that is fit for purpose (3) Plant Asset Manager and Supplier has set up availability, reliability and early warning	Variation Risk to transport from high and low temperatures, high winds, lightning	
Gas point heaters, gas storage, pumps,		Professional Head of Plant		America and North Africa Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent				Operational & storage thermal duty cycle already forms part of specification writing				indicator KPIs (1) Plant Asset Manager monitors component failure trends and increase in volume of consumables.	Risk to transport from high and low temperatures, high	
et Plant - fixed hydraulic buffers, tunnel ventilation fans, moving bridge		Wales & Western Wales & Western & Buildings/ Structural RAM Plant Asset Manager	Weather Warning	replacement unless asset management strategy changes. In addition these machines are not made only for the UK but also for countries with higher temperature such as Italy, North America and North Africa	1/minor Medium	1/minor Medium	1/minor 2/min	for process	1/minor 1/	/minor Medium	1/minor 1/minor	Medium (2) Project Manager and Project Engineer procure machine that is fit for purpose No (3) Plant Asset Manager and Supplier has set up availability, reliability and early warring indicator KPIs	Variation Risk to transport from high and low temperatures, high winds, lightning	
Gas point heaters, gas storage, pumps, t Plant - fixed hydraulic buffers, tunnel ventilation fans,		Wales & Western Wales & Western & Buildings/ Structural RAM Plant	Weather Warning	Decision threshold criteria does not apply, these factors are already considered as part of the design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes. In addition these machines are not	1/minor Medium	1/minor Medium	1/minor 4/mor	derate Operational & storage thermail duty cycle already forms part of specification writing orocess	1/minor 1/	/minor Medium	1/minor 1/minor	(1) Plant Asset Manager monitors component failure trends and increase in volume of consumables. Medium (2) Project Manager and Project Engineer procure machine that is fit for purpose No	Risk to transport from high and low temperatures, high winds, lightning	
moving bridge	temperature	Asset Manager		made only for the UK but also for countries with higher temperature such as italy. North America and North Africa Decision threshold citreria does not apply, these factors are already considered as part of the	<u> </u>			process		<mark></mark> '		(3) Plant Asset Manager and Supplier has set up availability, reliability and early warning indicator KPis (1) Plant Asset Manager monitors component failure trends and increase in volume of	winch alburung	
Gas point heaters, gas storage, pumps, Plant - fixed hydraulic buffers, tunnel ventilation fans, moving bridge		Wales & Western Wales & Western & Buildings/ Structural ASSet Manager	Weather Warning	design, A larger range will simply shorten plant asset lifespan and require more frequent replacement unless asset management strategy changes. In additon these machines are not made only for the UK ut also for countries with higher temperature such as tably. North	1/minor Medium	2/minor Medium	1/minor 1/mi	Operational & storage thermal duty cycle already forms part of specification writing process	1/minor 1/	/minor Medium	1/minor 1/minor	consumables. [2] Project Manager and Project Engineer procure machine that is fit for purpose No [3] Plant Asset Manager and Supplier has set up availability, reliability and early warning	Variation Risk to transport from high and low temperatures, high winds, lightning	
Signalling Interlocking	Extreme hot temperatures	Professional Head of	ng Life expired interlocking or component failure	America and North Africa Equipment located in passive location cases at risk of overheating, particularly where sun hats	6/moderate Medium	2/minor Medium	4/moderate 8/mor	derate Historic evidence has shown SSI and PSU failures are higher during hot days	6/moderate	N/A Medium	6/moderate N/A	Indicator KPIs	Variation Risk to transport from high and low temperatures, high whole linthroise	
	Lightolog Direct	Signalling and KAM		are not used and orientation gives the worst solar gain Signals should fail right side however LED signals are more susceptible to failure wrong side if hit				Random failure and somewhat infrequent. LED signals more prone to failure Previous signal and route knowledge mitigate against a major event. If a signal is put			N/A	Assuming NR follow the current long term deployment plan.	winds, lightning Risk to transport from high and low temperatures, high	
t Signalling Signals	Lightning Direct	Wales & Western Wales & Western Signalling and RAM RAM Signalling	ng Life expired or product failure	by lightning	2/minor Medium	4/moderate Medium	2/minor 4/mou	derate hektors signa and rubus knownege inligate spanis in rapid Venis. In a spin so pur back to danger (out of sequence signal) then there is potential for a major event however extremely unlikely (incredible) Aging signal posts are difficult to assess and predict how much life remains. Potential	4/moderate	N/A Medium	4/moderate h/A	Medium problem. This assuming our SICA assessments pick up any degrading/degraded ground No ⁻ mounted units	winds, lightning	
Signalling Signals	High winds Direct	Signaling and RAW	ng Life expired or product failure	As the population ages the frequency of signal post failure increases 6/1	6/moderate Medium	1/minor Medium	8/moderate 4/mode	derate WSF exists if the signal falls over maintaining its proving (Driver misses a yellow and arrives at a red at line speed)	6/moderate	N/A Medium	6/moderate N/A		Variation Risk to transport from high and low temperatures, high winds, lightning	
Signalling Location case	Large diurnal temperature range	Wales & Western Wales & Western Signalling and RAM Signalling	ng Life expired or product failure	This phenomena is generally seen around Spring and Autumn 4/1	4/moderate Medium	1/minor Medium	4/moderate 4/mode	derate Some equipment housed within location case are not protected against dripping water. This is a bigger problem for enclosures with little heat dissipation inside	6/moderate 6/m	moderate Medium	6/moderate 6/moderate	e Medium Assuming NR follow the current long term deployment plan The environmental knowledge is not lost from the product acceptance teams No'	Risk to transport from high and low temperatures, high winds, lightning	
Signalling Location case	Low soil moisture Direct	Broforcional Haad of	ng Life expired or product failure	Equipment that was previously resilient may start to cause problems 4/ Equipment designed to BR 967 was designed for a maximum ambient of 60DegC. More modern				derate Dry soil = higher impedance resulting in less transients being dissipated to earth	6/moderate 6/m				Variation Rick to transport from high and low temperatures, high winds, lightning Rick to transport from high and low temperatures. high Rick to transport from high and low temperatures. high	
	Extreme hot temperatures	Signalling and PAN	ng Life expired or product failure	equipment is designed to 70DegC. We have datalogger information showing temperatures up to 9/1 73DegC already on particularly hot days Equipment designed to BR 957 was designed for a maximum ambient of 60DegC. More modern		1/minor High	4/moderate 10/m	This could be our biggest problem and something we already suffer significant delay minutes from	12/major 12	2/major High	12/major 12/major	High Location cases do not have any form of active/passive cooling No	Variation Risk to transport from high and low temperatures, high winds, lightning	
Signalling Location case	Heat wave Direct	Broforcional Head of	ng Life expired or product failure	equipment is designed to 70DegC. We have datalogger information showing temperatures up to 9/ 75DegC already on particularly hot days	9/moderate High			Equipment in use today is often being used at its limit on hot days	12/major 17	major High	12/major 12/major	High Location cases do not have any form of active/passive cooling No	Variation Risk to transport from high and low temperatures, high winds, lightning thisks to infrastructure services from river, surface water and	
Signalling Location case	Erosion Direct	Wates & Western Wates & Western Signalling Power Signalling Notes & Western Professional Head of PAM Signalling	ng Life expired or product failure	Ground movement often stretches cable leading to potential breakages 6/1 desraded cables can let in water leading to low impedance between coses and earth 6/6				Generally not a problem with new cable however rodent impact cable or UV effected				Assuming NR follow the current long term deployment plan we will have less cabling for	Variation groundwater flooding Variation Risks to infrastructure services from river, surface water and	
Signalling Location case Signalling Lineside signalling cable		Wales & Western Wales & Western Signalling and RAM RAM Signalling	ng Life expired or product failure	degraded cables can let in water leading to low impedance between cores and earth 6/1	6/moderate Medium			cable can give a problem	9/moderate 9/m	noderate Medium	9/moderate 9/moderate	Medium Medium Medium Medium Medium Risk scores and narrative based on 'no additional adaption' -long term plan is to replace	groundwater nooding	
Signalling Location case Signalling Uneside signalling cable Signalling Uneside signalling cable	Flooding Direct		ng Local flooding of the track will prompt a limit of train movem (either a speed restriction or line closed)	ovements This will be most prevalent in low lying areas, coastal areas or areas with poor drainage	3/minor Medium	4/moderate Medium	4/moderate 4/mode	Saturation of cabling and components requires testing after flooding, replacement depends on damage and results of test	6/moderate	N/A Low	6/moderate N/A	Low AVS with EVEN Follower and the analysis of the additional adaption - unit term plan is to replace No EVEN WITH THE CONTRACT AND A CONTRAC	Variation Risks to infrastructure services from river, surface water and groundwater flooding	
Image: signalling Location case Location case Location case Signalling Uneside signalling cable Location case Location case	Flooding Direct Flooding Direct	Wales & Western Wales & Western Signalling and RAM			6/moderate Medium	2/Minor Medium	4/moderate 8/mod	derate Historic information shows TPWS is affected by high temperatures	6/moderate	N/A Low	6/moderate N/A	Risk scores and narrative based on 'no additional adaption' - long term plan is to replace AWS with ETCS ETCS fittment will reduce number of TCs significantly in 2050 and completely by 2080	Variation Risk to transport from high and low temperatures, high winds, lightning	
et Signalling Location case tet Signalling Lineside signalling cable et Signalling Lineside signalling cable		Besterriegal Hand of	ng Speed restrictions are enforced during high temperatures	es On extreme hot days speed reductions limits the risk caused by a failed TPWS system 6/1				derate Historic evidence has shown SSI and PSU failures are higher during hot days	6/moderate	N/A Medium	6/moderate N/A	ELS triment will reduce number of LS significantly in 2050 and completely by 2080 Medium Assuming NR follow the current long term deployment plan No	Variation Risk to transport from high and low temperatures, high winds, lightning	
et Signalling Location case signalling Uneside signalling cable et Signalling Uneside signalling cable et Signalling AWS et Signalling IPWS et Signalling Interlocking	Flooding Direct	Wales & Western Wales & Western Signalling and RAM	ng Speed restrictions are enforced during high temperatures ulfe expired interlocking or component failure	es On extreme hot days speed reductions limits the risk caused by a failed TPWS system 6/ Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain 6/	Vmoderate Medium	1/Minor Medium	4/moderate 8/mou							
et Signalling Location case Signalling Uneside signalling cable et Signalling Uneside signalling cable et Signalling AWS et Signalling TPWS et Signalling Interlocking	Flooding Direct Extreme hot temperatures Direct	Wales & Western Worless & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Worless & Western Professional Head of RAM Signalling	ng Life expired interlocking or component failure	Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain	6/moderate Medium 6/moderate Medium			Saturation of cabiling and components requires testing after flooding, replacement derate depends on damage and results of test. Speed reduction limits the risk caused by a failed	6/moderate	N/A Low	6/moderate N/A		Variation Risks to infrastructure services from river, surface water and groundwater flooding	
Signaling Location case Signaling Lineside signalling cable set Signaling Lineside signalling cable set Signaling AWS set Signaling TPWS set Signaling Interlocking set Signaling TPWS	Flooding Direct Extreme hot temperatures Direct Heat wave Direct Flooding Direct Extreme hot workert	Wales & Western Workssional Head of Signalling and AMA RAM Signalling Wales & Western Wales & Western Signalling and RAM Wales & Western Wales & Western Signalling and RAM	Ule expired interlocking or component failure Local flooding of the track will prompt a limit of train mover (either a speed restriction or line closed) Component Seed restrictions are enforced during high temperatures or Prisone cases the track circum splail before the track do Prisone cases the track ci	Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain are not used and orientation gives the worst solar gain areas or areas with poor drainage of this will be most prevalent in low lying areas, coastal areas or areas with poor drainage es es to do a surge subola country, athough highert risk in area with the hissert temperature lorgease of the temperature lorgease of temperatu	6/moderate Medium	8/moderate Medium	8/moderate 8/mode	Saturation of cabling and components requires testing after flooding, replacement detate depends on damage and results of test. Speed reduction limits the risk caused by a failed TPWS system				Low AWS with ETCS ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 Risk scores and narrative based on 'no additional adaption' - long term plan is to replace	Variation groundwater flooding Variation Risk to transport from high and low temperatures, high	
Signaling Location case set Signaling Lineside signalling cable set Signaling Lineside signalling cable set Signaling AWS set Signaling TPWS set Signaling Interlocking set Signaling TPWS	Floading Direct Extreme hot temperatures Direct Heat wave Direct Floading Direct Extreme hot temperatures Indirect	Wales & Western Wales & Western Professional Head of Signalling RAM Signalling Wales & Western Wales & Western Professional Head of Signalling RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Signalling and RAM RAM Signalling	If expired interlocking or component failure If expired interlocking or component failure If expired interlocking or component failure (ether a speed restriction or line closed) Seed restrictions are enforced during high temperatures or in some cases the track circuit may fail before the track di Subsequent repairs could necessitate a speed restriction unt fixed	Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain 6/ overments This will be most prevalent in low lying areas, coastal areas or areas with poor drainage est k does. 6/ exk does. Risk across whole country although highest risk in area with the biggest temperature increase 6/		8/moderate Medium	8/moderate 8/mode	Saturation of cabling and components requires testing after flooding, replacement depends on damage and results of test. Speed reduction limits the risk caused by a failed TPWS system denate This is a known issue		N/A Low		Low AVIS with ETCS No1 ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 No1 Low Risk scores and narrative based on 'no additional adaption' -long term plan is to replace Low No1 Low Risk scores and narrative based on 'no additional adaption' -long term plan is to replace ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 No1	Variation groundwater flooding Variation Risk to transport from high and low temperatures, high winds, lightning	
Signalling Location case Signalling Lineside signalling cable set Signalling Lineside signalling cable stat Signalling AWS stat Signalling TPWS stat Signalling Interlocking stat Signalling TPWS stat Signalling TPWS stat Signalling TPCS stat Signalling TPCS	Flooding Direct Extreme hot temperatures Direct Heat wave Direct Flooding Direct Extreme hot undrect	Wales & Western Workssional Head of Signalling and AMA RAM Signalling Wales & Western Wales & Western Signalling and RAM Wales & Western Wales & Western Signalling and RAM	If expired interlocking or component failure If expired interlocking or component failure If expired interlocking or component failure (ether a speed restriction or line closed) Seed restrictions are enforced during high temperatures or in some cases the track circuit may fail before the track di Subsequent repairs could necessitate a speed restriction unt fixed	Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain are not used and orientation gives the worst solar gain areas or areas with poor drainage of this will be most prevalent in low lying areas, coastal areas or areas with poor drainage es es to do a surge subola country, athough highert risk in area with the hissert temperature lorgease of the temperature lorgease of temperatu	6/moderate Medium	8/moderate Medium 8/moderate Medium	8/moderate 8/mode 4/moderate 8/mode	Saturation of cabling and components requires testing after flooding, replacement depends on damage and results of test. Speed reduction limits the risk caused by a failed TPWS system This is a known issue	6/moderate		6/moderate N/A	Low AVS with ETCS No ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 No Risk scores and narative based on 'no additional adaption' -long term plan is to replace AVS with ETCS No ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 No Risk scores and narative based on 'no additional adaption' -long term plan is to replace No Risk scores and narative based on 'no additional adaption' -long term plan is to replace No	Variation groundwater flooding Variation Risk to transport from high and low temperatures, high	
Image: Signaling Location case Signaling Location case Signaling Lineside signaling cable set Signaling Lineside signaling cable set Signaling AWS set Signaling TPWS set Signaling Therlocking set Signaling TPWS set Signaling Track Circuit set Signaling Track Circuit set Signaling Track Circuit	Flooding Direct Extreme hot temperatures Direct Heat wave Direct Flooding Direct Extreme hot temperatures Indirect Extreme hot temperatures Direct Extreme hot temperatures Direct Heat wave Direct	Wales & Western Wales & Western Professional Head of Signalling and AMM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling	If e expired interlocking or component failure Life expired interlocking or component failure (ether a speed restriction or line closed) Speed restrictions are enforced during high temperatures or in some cases the track circuit may fail before the track d Subsequent replix could necessitate a speed restriction are fixed interlocking are enforced during high temperatures. The set of the se	Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain prevention of the second	6/moderate Medium 6/moderate Medium	8/moderate Medium 8/moderate Medium 6/moderate Medium	8/moderate 8/mode 4/moderate 8/mode 4/moderate 8/mode	Saturation of cabling and components requires testing after flooding, replacement depends on damage and results of test. Speed reduction limits the risk caused by a failed TPWS system that the saturation shows electrical equipment associated from track circuits fails more	6/moderate 6/moderate	N/A Low	6/moderate N/A	Low AVS with ETCS No ETCS fitnered will reduce number of TCs significantly in 2050 and completely by 2080 No Low Risk scores and narrative based on 'no additional adaption' -long term plan is to replace AVS with ETCS No ETCS fitnered will reduce number of TCs significantly in 2050 and completely by 2080 No Low Risk scores and narrative based on 'no additional adaption' - long term plan is to replace AVS with ETCS No Low Risk scores and narrative based on 'no additional adaption' - long term plan is to replace AVS with ETCS No Low Risk scores and will reduce number of TCs significantly in 2050 and completely by 2080 No Low Long term plan to replace track circuits with ade counters or train based location system; gave No	Variation groundwater flooding Variation Risk to transport from high and low temperatures, high Variation Risk to transport from high and low temperatures, high Variation Risk to transport from high and low temperatures, high Variation Risk to transport from high and low temperatures, high Variation Risk to transport from high and low temperatures, high	
Signaling Location case Signaling Location case Signaling Lineside signaling cable stet Signaling Signaling Lineside signaling cable stet Signaling Signaling PWS stet Signaling table Track Circuit stet Signaling stet Signaling table Track Circuit	Flooding Direct Extreme hot temperatures Direct Heat wave Direct Flooding Direct Extreme hot temperatures Indirect Extreme hot temperatures Direct Extreme hot temperatures Direct Extreme hot temperatures Direct Extreme hot temperatures Direct Extreme hot temperatures Direct	Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling Wales & Western Wales & Western Signalling and RAM RAM Signalling Wales & Western Wales & Western Signalling and RAM RAM Signalling Wales & Western Wales & Western Professional Head of Signalling and RAM RAM Signalling	If e expired interlocking or component failure Let a lipoding of the track will prompt a limit of train mover (ectal floading of the track will prompt a limit of train mover (ectal floading of the track will prompt a limit of train mover (ectal floading of the track will prompt a limit of train mover for i some cases the track circuit may fail before the track d Subsequent repairs could necessitate a speed restriction unt fixed fixed restrictions are enforced during high temperatures. T statement is not true as the track circuit could fail before the rang Speed restrictions are enforced during high temperatures. T statement is not true as the track circuit could fail before the statement is not true the track result is failure i.e. Show Occupied When Clear	Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain 64 overments This will be most prevalent in low lying areas, coastal areas or areas with poor drainage est ki does. 66 ext does. Risk across whole country although highest risk in area with the biggest temperature increase 67 est track Risk across whole country although highest risk in area with the biggest temperature increase 67 Showing Areas prone to wet ballast tend to be known 67	6/moderate Medium 6/moderate Medium 6/moderate Medium 6/moderate Medium	8/moderate Medium 8/moderate Medium 6/moderate Medium 8/moderate Medium	B/moderate 8/moderate 4/moderate 8/moderate 4/moderate 8/moderate B/moderate 8/moderate	Saturation of cabling and components requires testing after flooding, replacement depends on damage and results of test. Speed reduction limits the risk caused by a failed TPWS system details This is a known issue details Historic information shows electrical equipment associated from track circuits fails more during periods of hot weather details Historic information shows wet ballast is any issue for track circuits failor of cabling and components requires testing after flooding, replacement	6/moderate 6/moderate 6/moderate	N/A Low N/A Low N/A Low	C/moderate N/A G/moderate N/A G/moderate N/A	Low AVS with ETCS No ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 No Low Risk scores and narative based on 'no additional adaption' -long term plan is to replace AVS with ETCS No ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 No Low Risk scores and narative based on 'no additional adaption' -long term plan is to replace ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 Low Risk scores and narative based on 'no additional adaption' -long term plan is to replace ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 Low Long term plan to replace track circuit with bale contexts or train based location system No Low ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 Low Long term plan to replace track circuit with bale contexts or tain based location system No	Variation groundwater flooding Variation Risk to transport from high and low temperatures, high Variation Risk to transport from high and low temperatures, high Variation Risk to transport from high and low temperatures, high	
Image: Signaling Location case signaling Location case signaling Location case signaling Location case signaling Uneside signaling cable signaling MvS signaling Signaling signaling TPvS signaling Signaling signaling TPvS signaling Signaling signaling Track Circuit signaling Track Circuit	Flooding Direct Extreme hot temperatures Direct Heat wave Direct Flooding Direct Extreme hot temperatures Indirect Extreme hot temperatures Direct Extreme hot temperatures Direct Heat wave Direct	Wales & Western Wales & Western Professional Head of Signaling and RAM RAM Signaling Wales & Western Wales & Western Professional Head of Signaling RAM Signaling Wales & Western Wales & Western Professional Head of Signaling and RAM RAM Signaling Wales & Western Wales & Western Professional Head of Signaling and RAM RAM Signaling Wales & Western Wales & Western Professional Head of Signaling and RAM RAM Signaling Wales & Western Wales & Western Professional Head of Signaling and RAM RAM Signaling Wales & Western Wales & Western Professional Head of Signaling and RAM RAM Signaling Wales & Western Wales & Western Professional Head of Signaling and RAM RAM Signaling Wales & Western Wales & Western Professional Head of Signaling and RAM RAM Signaling	Ule sopired interlocking or component failure Local flooding of the track will prompt a limit of train mover (either a speed restriction or line closed) Speed restrictions are enforced during high temperatures. Or in some cases the track circuit rung fail before the track de Subsequent repairs could necessitate a speed restriction unt fixed Speed restrictions are enforced during high temperatures.	Equipment located in passive location cases at risk of overheating, particularly where sun hats are not used and orientation gives the worst solar gain prevention of the second	6/moderate Medium 6/moderate Medium 6/moderate Medium	8/moderate Medium 8/moderate Medium 6/moderate Medium 8/moderate Medium	B/moderate 8/moderate 4/moderate 8/moderate 4/moderate 8/moderate B/moderate 8/moderate	Saturation of cabling and components requires testing after flooding, replacement depends on damage and results of test. Speed reduction limits the risk caused by a failed TPWS system detate This is a known issue detate Historic information shows electrical equipment associated from track circuits fails more during periods of hot weather elecate Historic information shows wet ballast is any issue for track circuits	6/moderate 6/moderate 6/moderate	N/A Low N/A Low	C/moderate N/A G/moderate N/A G/moderate N/A	Low AVS with ETCS No ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 No Low Risk scores and narative based on 'no additional adaption' -long term plan is to replace AVS with ETCS No ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 No Low Risk scores and narative based on 'no additional adaption' -long term plan is to replace ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 Low Risk scores and narative based on 'no additional adaption' -long term plan is to replace ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 Low Long term plan to replace track circuit with bale contexts or train based location system No Low ETCS fitment will reduce number of TCs significantly in 2050 and completely by 2080 Low Long term plan to replace track circuit with bale contexts or tain based location system No	variation groundwater flooding Variation Risk to transport from high and low temperatures, high Variation Risk to transport from high and low temperatures, high Variation Risk to transport from high and low temperatures, high variation Risk to transport from high and low temperatures, high variation Risks to infrastructure services from river, surface water and variation Risks to infrastructure services from river, surface water and variation Risks to infrastructure services from river, surface water and	

							Unable to map to climate variable. Leaf fall induced adhesion is a combination of weather									Assumed no change to current risk as effect of climate change on leaf fall is curren	tv.		
SIG26 Asset Signalling	Track circuit	Storms			Wales & Western Professional Head of Signalling and RAM Professional Head of	RAM Signalling Leaf fall can provide an insulating layer between wheel and rail causing the track circuit to SCWO Local flooding of the track will prompt a limit of train movements	events. The nearest category is storms as it includes rain, wind, however this only applies in Autumn	12/major Medium 16/m	najor Medium	16/major 16/majo	A well known problem with leaf fall caused by the combined effects of wind and rain Saturation of cabling and components requires testing after flooding, replacement		N/A Low	9/moderate	N/A L	ow unknown ETCS fitment will reduce number of TCs significantly in 2050 and completely by 20	No Variation	Risks to infrastructure services from river, surface water and Risk to transport from high and low temperatures, high groundwater flooding winds, lightning Risks to infrastructure services from river, surface water and	
	Axle counter/treadle	Flooding Extreme hot			Signalling and RAM	RAM Signalling (either a speed restriction or line closed) Speed restrictions are enforced during high temperatures. This	This will be most prevalent in low lying areas, coastal areas or areas with poor drainage		derate Medium	8/moderate 8/modera	Saturation of cabling and components requires testing after flooding, replacement depends on damage and results of test Historic information shows link between high temperatures and failure of axle	8/moderate 12	2/major Low		12/major L	Aging of product does not disproportionately impact upon housing IP rating	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding Risk to transport from high and low temperatures, high	
	Axle counter/treadle	temperatures Flooding			Alace & Western Signalling and RAM	the track RAA4 Cimpalling Local flooding of the track will prompt a limit of train movements	Risk across whole country although highest risk in area with the biggest temperature increase This will be most prevalent in low lying areas, coastal areas or areas with poor drainage	6/moderate Medium 8/mod	derate Medium	4/moderate 8/modera	counter/treadle equipment Saturation of cabling and components requires testing after flooding, replacement depends on damage and results of test. Sensitive electronic equipment is likely to be	8/moderate 12 8/moderate 12	2/major Low			w Aging of product does not disproportionately impact upon housing IP rating Aging of product does not disproportionately impact upon housing IP rating	No Variation	winds, lightning Risks to infrastructure services from river, surface water and	
	Interlocking	Flooding			Professional Head of	RAM Signalling Life expired interlocking or component failure	Equipment housed within location cases and unprotected control rooms as risk	6/moderate Medium 8/mod	derate Medium	8/moderate 8/modera	damaged by water ingress and require replacement Generally areas are known for flooding and location cases are elevated or moved		noderate Medius			Assuming we are unresponsive to the rising threat of flooding we are likely to see		groundwater flooding Risks to infrastructure services from river, surface water and	
SIG30 Asset Signalling	-	Extreme hot temperatures			Vales & Western Nales & Western Nales & Western Signalling and RAM	RAM Signalling Life expired interlocking or component railure	Equipment noused within located in passive lineside equipment housings at risk of overheating, particularly where sun orientation gives the worst solar gain	6/moderate Medium 6/mod	derate Medium	4/moderate 8/modera	Excluding Cambrian this is relatively new technology. Failure considered likely in the event of failed aircon/cooling during extreme hot weather events	9/moderate 9/m				Increased risk due to an increase in frequency and severity of storms and rain w No overlay areas	No Variation	groundwater flooding Risk to transport from high and low temperatures, high winds, lighting	
SIG31 Asset Signalling	ETCS-trackside	Flooding	Direct Wale	es & Western W	Nales & Western Signalling and RAM	RAM Signalling Life expired equipment or component failure	Equipment housed within lineside cases and 4ft may be at risk	6/moderate Medium 8/mod	derate Medium	8/moderate 8/modera	Generally areas are known for flooding and lineside equipment cases are elevated or positioned elsewhere. Excluding Cambrian this is relatively new technology. Failure	9/moderate 9/m	noderate Low	9/moderate	9/moderate L	w No overlay areas	No Variation	Wints, to infrastructure services from river, surface water and groundwater flooding	
SIG32 Asset Signalling	ETCS-trackside	Lightning	Direct Wale	es & Western W	Wales & Western Signalling and RAM	RAM Signalling Life expired equipment or component failure	Equipment located in passive lineside equipment housings at risk. Very difficult and expensive t protect against a direct hit however local lightning strikes can be mitigated	6/moderate Medium 8/mod	derate Medium	6/moderate 8/modera	considered as likely in the event of extreme flood events Excluding Cambrian this is relatively new technology. Need to consider ETCS trackside sub systems may be centrally positioned in ROC centres	6/moderate 9/m	noderate Mediur	m 6/moderate	9/moderate Me	dium No overlay areas	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
SIG4 Asset Signalling	Interlocking	Lightning	Direct Wale	es & Western W	Wales & Western Signalling and RAM	RAM Signalling Life expired interlocking or component failure	Very difficult and expensive to protect against a direct hit however local lightning strikes can be mitigated	6/moderate Medium 8/mod	derate Medium	6/moderate 8/modera	Lightning is currently infrequent in the UK however when a strike occurs near Signalling equipment we do see failures	6/moderate 9/m	noderate Mediu	m 6/moderate	9/moderate Me	Electrical storms focused over key 'unprotected' areas statistically will increase cau dium asset failures. Equipment based within ROCs are unlikely to suffer due to the level protection offered by the building and power supply		Risk to transport from high and low temperatures, high winds, lightning	
SIG5 Asset Signalling	Signals	Extreme hot temperatures	Direct Wale	es & Western W	Wales & Western Professional Head of Signalling and RAM	RAM Signalling Life expired or product failure	Solar heating combined with an extreme ambient can lead to electronics being pushed beyond their operating parameters	4/moderate High 4/mod	derate High	3/minor 6/modera	We do not see many signal failures due to heat, normally a weaker component in the chain fails before the signal. Aging LED signals will be more prone to this failure mode	4/moderate	N/A High	4/moderate	N/A H	igh Assuming NR follow the current long term deployment plan	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
SIG6 Asset Signalling	Signals	Snow	Direct Wale	es & Western W	Wales & Western Professional Head of Signalling and RAM	RAM Signalling Life expired or product failure	Greater risk for Northern areas and also LED signals do not heat the lens like a Halogen lamp	6/moderate High 8/mod	derate High	8/moderate 6/modera	Cccasionally we get signals covered in snow. This is more of a problem for alphanumeric than CLS	2/minor	N/A Mediu	m 2/minor	N/A Me	dium Assuming NR follow the current long term deployment plan	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
SIG7 Asset Signalling	Signals	Light rain/drizzle	Direct Wale	es & Western W	Wales & Western Professional Head of Signalling and RAM	RAM Signalling Life expired or product failure	Route knowledge will act as a mitigation	2/minor Medium 4/mod	derate Medium	4/moderate 4/modera	kilowiedge mitigating the fisk	2/minor	N/A Mediur	m 2/minor	N/A Me	dium Assuming NR follow the current long term deployment plan	No Variation		
SIG8 Asset Signalling		Heavy rain/cloudburst			Signalling Broforcional Hoad of	RAM Signalling Life expired or product failure	Route knowledge will act as a mitigation	2/minor Medium 4/mod	derate Medium	4/moderate 4/modera	Short term event that the driver can prepare for. Also the driver has route knowledge mitigating the risk		N/A Mediu			dium Assuming NR follow the current long term deployment plan Assuming NR follow the current long term deployment plan.	No Variation	Risks to infrastructure services from river, surface water and Risk to transport from high and low temperatures, high groundwater flooding winds, lightning Risks to infrastructure services from river, surface water and [
SIG9 Asset Signalling STR1 Asset Structures	Coastal and estuarial protection	Storms			Wales & Western Signalling and RAM Professional Head of Wales & Western Professional Head of Wales & Wal	RAM Signalling Life expired or product failure RAM Structures Intervention based on Extreme Weather Plans determined by eau	Trains are unlikely to be running if ground mounted signal are covered with water Caused by storm surges, large waves and strong wind, they can elevate sea levels and cause Caused by storm surges, large waves are scan overtoo coastal defences and cause	4/moderate Medium 6/mod 9/moderate High 10/m	derate Medium		te Trains are unlikely to be running if ground mounted signal are submerged Based on past asset failures	4/moderate	N/A Medius			dium Assume current funding remains for current management practices	No Variation	groundwater flooding Risks to infrastructure services from coastal flooding and	
	Bridges, culverts and retaining walls	Flooding			Professional Head of	RAM Structures Intervention based on Extreme Weather Plans determined by eac	inundation, erosion, scour, loss of stability and structural damage Bridge scour, is the removal of sediment such as sand and gravel from round bridge abutments	9/moderate High 10/m	najor High	10/major 10/majo	Based on past asset failures	9/moderate 12	2/major High			igh Assume current funding remains for current management practices	No Variation	erosion Risks to bridges and pipelines from flooding and erosion	
	Bridges, culverts and retaining walls	Election		es & Western W	Avalor & Wortorn Professional Head of	RAM Structures Intervention based on Extreme Weather Plans determined by ear	Integrity of a structure During a flood, a structure may be partially or entirely submerged by the flow and the ch subsequent loading of fluid and/or debris can cause structures to collapse. For existing		najor High	10/main: 10/main	Based on past asset failures	12/major 12	2/major Mediu			That current management practices continue, but that Network Rail increase num		Risks to bridges and pipelines from flooding and erosion	
STRS Asset Structures		·····	Direct Wale	es a western w	Structures and RAM	roum subcures route	structures, marker plates are installed and monitored during adverse weather events. For newe structures, the risks for uplift are considered in the design. There is currently no management system. One needs to be developed and either implemented	Shiderate nign 20/n	iajor nign		The current risk is not significant with electrical insulation provided by other asset		(Thayon Weblar			buoyancy assessments			
STR4 Asset Structures	Bridges, culverts and retaining walls. Coa and estuarial protection	ustal Lightning	Direct Wale	es & Western W	Wales & Western Professional Head of Structures and RAM	RAM Structures No intervention threshold currently	by Professional Head of Structures or ownership by another Asset Function (e.g. E&P) must be agreed	6/moderate Medium 8/mod	derate Medium	6/moderate 8/modera	disciplines (Signalling and Electrification) to protect assets. No specific control however included in requirements for building/structures design documents. Risk for structures is low, but higher for other disciplines	6/moderate 8/m	noderate Mediur	m 6/moderate	8/moderate Me	dium The risk from metal structures is currently unmanaged within Structures discipline may become worse under climate change projections	and No Variation	Risk to transport from high and low temperatures, high winds, lightning	
					Professional Head of	Mainly through icicle formation in tunnels and weathering of	On icicles, there is an established process of managing tunnel shafts and therefore risks are minimal. The rate of weathering is a function of exposure and material constituting the asset. This mainl impacts structures with concrete encasement of structures with soft bricks. The risks are											Risk to transport from high and low temperatures, high	
STR5 Asset Structures	Bridges, culverts and retaining walls	Snow/ice	Direct Wale	es & Western W	Wales & Western Structures and RAM	RAM Structures material	managed as BAU through tapping surveys. There is no special requirement within policy to manage structures until such time they are rendered unserviceable. Bridges are most critical and routine structural assessments gauge the impact of weathering on the capability of assets.	9/moderate High 9/mod	derate High	9/moderate 9/modera	Based on past assets failures	9/moderate 6/m	noderate High	9/moderate	6/moderate H	igh No further action	No Variation	winds, lightning	
STRE AT 1	Moving bridger	Extreme hot	Direct	or 8. 111	Volor 8. Wortern	RAM Cruchurge	No further policy intervention is required Most of the assets within this category are classed as 'major structures' for example swing bridges. Significant capital investment is required and in current control periods deemed	6 Imode	iert iiii	Almoin		5 local			0/maint	For major structures, these are covered in their own bespoke Asset Management I	lans. No Visioning	Risk to transport from high and low temperatures, high	
Asset Structures	Moving bridges	temperatures	Wale	es & Western W	Wales & Western Structures and RAM Professional Head of	RAM Structures Intervention dictated by Structural Asset Management Plans	umafordable. As sustainable approach has been to identify routine maintenance activities to kee the asset functional. These do not meet all stakeholder requirements	6/moderate Medium 6/mod	derate Medium	symoderate 6/modera	te Based on past asset failures	6/moderate 9/m	noderate Medius	m 6/moderate	ə/moderáte Me	Jium For other structures, condition managed through route examination processes	we variation	winds, lightning	
STR7 Asset Structures	Bridges, culverts and retaining walls	Erosion	Direct Wale	es & Western W	Wales & Western RAM		Undermining of structure leading to loss of support and potentially fouling gauge. There is also the risk of loss of support of earthwork bearing track formation	9/moderate Medium 10/m	najor Medium	10/major 10/majo	Based on past assets failures	9/moderate 12	2/major Mediu	m 9/moderate	12/major Me	dium Assume current funding remains for current management practices	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
T&RS1 Asset T&RS	Mobile plant, rail vehicle - rolling stock	Erosion	Interdependency (them court) Wale	es & Western W	Wales & Western	For operations of T&RS this will be based either on the trigger/threshold for the local civils teams based on the discovery of of infracture that is at risk of elinoing or on the discovery of	Y a There is a risk across the whole country of landslips following lengthy periods of rainfall	12/major Medium 16/m	najor Medium	16/major 16/majo	We have had past incidents relating to landslips (see Watford September 2016), but there is an expectation that this rick is already being managed by our Civils teams	12/major 16	5/major Low	12/major	16/major L	We have low confidence in the risk rating but we have high confidence that the ris	will No Variation	Risks to infrastructure services from river, surface water and exoundwater flooting	
T&RS10 Asset T&RS	Mobile plant, rail vehicle - rolling stock	Heavy	(memon us)		Avalar & Wastern Professional Head of T&F	landslip that has already occurred	There is a risk across the country of this occurring	6/moderate Medium 8/mod	derate Medium		there is an expectation that this risk is already being managed by our Civils teams Current asset is well known and there are maintenance procedures in place to replace te seals, etc. to mitigate this hazard. As T&RS assets have a life of c.30 years, the effect on					Assumption that current assets have been replaced by 2050, and that weather res	lience No Variation	groundwater flooding Risks to infrastructure services from river, surface water and	
T&RS10 Asset T&RS	Mobile plant, rail vehicle - rolling stock	long hot dou			Wales & Western and RAM Wales & Western Professional Head of T&R		Greater risk of this occurring in Southern areas of the country where the temperatures historically are higher. Greatest risk in rural areas. Such failures have not been found on our		inor Medium		future assets in unknown Current asset is well known, as these failures have occurred on DMUs in recent years we					his been considered as part of the procurement of new assets Assumption that current assets have been replaced by 2050, and that weather res	lience No Variation	groundwater flooding Rick to transport from high and low temperatures, high whole likehings	
		summer					According to our fleet teams, the setting of temperature sensors in OTMs can be quite arbitrary				Point was raised as a risk with current fleet, no clear view on how this will be managed with future procurements. The current draft of the Key Trains Requirement (Rail Delivery					has been considered as part of the procurement of new assets		winds, lightning	
T&RS12 Asset T&RS	Mobile plant, rail vehicle - rolling stock	Heat wave	Direct Wale	es & Western W	Wales & Western Professional Head of T&R	RS Series of vehicle shutdowns due to overheating	According to our fleet teams, the setting of temperature sensors in OTMs can be quite arihtrary (such as hottest day of year +10oC), with an increase in temperatures there will be a greater emphasis on cooling systems being able to cope with high temperatures. Greater risk of this occurring in Southern areas of the country where the temperatures historically are higher	3/minor Low 3/mi	inor Low	2/minor 4/modera	Group owned, cross industry working group aiming to improve rail vehicle specifications) te guidance document refers to the use of BS EN 50125-1:2014's temperature parameters as a general solution to setting operating temperature envelopes though it has been noted that the increasing the temperature envelopes though it has been cost of that the increasing the temperature envelopes though it has been and that the increasing the temperature envelopes though it has been and that the increasing the temperature envelope for environment increases creat		noderate Low	4/moderate	4/moderate L	Increase of average temperatures and number of hot summer days offset by chan propulsion systems to meet decarbonisation targets & current work being done by industry (see KTR) to set guidance for weather resilience		Risk to transport from high and low temperatures, high winds, lightning	
	On track machines	Long hot, dry	Direct Wale	es & Western W	Wales & Western Professional Head of T&R	RS Driver reports of reduced visibility whilst passing tamping activiti	Hazard raised by SCO Fleet Engineering Management as a current bazard when tamping in bot	6/moderate Medium 6/mod	derate Medium	4/moderate 8/modera	noted that just increasing the temperature envelope for equipment increases costs significantly Greatest risk perceived to be the lack of visibility of track workers involved in tamping onerations of inability to read signals.	9/moderate 9/m	noderate Medius	m 9/moderate	9/moderate Me	lium No change in tamping methodology	No Variation	Risk to transport from high and low temperatures, high winds lishtning	
	Rail vehicle - rolling stock	Snow/ice			Wales & Western Professional Head of T&R		ary conditions Linked with Southern Scotland due it being at the greatest risk because of temperatures and number of operations, but credible for the entire country				operations of inability to read signals Hazard is well known in vehicle design, so such a hazard is usually eliminated by design We have had several flooding instances on the network flooding over the last few years			_	3/minor H	gh No negative impact on resilience to snowfall in future rail vehicle designs for elect equipment	No Variation	winds, lightning Risk to transport from high and low temperatures, high winds, lightning	
T&RS15 Asset T&RS	Rail vehicle - rolling stock	Flooding	Indirect Wale	es & Western W	Wales & Western Professional Head of Geotechnical	RAM GLD Evidence of localised flooding in stabling areas	Mainly linked to west coast areas or stabling areas on a flood plain due to either the amount of rain they see or due to the inherent risk of the stabling area flooding	6/moderate Medium 8/mod	derate Medium	8/moderate 8/modera	so there is a perceivable risk of this occurring. The impact however would mainly be to operational either the flooding would disable the vehicles (such as due to damage to the electrical systems) or operationally the vehicles will not be able to be moved if the water	6/moderate 8/m	noderate High	6/moderate	8/moderate H	igh No fundamental change in the operation of rail vehicles in flooded areas	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
T&RS16 Asset T&RS					Professional Head of T&R	RS Wind speeds reached that enforce reduced speed operation or	Linked to areas that are exposed to high winds, so potentially more a risk for the West Coast of				is above the rail head (see GE/RT 8000 - M3 iss.2) ARP risk selected due it best suiting the various potential scenarios. There is a possibility that a flyting object could generate a part of the vehicle and cause fatalities but the							Risk to transport from high and low temperatures, high	
	Rail vehicle - rolling stock	Long hot, dry			Wales & Western Professional Head of T&R	stopping of services in extreme scenarios	the country than the East Coast. Risk will be greatest where the area also has significant amounts of vegetation Risk is prevalent in the South where temperatures are higher but hazard can be encountered	4/moderate Medium 4/mod 4/moderate High 4/mod	derate Medium	8/moderate 2/minor	greatest numbers of scenarios will cause minor damage to venicles. Either way the AKP risk is consistent at the level in column M Known based for endinger activities, common occurrence but energy in the scenario.		noderate Medius noderate Medius			dium Assumption that no further mitigation is put in place to mitigate these hazards dium Assumption that no further mitigation is put in place to mitigate these hazards	No Variation	winds, lightning Risk to transport from high and low temperatures, high	
	Rail vehicle - rolling stock	summer Snow/ice			Wales & Western Professional Head of T&R		across the country when there has been hot & dry weather Drier systems are not powerful enough on our MPV fileet to de-ice brake systems. Also a problem for Stone blowers. Risk prevalent in Scotland due to colder winters		-		Common issue, but consequences are very minor (i.e. no shifts have been lost due to it)					lium Assumption that no further mitigation is put in place to mitigate these hazards	No Variation	winds, lightning Risk to transport from high and low temperatures, high winds, lightning	
T&RS19 Asset T&RS	Rail vehicle - rolling stock	High winds	Indirect Wale	es & Western W	Professional Head of Drainage and Off Track, RAM and local	Not really applicable to T&RS, the decision threshold here is more in relation to when lineside vegetation should be regarded as	e See 'decision threshold' column. For previous incidents involving Network Rail fleets, refer to to RAIB report 01/2018 and Kingswood runaway from 2006	12/major Medium 12/m	najor Medium	16/major 10/majo	We have had two incidents in the last 13 years of MPVs running away due to brake releases, the Markinch episode being due to the train striking vegetation on the line. Unbraked, out of control vehicle could cause multiple fatalities (level crossings, track	12/major 12	2/major Mediur	m 12/major	12/major Me	dium Numbers of storms increases over the coming decades	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
					maintenance teams	run/not run trains based on recorded wind speeds					workers, etc) Known hazard for some EMUs, no incidents of this type known to have occurred on								
T&RS2 Asset T&RS	Rail vehicle - rolling stock	Heavy rain/cloudburst	Direct Wale	es & Western W	Wales & Western Professional Head of T&R		History of this type of failure occurring in coastal locations, but possible to recreate a similar failure mode with high levels of rainfail	3/minor High 4/mod	derate High		te 313121. Worth considering as this could be a hazard for fleets we bring in over the coming years	3/minor 6/m	noderate High	3/minor	6/moderate H	igh That rolling stock portfolio continues to contain units that carry the risk	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
T&RS20 Asset T&RS	Mobile plant, rail vehicle - rolling stock	Heat wave			Wales & Western Professional Head of T&R	traction motors	Greater risk of this occurring in Southern areas of the country where the temperatures historically are higher, increased risk for DC motors		inor Medium	2/minor 4/modera	Expected to see a phasing out of vehicles with DC traction motors over the next few years, the level of reliability of AC motors of future vehicles in such conditions is unknown Known hazard for some EMUs, no incidents of this type known to have occurred on				_	ow Assumption based on current working practices not changing	No Variation	Risk to transport from high and low temperatures, high winds, lightning Risk to transport from high and low temperatures, high Risk to transport from high and low temperatures, high	
T&RS3 Asset T&RS	Rail vehicle - rolling stock	High winds	Direct Wale	es & Western W	and RAM	randre of dirit due to build up of water in the partograph wen	History of this type of failure occurring in coastal locations with high waves	4/moderate High 4/mod	derate High	8/moderate 2/minor	313121. Worth considering as this could be a hazard for fleets we bring in over the coming years Consequence of such an event happening would be catastrophic, but the likelihood of the	4/moderate 8/m	noderate High	4/moderate	8/moderate H	igh Current design does not change	No Variation	winds, lightning	
T&RS4 Asset T&RS	Mobile plant, rail vehicle - rolling stock	Extreme hot temperatures	Indirect Wale	es & Western W	Wales & Western Professional Head of Trac and RAM	based on NR/L2/TRK/001 mod.14	There is a risk of track buckles over the entirety of the country above a certain ambient temperature	10/major Medium 10/m	najor Medium	6/moderate 12/majo	event happening at present is relatively low given the current risk mitigations in place. Risk increase in future due to ambient thresholds for track buckles being met more regularly	12/major 15	5/major Mediur	m 12/major	15/major Me	dium Assumption based on current working practices not changing	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
T&RS5 Asset T&RS	Rail vehicle - rolling stock	Extreme hot temperatures	Indirect Wale	es & Western W	Wales & Western Professional Head of Contact Systems		: of Increased risk of dewirements in high temperatures due to sag in contact wires	9/moderate Medium 9/mod	derate Medium	6/moderate 10/majo	Current asset is known, but there is historic evidence of the hazard occurring in high temperatures	9/moderate 12	2/major Mediu	m 9/moderate	12/major Me	dium Assumption based on current working practices not changing	No Variation	Rick to transport from high and low temperatures, high winds, lightning	
T&RS6 Asset T&RS	Mobile plant, rail vehicle - rolling stock	Heat wave	Direct Wale	es & Western W	Wales & Western Professional Head of T&R	traction motors	Greater risk of this occurring in Southern areas of the country where the temperatures historically are higher, increased risk for DC motors	4/moderate Medium 4/mod	derate Medium	2/minor 6/modera	Expected to see a phasing out of vehicles with DC traction motors over the next few years, the level of reliability of AC motors of future vehicles in such conditions is unknown	1/minor 1/	/minor Mediu	m 1/minor	1/minor Me	dium Assumption based on current working practices not changing Assumption that different operating parameters for operation are not selected for	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
T&RS7 Asset T&RS T&RS8 Asset T&RS	Mobile plant, rail vehicle - rolling stock Mobile plant, rail vehicle - rolling stock	Extromo hot			Wales & Western Professional Head of T&R Wales & Western Professional Head of T&R	diesel motors. Overheating alarm on vehicles	Greater risk of this occurring in Southern areas of the country where the temperatures historically are higher Greater risk of this occurring in Southern areas of the country where the temperatures	6/moderate Medium 6/mod	derate Medium		te Current asset is well known and capable of withstanding a large variety of temperatures te Current asset is well known and capable of withstanding a large variety of temperatures					dium equipment (refer to BS EN 50125-1:2014 for the environmental condition classes f rolling stock) dium Assumption that current assets have been replaced by 2050, and that weather res		Risk to subteranean and surface infrastructure from Risks to subteranean and surface infrastructure from	
	Mobile plant, rail vehicle - rolling stock	temperatures			wales & Western Professional Head of T&R	excessive operating temperatures Series of hydraulic failures linked to operation in excessive operating temperatures	historically are higher Greater risk of this occurring in Southern areas of the country where the temperatures historically are higher	6/moderate Medium 6/mod	derate Medium		te Current asset is well known and capable of withstanding a large variety of temperatures					has been considered as part of the procurement of new assets Assumption that current assets have been replaced by 2050, and that weather res has been considered as part of the procurement of new assets		SubSidence Risk to transport from high and low temperatures, high winds, lightning	
TR1 Asset Track	Track and S&C (jointed)	Extreme hot temperatures	Direct Wale	es & Western W	Wales & Western Professional Head of Trac	ck RAM Track Rail temps exceeding 54 degrees C will require speed restrictions control risk	to Historic evidence of buckle trends shows that jointed track is more likely to buckle than CWR	9/moderate High 9/mod	derate High	6/moderate 8/modera	Increase in track buckles as temperatures rise with a greater likelihood of buckling	9/moderate 12	2/major Mediu	m 9/moderate	12/major Me	Jointed track is less resilient to heat beyond 38 degrees C air temp. Assuming that dium have managed all deficiencies to meet compliant design limits. However if this assumption proves to be incorrect then the risk for 2050 and 2080 will increase the difference of the second se	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
TR10 Asset Track	CWR	Long hot, dry summer	Direct Wale	es & Western W	Wales & Western and RAM	ck RAM Track Rail Temps exceed 56 resulting in speed restrictions to control ris	Deterioration of track quality as a result of inability to undertake routine maintenance activities k Also increased risk of staff fatigue and risk of being struck by trains whilst undertaking hot weather patrolling duties	9/moderate High 9/mod	derate High	6/moderate 10/majo	Failures will increase due to impact of not being able to deliver work during this period	9/moderate 12	2/major High	9/moderate	12/major H	Maintenance work routinely undertaken during summer is restricted above 32 deg Maintenance work routinely undertaken during summer is restricted above 32 deg Extended periods of hot and dry weather will affect ability to carry out maintenan resulting in track quality deterioration	rees C.	Risk to transport from high and low temperatures, high winds, lightning	
TR11 Asset Track	S&C	Large diurnal	Direct Wale	es & Western W	Wales & Western and RAM	ck RAM Track S&C on timber layouts and of weaker constructions (such as swit	weather parrolling duties ch Increased risk of misalignments and buckling due to rapid thermal expansion stresses	6/moderate High 6/mod	derate High	6/moderate 6/modera	Large changes in temperature variation causing imbalance in rail stress with variation	9/moderate 12	2/major Mediu	m 9/moderate	12/major Me	Currently 15% of S&C is modern variant, but future projections results in less than of assets being modernised, thereby unable to withstand large increases in temp. Assuming that Routes have managed all deficiencies to meet compliant design limitant dium Assuming that Routes have managed all deficiencies to meet compliant design limitant diverses and the second second second all deficiencies and the second s	ts. No Variation	Rick to transport from high and low temperatures, high	
		temperature range			and RAM	diamonds) unable to withstand rail temps above 54 degrees C					exceeding 30 degrees C in hot and cold temps					However, if this assumption proves to be incorrect then the risk for 2050 and 2080 increase further Future S&C renewal projections means less than 1/3rd of assets will be modernise	will	winds, lightning	
TR12 Asset Track	Track and S&C	Higher average temperature	Direct Wale	es & Western W	Wales & Western and RAM	ck RAM Track diamonds) unable to withstand rail temps above 54 degrees C	ch Increased risk of misalignments and buckling due to rapid thermal expansion stresses	6/moderate High 6/mod	derate High	4/moderate 8/modera	Increase in track buckles as temperatures rise with a greater likelihood of buckling especially in legacy S&C construction	9/moderate 12	2/major High	9/moderate	12/major H	Future S&C renewal projections means less than 1/3rd of assets will be modernise 2050 and around 45% by 2080 creating differential expansion between S&C and a plain line and weaknesses in S&C. Assuming that Routes have managed all deficier meet compliant design limits. However if this assumption proves to be incorrect th	jacent cles to No Variation	Rick to transport from high and low temperatures, high winds, lightning	
					Professional Head of											risk for 2050 and 2080 will increase further			
TR13 Asset Track	Track and S&C	Heavy rain/cloudburst	Indirect Wale	es & Western W	Wales & Western Wales & Western	d RAM Track Water exceeds rail head level causing trains to stop or travel at caution	Historic failures where track has flooded due to inability for drainage (natural or drainage system) to cope with rain or blocked/broken drains. Water exceeds rail level and stops or slows trains down	6/moderate High 8/mod	derate High	8/moderate 8/modera	Flooded track caused by weaknesses in drainage systems or lack of drainage system	9/moderate 12	2/major High	9/moderate	12/major H	gh Excess rain exceeds drainage capacity resulting in weakened track assets and expo increased risk	sure to No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
		111-1			Professional Head of		Historie failures where the first th												
TR14 Asset Track	Track and S&C	High average rainfall over several days	Indirect Wale	es & Western W	Wales & Western Vales & Western And RAMs	k RAM Track Water exceeds rail head level causing trains to stop or travel at caution	Historic failures where track has flooded due to inability for drainage (natural or drainage system) to cope with rain or blocked/broken drains. Water exceeds rail level and stops or slows trains down	6/moderate High 8/mod	derate High	8/moderate 8/modera	Flooded track caused by weaknesses in drainage systems or lack of drainage system	9/moderate 12	2/major High	9/moderate	12/major H	gh Excess rain exceeds drainage capacity resulting in weakened track assets and expo increased risk	ure to No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
TR15 Asset Track	Track and S&C	High soil moisture	Interdependency (us on them) Wale	es & Western W	Wales & Western Geotechnical and RAM	RAM Track misaligned or very rough top causing a rapid reduction in ri quality	ide Historic failures especially on clay or peat areas in South or East of England resulting in destabilised embankments and cuttings	9/moderate High 10/m	najor High	10/major 10/majo	High Soil moisture causes weaknesses in embankment stability	9/moderate 12	2/major High	9/moderate	12/major H	gh track and deteriorating track quality conditions	age to No Variation	Risks to infrastructure services from river, surface water and Risks to infrastructure services from slope and embankment failure failure	subsidence
TR16 Asset Track	Track and S&C	Law call maistura	Interdependency (us on them) Wale	es & Western W			destabilised embankments and curungs ide Historic failures especially on clay or peat areas in South or East of England resulting in destabilised embankments and cuttings	9/moderate High 9/mod	derate High	9/moderate 10/majo	Low Soil moisture causes prolonged instability in embankments especially if followed by heavy and sustained rainfall	9/moderate 12	2/major High		12/major H	igh Effect on earthworks due to dryness will cause shrinkage and deterioration in trad quality and condition	No Variation	Pourmwater mount Risk to transport from high and low temperatures, high minds, lights to transport networks from slope and embankment failure	Risks to subterranean and surface infrastructure from subsidence
			Laboration of the second secon		Professional Head of Geotechnical/	Water undermines track support system (e.g.	Historic failures in earthwork due to flooding which undermines the track condition resulting in some fracticitions or line choicere.									Flooding near rivers, coastal areas or low lying land resulting in weakening track		Risks to infrastructure services from river, surface water and	
TR17 Asset Track	Track and S&C	Flooding	(us on them) Wale	es & Western W	Wales & Western Professional Head of Drainage and Off Track and RAMs	mum track embankment/cutting)	spece resolutions on mile costanes	6/moderate High 8/mod	derate High	8/moderate 8/modera	te Detrimental impact on embankment stability causing deterioration of track geometry	9/moderate 12	2/major High	9/moderate	12/major H	igh formation and causing wash-out increasing future risk due to rise in river and sea I Likely to cause extensive damage to track	evels. No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
TR18 Asset Track	Track and S&C	Erosion	Interdependency (us on them) Wale	es & Western W	Wales & Western Geotechnical and RAM	RAM Track misaligned or very rough top from eroded embankment or cutting causing a rapid reduction in ride quality	Historic failures especially on embankments resulting in track becoming uneven from embankment subsidence	9/moderate High 10/m	najor High	10/major 10/majo	This could either be from standard river or flood flows (could result in rapid or slow deterioration)	9/moderate 12	2/major Mediur	m 9/moderate	12/major Me	dium Effect on track stability expected to increase especially in Southern half of country (cuttings and embankments)	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
TR19 Asset Track	Track and S&C	Storms	Indirect Works	es & Western 14	Professional Head of Geotechnical/ Wales & Western Professional Head of		Historic failures where track has flooded during stormy weather due to inability for drainage to	9/moderate High 10-	najor High	10/major 10/majo	Flooded track causes weaknesses in drainage systems to arise and also affects	9/moderate 12	2/major Mediu	m 9/moderate	12/major Ma	dium weaker embankments will make track formation less stable and degrade its condit	on No Variation	Risks to infrastructure services from river, surface water and Risks to energy from high and low temperatures, high wind	Risks to transport networks from slope and embankment Risks to subterranean and surface infrastructure from
			vulle		Drainage and Off Track and RAMs	trains to stop or travel at caution	Historic failures where track has flooded during stormy weather due to inability for drainage to cope with rain or blocked/broken drains. Water exceeds rail level and stops or slows trains dow		1.16.1		embankment stability. A key risk in coastal areas and near rivers		.neulu		We			groundwater flooding and lightning	umure subsidence
	Track and S&C	Higher average temperature	Direct Wale	es & Western W	Wales & Western and RAM	Condorrisk	Instance endence of duckie crends shows that jointed track is more likely to duckie than even		derate High	6/moderate 10/majo	Increase in track buckles as temperatures rise with a greater likelihood of buckling	9/moderate 12	2/major Mediu	m 9/moderate	12/major Me	Jointed track is less resilient to heat beyond 38 degrees C air temp. Assuming that dium have managed all deficiencies to meet compliant design limits. However if this assumption proves to be incorrect then the risk for 2050 and 2080 will increase fu	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
TR20 Asset S&C	S&C	Snow/ice			Wales & Western and RAM Wales & Western and RAM	RS RAM Track Switches overwhelmed by snow build up preventing operation of points RS RAM Track Switches overwhelmed by snow build up preventing operation of Switches overwhelmed by snow build up preventing operation	Historic failures from severe snow storms (2010 and 2018) causing points with or without point heating to freeze or to become compacted with snow or ice Historic failures from severe snow storms (2010 and 2018) causing points with or without point	6/moderate Medium 8/mod			Snow levels have reduced hence frequency of events likely to drop		noderate Medius			dium Impact will worsen although frequency of events will reduce	No Variation	Risk to transport from high and low temperatures, high winds, lightning Risk to transport from high and low temperatures, high	
TR21 Asset S&C TR22 Asset S&C	S&C Points operating equipment	Snow/ice Extreme hot temperatures			Wales & Western Professional Head of S&C	C RAM Track Electronic components fail due to early life failures or exceeding design threshold	heating to freeze or to become compacted with snow or ice Excessive heat causes components in lineside cabinets or equipment cases to heat up reducing life expectancy of electronic components through thermal stressing	6/moderate Medium 6/mod 6/moderate Medium 6/mod	derate Medium derate Medium		te Snow levels have reduced hence frequency of events likely to drop Failures will increase due to negative effect of thermal stressing on electronic components increasing degradation		noderate Low noderate Medius			ow Impact will worsen although frequency of events will reduce dium Effect increases by 2080 due to projected temp increases and current design paral	No Variation neters No Variation	winds. Lightning Risk to transport from high and low temperatures, high winds. Lightning	
	Points operating equipment	Large diurnal temperature range	Direct Wale	es & Western W	Wales & Western And RAM		Rapid rise and drop in temperatures causing electronic components in lineside cabinets or equipment cases to experience thermal stressing and reducing life expectancy of electronic components	6/moderate Medium 6/mod	derate Medium	6/moderate 6/modera	Failures will increase due to negative effect of thermal stressing on electronic components increasing degradation	6/moderate 9/m	noderate Medius	m 6/moderate	9/moderate Me	dium Effect increases by 2080 due to projected temp increases and current design para	neters No Variation	Risk to transport from high and low temperatures, high winds, lightning	
TR24 Asset S&C	Points operating equipment	Flooding	Indirect Wale	es & Western W	Wales & Western Professional Head of Drainage and Off Track		in This is a low risk currently as assets are sealed and generally not affected by floods, however du to the position of equipment next to track protection by raising is not always feasible and persistent flooding would inevitably result in component degradation and failure	2/minor Low 4/mod	derate Low	4/moderate 4/modera	Limited number of failures due to water ingress however deterioration in sealed material could affect electrical and mechanical components within points operating equipment	6/moderate 6/m	noderate Medius	m 6/moderate	6/moderate Me	dium Expected increase in flooding on coastal areas, rivers and on level land or cuttings more prone to effects of flooding		Risks to infrastructure services from river, surface water and groundwater flooding	
TR25 Asset Track	Track and S&C	Higher average temperature	Direct Wale	es & Western W	Wales & Western Professional Head of Trac	ck RAM Track Associated with S&C, curvature in track and connections between different sleeper/bearer types		2/minor High 2/mi	inor High	2/minor 4/modera	te Current failures associated with deficiencies and not poor design	6/moderate 6/m	noderate Mediu	m 6/moderate	6/moderate Me	dium Increased temperature especially in southern half of the network will be impacted sleepers/bearers are of an older design or made from timber		Risk to transport from high and low temperatures, high winds, lightning	
TR3 Asset Track	Track and S&C	Heat wave	Direct Wale	es & Western W	Wales & Western and RAM	ck RAM Track Rall temps exceeding 54 degrees C will require speed restrictions control risk	to Historic evidence of buckle trends shows that jointed track is more likely to buckle than CWR	9/moderate High 9/mod	derate High	6/moderate 10/majo	Increase in track buckles as temperatures rise with a greater likelihood of buckling	9/moderate 12	2/major Mediur	m 9/moderate	12/major Me	Jointed track is less resilient to heat beyond 38 degrees C air temp. Assuming that dium have managed all deficiencies to meet compliant design limits. However if this assumption proves to be incorrect then the risk for 2050 and 2080 will increase fu	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
TR4 Asset Track	Track and S&C	Large diurnal temperature range	Direct Wale	es & Western W	Wales & Western and RAM	ck RAM Track condition assets being exposed through expansion	Historic failures causing rapid expansion and contraction of metal rails causing destabilisation in rail stress if not adequately stressed	9/moderate High 9/mod	derate High	9/moderate 9/modera	Failures will increase due to change in temperature variation due to rail temps exceeding 53 degrees C	9/moderate 12	2/major Mediu	m 9/moderate	12/major Me	Jointed track is less resilient to heat beyond 38 degrees C air temp. Assuming that dium have managed all deficiencies to meet compliant design limits. However if this	Routes No Variation	Risk to transport from high and low temperatures, high winds, lightning	
		Long hot, dry			Brefersional Haad of Trac	Condition assets being exposed through expansion	Historic failures from previous hot summers where we have experienced double figures in track									assumption proves to be incorrect then the risk for 2050 and 2080 will increase fu	ther	winds, lightning Risk to transport from high and low temperatures, high	
TR5 Asset Track	Track and S&C	summer	uirect Wale	es & Western W	Wales & Western and RAM	RAM Track control risk control risk	^{LD} buckles or high number of speed restrictions that have resulted in cancellations and severe train delays to passengers and freight	9/moderate High 9/mod	derate High	Б/moderate 10/majo	Failures will increase due to impact of not being able to deliver work during this period	9/moderate 12	2/major High	9/moderate	12/major H	gh have managed all deficiencies to meet compliant design limits. However if this assumption proves to be incorrect then the risk for 2050 and 2080 will increase fu	No Variation	nisk to bansport i rom nign and row temperatures, nign winds, lightning	

					Professional Head of Track		Fully stressed and undisturbed track is resilient to between 54 and 59 degrees C, but more				Increase in track buckles as temperatures rise with a greater likelihood of buckling				Legacy CWR track is resilient to 41 degrees C air temp. Projected increases in modern	7		
TR6 Asset	Track	rack and S&C (CWR)		Wales & Western Wales & Western	and RAM Track	Rail Temps exceed 56 resulting in speed restrictions to control r	lisk modern variants can withstand up to 64 degrees C. Current network coverage of modern CWR i just over 30%. Risk of excessive heat causing more track buckles increasing derailment risk Fully stressed and undisturbed track is resilient to between 54 and 59 degrees C, but more	s 6/moderate High 6/mo	oderate High	4/moderate 8/moderate	especially in legacy CWR construction	9/moderate 12/major	High 9/moderate	12/major	High CWR over next 30-50yrs means greater coverage over network. Assumes that Routes manage all deficiencies to meet compliant design limits. However if this assumption proves to be incorrect then the risk will increase Legacy CWR track is resilient to 41 degrees C air temp. Projected increases in modern		Risk to transport from high and low temperatures, high winds, lightning	
TR7 Asset	Track	irack and S&C Higher av temperat		Wales & Western Wales & Western	Professional Head of Track and RAM	Rail Temps exceed 56 resulting in speed restrictions to control r	isk modern variants can withstand up to 64 degrees C. Current network coverage of modern CWR i just over 30%. Higher than normal heat increases track buckles leading to derailment Fully stressed and undisturbed track is resilient to between 54 and 59 degrees C, but more	s 6/moderate High 6/mo	oderate High	4/moderate 8/moderate	Increase in track buckles as temperatures rise with a greater likelihood of buckling especially in legacy CWR construction	9/moderate 12/major	High 9/moderate	12/major	High High CWR over next 30-50yrs means greater coverage over network. Assumes that Routes manage all deficiencies to meet compliant design limits. However if this assumption proves to be incorrect then the risk will increase Legacy CWR track is resilient to 41 degrees C air temp. Projected increases in modern	No Variation	Rick to transport from high and low temperatures, high winds, lightning	
TR8 Asset	Track	frack and S&C Heat wav	Direct	Wales & Western Wales & Western	Professional Head of Track and RAM	Rail Temps exceed 56 resulting in speed restrictions to control r	modern variants can withstand up to 64 degrees C. Current network severage of modern CNP is	9/moderate High 9/mo	oderate High	6/moderate 10/major	Increase in track buckles as temperatures rise with a greater likelihood of buckling especially in legacy CWR construction	9/moderate 12/major	High 9/moderate	12/major	High High cover next 30-50yrs means greater coverage over network. Assumes that Routes manage all deficiencies to meet compliant design limits. However if this assumption proves to be incorrect then the risk will increase	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
TR9 Asset	Track	frack and S&C Large diu temperat		Wales & Western Wales & Western	Professional Head of Track and RAM	Rail Temps exceed 56 resulting in speed restrictions to control r	isk Increased risk of rail breaks due to compressive stresses or track buckling as a result of disturbance or deficiencies	6/moderate High 6/mo	oderate High	6/moderate 6/moderate	Failures will increase due to change in temperature variation as a result of rail temps exceeding 56 degrees C	9/moderate 12/major	Medium 9/moderate	12/major	Legacy CWR track is resilient to 41 degrees C air temp. Projected increases in modern Medium Medium manage all deficiencies to meet compliant design limits. However if this assumption proves to be incorrect then the risk will increase	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
Tun1 Asset	Tunnels	'unnels Heat waw	Direct	Wales & Western Wales & Western	Professional Head of Mining and Tunnels RAM Structures	Intervention based on deteriorating condition against predetermined baseline requirements	More defects (loss of confinement of the arch/arch collapse), higher costs to repair, deterioration may lead to speed restrictions through tunnels Predominantly a risk to Tunnels through clay solls	3/minor Low 3/r	minor Low	2/minor 4/moderate	Limited information about soil/tunnel interaction. Minimal occurrences previously	6/moderate 9/moderate	Low 6/moderate	9/moderate	Low Assumptions based on how soils behave when saturated with water and how this woul impact the tunnel lining	d No Variation	Risks to subterranean and surface infrastructure from subsidence	
	Tunnels	unnels Snow/ice	Direct	Wales & Western Wales & Western	Professional Head of Mining and Tunnels and RAM	Intervention based on Extreme Weather Plans determined by e route	Risk of tunnel closures to remove ice, thawing ice may fall and damage assets (OLE, Track), risk to safety of workforce Risk only to Tunnels with construction shafts	12/major High 12/	major High	12/major 12/major	Current issue for Tunnel operation. Likely to become less frequent but worse	12/major 10/major	Medium 12/major	10/major	Medium Assumptions based on recurrent issue within tunnels which will occur more often with extended periods of low temperatures	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
		'unnels Snow/ice	Direct	Wales & Western Wales & Western	Professional Head of Mining and Tunnels and RAM	Intervention based on Extreme Weather Plans determined by e route	ach Risk of tunnel closures to remove ice, teams required to enter tunnel more frequently to unbloc tunnels, delays to morning trains while ice is removed More defects, higher costs to repair, deterioration may lead to speed restrictions through	12/major High 12/	major High	12/major 12/major	Current issue for Tunnel operation. Likely to become less frequent but worse	12/major 12/major	Medium 12/major	12/major	Medium Assumptions based on recurrent issue within tunnels which will occur more often with extended periods of low temperatures	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
Tun4 Asset	Tunnels	'unnels Figh aver season		Wales & Western Wales & Western	Professional Head of Mining and Tunnels RAM Structures	Intervention based on deteriorating condition against predetermined baseline requirements	wore berecks, majner costs to repar, beterioration may read to speed restrictions introugn tunnels. Drainage systems need improving to cope with additional flow Increase of Winter rainfall may destabilise hidden shafts and could lead to collapse in extreme cases	12/major Medium 16/	major Medium	16/major 16/major	Tunnel defects currently managed. Increase could make the level of defects unmanageable	16/major 20/severe	Medium 16/major	20/severe	Assumptions based on water ingress being a major cause of defects within tunnels. Assumed that increase Winter rainfall will increase water ingress in tunnels	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
Tun5 Asset	Tunnels	'unnels Flooding	Direct	Wales & Western Wales & Western	Professional Head of Mining and Tunnels and RAM	Intervention based on increase in flood incidents in Tunnels	Tunnels could be closed due to flooding, TSRs in place in case of scour damage, closures could b lengthy if track bed is damaged by the flooding	9/moderate Medium 10/	major Medium	10/major 10/major	Few instances of flooding currently due to water levels therefore uncertain on total extent of damage	12/major 16/major	Medium 12/major	16/major	Medium Assumption based on increasing sea level resulting in tunnels being below tide levels a therefore flooding	nd No Variation	Risks to infrastructure services from coastal flooding and erosion Risk to offshore infrastructure from storms and high waves	
Tun5A Asset	Tunnels	'unnels Flooding	Direct	Wales & Western Wales & Western	Professional Head of Mining and Tunnels Professional Head of	Intervention based on increase in flood incidents in Tunnels	Tunnels could be closed due to flooding, TSRs in place in case of scour damage, closures could b lengthy if track bed is damaged by flooding	9/moderate Medium 10/	major Medium	10/major 10/major	Few instances of flooding currently due to water levels therefore uncertain on total extent of damage	12/major 16/major	Medium 12/major	16/major	Medium Assumption based on increasing river flows result in Tunnels being below water levels and therefore flooding	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
Tun6 Asset	Tunnels	unnels High winc	Direct	Wales & Western Wales & Western	Mining and Tunnels and RAM Structures		Increased specification for fixings and signage to cope with higher windspeeds. Potential restriction of access during high winds to carry out remedial work Tunnel closure could be required to repair defects below the track and within the drainage. Risk	3/minor High 3/r	minor High	4/moderate 2/minor	Current risk low, would expect increase in risk only for significant wind speed increase	6/moderate 8/moderate	Low 6/moderate	8/moderate	Low Assumption based on increase in wind speed increasing pressure on signage and causin it to dislodge	NO Variation	Risk to transport from high and low temperatures, high winds, lightning	
	Tunnels	'unnels High soil i	Direct		Mining and runnels	Intervention based on deteriorating condition against predetermined baseline requirements Intervention based on deteriorating condition against	to train operations Predominantly a risk to Tunnels through clay soils	6/moderate Low 8/mo	oderate Low	8/moderate 8/moderate	Minimal occurrences currently therefore unclear the impact this may have long term	6/moderate 9/moderate	Low 6/moderate	9/moderate	Low Assumptions based on how solis behave when saturated with water and how this woul impact the tunnel lining Assumptions based on this being a cause of defects within tunnels. Assumed that increases the option of the defect of the tunnels.		Risks to infrastructure services from river, surface water and groundwater flooding	
Tun8 Asset	Tunnels	temperat	e range	Wales & Western Wales & Western	Mining and Tunnels RAM Structures Professional Head of	predetermined baseline requirements	More defects, higher costs to repair Changes in climate more favourable to the spread of pathogens that have no known predation	12/major Medium 12/	major Medium	12/major 12/major	unmanageable	16/major 20/severe	Low 16/major	20/severe	In numioity and temperature range will increase deletts in tunnels			
VN1 Asset	Vegetation	frees Long hot, summer	Direct		Drainage and Off Track RAM GLD and RAM	Trigger points dependant on condition measures applied to tree risk	^c could lead to increased failure modes. The indicators would be captured during tree risk assessment. Potential for interventions to be increased to assess risk	9/moderate Medium 9/mo	oderate Medium	6/moderate 10/major	Infestations are likely to happen there will be uncertainty on the impact to the railway Uncertainty whether this risk will have a noticeable affect on tree health within a short	9/moderate 9/moderate	Medium 9/moderate	9/moderate	Medium Medium Medium in view of the future climate projection	e No Variation ble		
VN2 Asset	Vegetation	frees Low soil n	isture Direct		Drainage and Oil Track	Trigger point can be related to long periods of drought during spring extending to early summer	Trees can be susceptible to pests and diseases following long periods of drought. In severe case trees can die within 1 season. This increases tree risk failure	^g 9/moderate Medium 9/mo	oderate Medium	9/moderate 10/major	period of time or if this will be a contributing factor to changes in growth patterns over longer periods of time as tree adapt to local conditions	9/moderate 9/moderate	Low 9/moderate	9/moderate	Low There is no current data to assess trends and possible predictions	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
VN3 Asset	Vegetation	Trees/Bush Long hot, summer	Direct		Professional Head of Drainage and Off Track RAM GLD and RAM	Trigger point can be related to long periods of drought during spring extending to early summer	Lineside fires are likely to increase this can have an affect on performance and put operators at risk	8/moderate High 8/mo	oderate High	6/moderate 10/major	Likely to happen but impact would be minor where performance will be affected more than safety	10/major 10/major	High 10/major	10/major	High There is no current data to assess trends and possible predictions, there are design features that can be adopted within new and existing woodlands and lineside habitats	No Variation	Risk to transport from high and low temperatures, high winds, lightning	
VN4 Asset	Vegetation	Extended season (combina weather		Wales & Western Wales & Western	Professional Head of Drainage and Off Track RAM GLD and RAM	Trigger points dependant on encroachments that require action and immediate action	Extended growth seasons and warmer wetter climates are likely to result in more rapid woody stem, leaf and bud development with conditions more favourable to exotic species	3/minor Medium 4/mo	oderate Medium	4/moderate 4/moderate	High confidence that growth seasons will increase but low confidence that this will result in growth rate increase and resulting encroachment increase	5/moderate 5/moderate	Medium 5/moderate	5/moderate	There is no current data that suggests growth rate and subsequent encroachment rate are increasing, normalised or decreasing. If seasonal changes are expected vegetation and growth would be expected to adapt. Difficult to predict if this will be positive or	s No Variation		
		weather paramete Extended season	rowth		and RAM Professional Head of										negative to the railway			
VN5 Asset	Vegetation	nvasive plants season weather paramete)	Wales & Western Wales & Western	Drainage and Off Track RAM GLD and RAM	Increase in financial penalties and claims, reputational damage drain on resources to control spread	and Extended growth season could increase the spread of invasive plants for established sites and new colonies to develop	5/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate	There is no specific data that suggests that invasive plants are adapting to current conditions more aggressively than native plants	9/moderate 9/moderate	Medium 9/moderate	9/moderate	Medium Likely that transport networks and corporate bodies will be a legislative and regulatory focus and vulnerable to claims	No Variation		
VN6 Asset	Vegetation	rees/leaf fall (combina	rowth	Wales & Western Wales & Western	Professional Head of Drainage and Off Track RAM GLD	Adhesion performance indicators	Seasonal changes could lead to the effects of leaf fall being irregular leading to unexpected operational issues	2/minor Low 3/r	minor Low	3/minor 3/minor	low confidence on the effects of seasonal changes and its level of change	9/moderate 9/moderate	Low 9/moderate	9/moderate	Seasonal performance will continue to be an industry focus, changes in vegetation Low composition, growth characteristics will require some understanding over the next 50	No Variation		
VN7	Vegetation	veather paramete rees Heavy	Direct	Wales & Western Wales & Western	Professional Head of	Increased incident/fault/condition indicators	This has links to earthwork and potential bank slip but also in locations next to the railway wher	9/moderate Medium 10/	major Medium	10/maig	Increase in storms would suggest that conditions that have the potential to cause soil	10/mains	Low 10/major	12/00	Vears Low Future climate suggests storm events to be more frequent, if this continues the negative	re No Variation	Risks to infrastructure services from river, surface water and Risks to transport networks from slope and embankment	
VN7 Asset VN8 Asset		rees rain/clour	Direct	Weles 8 Westers Weles 8 Westers	Professional Head of	Increased incident/fault/condition indicators	substrates are washed out that were providing root anchorage This has links to drainage where trapped water or where areas are left to develop into wetland	9/moderate Medium 10/	major Medium major Medium		washout will be more frequent Water logging around trees is known to result in tree death there is no current data or	10/major 12/major 9/moderate 9/moderate		12/major 9/moderate	effects of washout are also likely to increase Without current modelling it is difficult to provide a high degree of confidence of the		groundwater flooding failure failure failure	
YV01 Accet		rain/cloud	Direct		RAM and Professional		causes water log effect on trees and their roots Flooding could disrupt access to services, risk the safety of passengers and staff through slips,			R/madacata R/madacata	modelling in place for this type of defect Past incidences? Flooding within buildings would be unlikely (existing controls for					No Variation	groundwater flooding Risks to infrastructure services from river, surface water and	
ASSET	Drainage	station buildings Flooding	birect		Head of Drainage and Off Track RAM and Professional	and damages buildings	trips and fails and require repairs	sympoerate medium symp	oderate Medium	Symoderate Symoderate	extreme weather would be in place) but moderate impact	9/moderate 9/moderate		9/moderate	Medium N/A		groundwater flooding	
XXO2 Asset	Drainage	Platforms Flooding	Direct	Wales & Western Wales & Western	Head of Drainage and Off Track	Flooding poses risk to safety/wellbeing of staff and/or passenge and damages platforms	rs Flooding could disrupt access to services, risk the safety of passengers and staff through slips, trips and falls and require repairs	9/moderate Medium 10/	major Medium	10/major 10/major	Past incidences? Flooding of platforms possible likelihood and moderate impact	12/major 12/major	Medium 12/major	12/major	Medium N/A	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
XX03 Asset	Drainage	Subways Flooding	Direct	Wales & Western Wales & Western	RAM and Professional Head of Drainage and Off Track	and could damage the structure	rs Flooding could render subways impassable, causing disruption to railway users and require repairs	9/moderate Medium 10/	major Medium	10/major 10/major	Past incidences? Flooding of subways possible likelihood and moderate impact	12/major 12/major	Medium 12/major	12/major	Medium N/A	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
XX04 Asset	Drainage	Car parks Flooding	Direct	Wales & Western Wales & Western		Flooding poses disruption to car park access, poses a safety risk passengers and staff and/or damages the structure	to Disruption accessing vehicles or entering/existing car parks. Risk to staff and passengers. Repair may be required	^g 6/moderate Medium 8/mo	oderate Medium	8/moderate 8/moderate	Past incidences? Flooding of car parks possible with a minor impact	8/moderate 8/moderate	Medium 8/moderate	8/moderate		No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
XX05 Asset	Structures	Coastal and estuarial protection High wind	N.	Wales & Western Wales & Western	RAM and Professional Head of Structures RAMs and local	Safety speed restrictions considered and imposed	Risk to rolling stock, passengers, staff and assets	10/major Medium 10/	major Medium		Risk to safety and operations	12/major 16/major		16/major	Medium N/A	No Variation	Risks to Infrastructure services from coastal flooding and erosion Risks to transport from high and low temperatures, high Risks to transport from high and low temperatures, high	
XX06 Asset	All	Vaintenance activities summer	Direct	Wales & Western Wales & Western	All RAMs RAM/ Professional Head	Advanced weather warning	Certain works for example on track can not be undertaken in high temperatures		oderate Medium	4/moderate 8/moderate	Disruption to maintenance regime	8/moderate 8/moderate	Medium 8/moderate	8/moderate	Medium Little but some contingency in place for rearranging maintenance works	No Variation	winds, lightning	
XX07 Asset	Buildings	itaff and passengers Extreme h temperat		Wales & Western Wales & Western	of Buildings and Architecture and station manager	Weather warning for hot days, risk to safety/wellbeing of staff/passengers	Risks to the health, wellbeing and comfort of passengers and staff. Could lead to less passengers choosing to travel or an increase in health incidents, increase in irritancy and antisocial behaviour	s 6/moderate Medium 6/mo	oderate Medium	4/moderate 8/moderate	Unlikely that this will happen currently due to the small number of very hot days currently experienced	9/moderate 12/major	Medium 9/moderate	12/major	Medium Assuming that stations have existing air conditioning/ventilation but overheating may : occur	No Variation	Risks to transport from high and low temperatures, high winds, lightning	
XX08 Asset	Buildings	Platforms Higher av temperat		Wales & Western Wales & Western	RAM and Professional Head of Buildings and Architecture	Reports of deformed surfacing	Deformed surfacing could lead to risk to safety of staff/passengers and quicker deterioration of further materials if not treated	4/moderate Medium 4/mo	oderate Medium	4/moderate 6/moderate	Minor impact should it be detected and localised	6/moderate 6/moderate	Medium 6/moderate	6/moderate	Medium Regular maintenance inspections to surfacing	No Variation	Risks to transport from high and low temperatures, high winds, lightning	
200	Buildings	station buildings Snow/ice	Direct	Wales & Western Wales & Western	Architecture RAM and Professional Head of Buildings and RAM Buildings	Advanced weather warning for heavy snow	Large snow accumulations can increase weight loading on the roof/structures, increasing rate o	f 6/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate	Heavy snow events are possible albeit generally limited to a few times per year at most	4/moderate 4/moderate	Medium d/mediume	4/moderate	Medium Structures have been built with wind loading taken into account	No Variation	Risks to transport from high and low temperatures, high	
M223 M2261		Show/ice	Un Ctt	wares & western	Architecture RAM and Professional		deterioration	incuti o/mo	Medium	of the second of the second seco				y moder die	and the second s		winds, lightning	
XX10 Asset	Buildings	station buildings High wind	Direct	Wales & Western Wales & Western	Head of Buildings and RAM Buildings Architecture	Storm warning. Linked to trigger level for investment which is a condition	sset Risk to safety of human receptors and surrounding environment	4/moderate Low 4/mo	oderate Low	6/moderate 6/moderate	While it is likely that an event could occur the likelihood of a person being hit or injured or damage to the surrounding buildings or environment is low	8/moderate 8/moderate	Low 8/moderate	8/moderate	Low Infrastructure has been built with wind loading taken into account	No Variation	Risks to transport from high and low temperatures, high winds, lightning	
XX11 Asset	Buildings	station buildings Snow/ice	Direct	Wales & Western Wales & Western	RAM and Professional Head of Buildings and Architecture	Advanced weather warning for snow. Linked to trigger level for investment which is asset condition	Potential for disruption to operations and deterioration of materials from water ingress	6/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate	Unlikely for leaks to occur as a result of snow given building composition and frequency of snowfall	4/moderate 4/moderate	Medium 4/moderate	4/moderate	Medium Structures have been built to a high degree of protection from leaks	No Variation	Risks to transport from high and low temperatures, high winds, lightning	
XX12 Asset	Buildings	itaff and passengers Snow/ice,	ainfall Direct	Wales & Western Wales & Western	RAM and Professional Head of Buildings and RAM Buildings	Risk to safety of staff/passengers	Increased water on surfaces from footfall encouraging slip risk to spread	8/moderate Medium 10/	major Medium	10/major 10/major	Likely that this already occurs however would be of minor impact	9/moderate 10/Major	Medium 9/moderate	10/Major	Medium Response/maintenance teams and processes within buildings for clear up of water	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
YY12 Arrot	Ruildings	tation building:	fall Direct	Wales & Western Wales & Western	Architecture RAM and Professional Head of Buildings and RAM Buildings	Weather warning for heavy rainfall, risks to safety of passengers/staff. Asset deterioration and repairs inked to trigge	Potential for disruption to operations, risk to safety and deterioration of materials from water	6/moderate Medium 8/mo	oderate Medium	R/madacata R/madacata	Unlikely for looks to occur alway building composition	9/moderate 9/moderate	Medium 9/moderate	9/moderate	Medium Regular maintenance inspections on building conditions	No Variation	Risks to infrastructure services from river, surface water and	
Asset	Buildings		fall Direct		Architecture RAM and Professional	level for investment which is asset condition	ngress Reteatial for discussion to executions, sick to safety and datasiantics of materials from water				Unlikely for leaks to occur given building composition						groundwater flooding	
XX14 Asset	Buildings	itation buildings Intense ra	ifall Direct	Wales & Western Wales & Western	Head of Buildings and RAM Buildings Architecture	Linked to trigger level for investment which is asset condition	Potential for disruption to operations, risk to safety and deterioration of materials from water ingress	4/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate	Increases in the water table high enough to cause water ingress are unlikely	6/moderate 6/moderate	Medium 6/moderate	6/moderate	Medium Regular maintenance inspections on building conditions	No Variation	Risks to Infrastructure services from river, surface water and groundwater flooding	
XX15 Asset	Buildings	station buildings Extreme of temperat	ld Interdependen es (us on them)	Wales & Western Wales & Western	RAM and Professional Head of Buildings and Architecture	Linked to trigger level for investment which is asset condition	Increase in fuel cost associated with heating	6/moderate Medium 6/mo	oderate Medium	9/moderate 4/moderate	Possible though minor impact	4/moderate 4/moderate	Medium 4/moderate	4/moderate	Medium N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning	
XX16 Asset	Buildings	station buildings Snow/ice	Direct	Wales & Western Wales & Western	RAM and Professional Head of Buildings and Architecture	Advanced weather warning for snow, risks to safety of passengers/staff	Closure may be due to difficulty accessing station buildings due to snow or risk to health and safety	4/moderate Medium 4/mo	oderate Medium	4/moderate 4/moderate	Highly unlikely for stations to close - procedures would be in place to ensure they remain open	8/moderate 12/major	Medium 8/moderate	12/major	Medium Emergency response/extreme weather response plans to ensure stations remain open extreme weather	in No Variation	Risks to transport from high and low temperatures, high winds, lightning	
XX17 Asset	Buildings	station buildings Intense ra	ifall Direct	Wales & Western Wales & Western	RAM and Professional Head of Buildings and RAM Buildings	Linked to trigger level for investment which is asset condition	Disruption to operation, increased deterioration of materials	9/moderate Medium 10/	major Medium	10/major 10/major	Heavy precipitation events and flash flooding is increasingly likely	12/major 12/major	Medium 12/major	12/major	Medium Drainage design has not been updated to cope with increased flows	No Variation	Risks to infrastructure services from river, surface water and enumdwater flooting	
					Architecture RAM and Professional										Roof tiles would be firmly secured and routine maintenance would be undertaken,		groundwater flooding Risks to transport from high and low temperatures, high	
XX18 Asset	Buildings	itation buildings High wind	Direct	Wales & Western Wales & Western	Head of Buildings and RAM Buildings Architecture	Linked to trigger level for investment which is asset condition	Risk to safety of human receptors and surrounding environment and asset damage	4/moderate Medium 4/mo	oderate Medium	6/moderate 6/moderate	Highly unlikely that roof tiles would be dislocated but would be a major event	8/moderate 8/moderate	Medium 8/moderate	8/moderate	Medium Identifying any loose components. Western - this is something that would easily be pic up under current maintenance	keqNo Variation	reast to transport from nign and low temperatures, nign winds, lightning	
XX19 Asset	Buildings	station buildings Lightning	Direct	Wales & Western Wales & Western	RAM, Professional Head of Buildings and Architecture and Professional Head of	Advanced weather warning and investment after events	Risk to safety of human receptors and surrounding environment, disruption to operation and asset damage	6/moderate Medium 8/mo	oderate Medium	6/moderate 8/moderate	Unlikely however a moderate impact	6/moderate 6/moderate	Medium 6/moderate	6/moderate	Medium Provision of backup power supplies and fire response plans	No Variation	Risks to transport from high and low temperatures, high winds, lightning	
					Power Distribution HV/LV		-											
XX20 Asset	Drainage	nterconnected track drainage systems Flooding	Direct	Wales & Western Wales & Western	RAM and Professional Head of Drainage and Off Track	Local flooding of the track will prompt a limit of train movemen (either a speed restriction or line closed) and trigger level for investment based on asset condition after damage		6/moderate Medium 8/mo	oderate Medium	8/moderate 8/moderate	Moderate impacts as a result of speed restriction delays	9/moderate 9/moderate	Medium 9/moderate	9/moderate	Track drainage provisions are designed to cope with increased flows and regularly inspected – This risk needs to be reassessed in the next review without the assumption adaptation	of No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
XX21 Asset	Drainage	Rock cuttings, soil cuttings, embankments Flooding	Direct	Wales & Western Wales & Western	RAM and Professional head of Drainage and Off Track	Linked to trigger level for investment which is asset condition	Risk to operation, materials condition	6/moderate Medium 8/mo	oderate Medium	8/moderate 8/moderate	Unlikely however a moderate impact	9/moderate 9/moderate	Medium 9/moderate	9/moderate	Medium Assumption that cess ditches and catchpits would be routinely monitored	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding	
					Track RAMs, Professional Head		×											
XX22 Asset	Drainage	Third party drainage systems Flooding	Interdependen (them on us)		of Buildings and Architecture and Professional Head of Drainage and Off Track	Local flooding of the track will prompt a limit of train movemen (either a speed restriction or line closed) and trigger level for investment based on asset condition after damage	Is Disruption to operation and to surrounding environment, increased deterioration of materials	9/moderate Medium 10/	major Medium	10/major 10/major	Heavy precipitation events and flash flooding is increasingly likely	12/major 12/major	Medium 12/major	12/major	Medium Drainage had not been designed to cope with increased flows	No Variation	Risks to infrastructure services from river, surface water and Risks to infrastructure networks (water, energy, transport, groundwater flooding	
					RAMs, Professional Head													
XX23 Asset	Drainage	Rock cuttings, soil cuttings, embankments Snow/ice	Direct	Wales & Western Wales & Western	of Geotechnical and Professional head of Drainage and Off Track	Linked to trigger level for investment which is asset condition	Disruption to operation, increased deterioration of materials	6/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate	Unlikely that snow will result in flooding. Heavy snow events are possible albeit generally limited to a few times per year at most	4/moderate 4/moderate	Medium 4/moderate	4/moderate	Medium Drainage is designed to cope with increased flows	No Variation	Risks to transport networks from slope and embankment failure	
					RAMs , Professional Head													
XX24 Asset	Drainage	Coastal and estuarial protection Sea level rise/Storn	Direct	Wales & Western Wales & Western	of Structures and Professional Head of Drainage and Off Track	Signs of flooding or deterioration of assets situated by the coast	Risk to rolling stock, passengers, staff and assets	9/moderate Medium 10/	major Medium	10/major 10/major	Risk to safety and operations	10/major 12/major	Medium 10/major	12/major	Medium Western: We are already seeing this happening in multiple locations which is triggering interventions.	No Variation	Risks to infrastructure services from coastal flooding and erosion	
XX25 Asset	Drainage	Drainage system Snow/ice	Direct	Wales & Western Wales & Western	RAM and Professional Head of Drainage and Off RAM GLD	Advanced weather warning for snow/ice	Blocking of drainage leading to risk of flooding	6/moderate Medium 6/mo	oderate Medium	6/moderate 6/moderate	Possible that ice may block drainage	4/moderate 4/moderate	Medium 4/moderate	4/moderate	Medium N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning	
XX26 Asset	Geotechnical	Rock cuttings, soil cuttings, embankments Flooding	Direct	Wales & Western Wales & Western	Track RAM and Professional Head of Geotechnical RAM GLD	Signs of deterioration of ground conditions	Risk to operation, safety, surrounding environment and damage to assets	8/moderate Medium 10/	major Medium	10/major 10/major	Unlikely however major impacts should this occur	12/major 12/major	Medium 12/major	12/major	Medium N/A	No Variation	Risks to transport networks from slope and embankment failure	
		Rock cuttings, soil cuttings, embankments Snow/ice	Direct	Wales 8 Washers Wales 8 Washers	RAM and Professional Head of Geotechnical RAM GLD	Advanced weather warning for snow	Snow melt will decrease the stability of ground conditions	6/moderate Medium 6/mo			Unlikely that accumulations of snow melt are large enough to result in such an impact			4/moderate		No Variation	Tallure Risks to transport networks from slope and embankment fallure	
					RAMS, Professional Head													
XX28 Asset	Power distribution	Electrical equipment across multiple sites Higher av temperat	age Direct	Wales & Western Wales & Western	RAMS, Professional Head of Plant & Asset Manager RAM and Professional Head of Electricfication Power Distribution HV/LV	Advanced weather warning for extreme heat	AC/ventilation provision will regulate equipment temperature, avoiding risk of overheating	6/moderate Medium 6/mo	oderate Medium	4/moderate 8/moderate	Currently it is unlikely event that AC would fail AND that equipment would overheat simultaneously	9/moderate 9/moderate	Medium 9/moderate	9/moderate	Medium AC is designed to operate in high temperatures	No Variation	Risks to transport from high and low temperatures, high winds, lightning	
YY20 Accot	Power	Electrical equipment across multiple sites Higher av	age	Waler & Wortern Waler & Wortern	RAMS, Professional Head of Plant & Asset Manager RAM	Advaged wastker warning for automa hast	Histor damand for ensure and maintenance leading to large and ensure	Elmoderate Medium Elmo	adarata Madium	Almadarita Rimadarita	Currently it is unlikely event that AC would fail AND that equipment would overheat	9/moderate 9/moderate	Modium &/moderate	9/modorata	Motion M/A	No Variation	Risks to transport from high and low temperatures, high	
XX29 Asset	distribution	ncl. location casing temperat	e	Wales & Western Wales & Western	of Plant & Asset Manager RAM and Professional Head of Electricfication Power Distribution HV/LV	Advanced weather warning for extreme heat	Higher demand for energy and maintenance leading to increased costs	- model acc medium 6/mo	Meaium	4/moderate 8/moderate	simultaneously	s/moderate	Medium 8/moderate	oymoderate		No Variation	winds, lightning	
XX30 Asset	Geotechnical	Rock cuttings, soil cuttings, embankments Drier sum	ers Direct	Wales & Western Wales & Western	RAM and Professional Head of Geotechnical RAM GLD	Linked to trigger level for investment which is asset condition	Changes in soil moisture lead to ground movements affecting geotechnical assets and track geometry increasing safety risk and asset damage. Increased intervention	6/moderate Medium 9/mo	oderate Medium	4/moderate 9/moderate	Frequency of long enough and hot enough heatwaves/summers do not yet poses a grave risk, but impacts are felt in hot years	8/moderate 9/moderate	Medium 8/moderate	9/moderate	Medium Current intervention levels, policy and method continue	No Variation	Risks to transport networks from slope and embankment failure	
XX31 Asset	Geotechnical	tock cuttings, soil cuttings, embankments Intense ra	fall Direct	Wales & Western Wales & Western	RAM and Professional Head of Geotechnical	Linked to trigger level for investment which is asset condition	Changes in soil moisture lead to ground movements affecting geotechnical assets and track geometry increasing safety risk an asset damage. Increased intervention	6/moderate Medium 8/mo	oderate Medium	8/moderate 8/moderate	Risk score assumes current rainfall conditions and assuming that ground conditions are monitored for deterioration	8/moderate 9/moderate	Medium 8/moderate	9/moderate	Medium Ground conditions will be inspected for deterioration following periods of heavy rainfa	I No Variation	Risks to transport networks from slope and embankment failure	
XX32 Asset	Geotechnical	tock cuttings, soil cuttings, embankments Intense ra	ifall Direct	Wales & Western Wales & Western	RAM and Professional Head of Geotechnical	Linked to trigger level for investment which is asset condition	Weathering of geotechnical assets lead to ground movements/creep covering the cess increasing safety risk	6/moderate Medium 8/mo	oderate Medium	8/moderate 8/moderate	Risk score assumes current rainfall conditions and assuming that ground conditions are monitored for deterioration	8/moderate 9/moderate	Medium 8/moderate	9/moderate	Medium Ground conditions will be inspected for deterioration following periods of heavy rainfa	II No Variation	Risks to transport networks from slope and embankment failure	
XX33 Asset	Vegetation	Rock cuttings, soil cuttings, Higher av mbankments/Trees temperat	age Direct	Wales & Western Wales & Western	RAM, Professional Head of Geotechnical and Professional Head of	Linked to trigger level for investment which is asset condition	Dependent on the prevalence of high water demand trees on the line	3/minor Low 3/r	minor Low	3/minor 6/moderate	Frequency of long enough and hot enough heatwaves/summers do not yet poses a grave risk, but impacts are felt in hot years	6/moderate 9/moderate	Low 6/moderate	9/moderate	Low Assuming that there are not a great number of high water demand trees on the line?	No Variation	Risks to transport networks from slope and embankment failure	
		temperat			Protessional Head of Drainage and Off Track						- the second sec							

XX34 Asset Geotechnical	Rock cuttings, soil cuttings, embankm	nents Intense rainfall	Direct	Wales & Western Wales & Western	RAMs, Professional Head of Geotechnical and RAM GLD	Linked to trigger level for investment which is asset condition	Dependent on the distance of the line to areas susceptible to flood	4/moderate Low 6/mod	derate Low	6/moderate 6/moderate	Silt deposition due to past flooding is a slow incremental process, unlikely to notice	5/moderate 6/moderate	Low S/moder	ate 6/moderate	Low Assuming that there are few areas of track which would be susceptible to this	No Variation	Risks to infrastructure services from river, surface water and
	nock carrings, son carrings, cinoanain	Changes in soli		Hues a Western	Professional head of Drainage and Off Track					oy moderate	significant effects in the short term	Symochate					groundwater flooding
XX35 Asset Geotechnical	Rock cuttings, soil cuttings, embankme	ments moisture/intensi	e Direct 1	Wales & Western Wales & Western	nead of Geolecinical	Burst water mains; life expired or product failure linked to asset damage and condition	: Washout on surface soils would result in surface instability and disruption to operation and safety	6/moderate Medium 9/mod	derate Medium	9/moderate 9/moderate	Whilst these are 3rd party events outside our control it is assumed that mitigations and controls are in place for known risk locations	8/moderate 9/moderate	Medium 8/modera	ate 9/moderate	Medium The water industry maintain current intervention levels, policy and methods	No Variation	Risks to linfastructure networks (water, energy, transport, ICT) from casceding failures
XX36 Asset Level crossing	g Level crossing drainage	Intense rainfall	Interdependency (us on them)	Wales & Western Wales & Western	RAM, Professional Head of Level Crossing and Professional Head of Drainage and Off Track	Advanced weather warning of extreme rainfall	Third party run off impact ground conditions potentially affecting our crossing stability	6/moderate Medium 8/mod	derate Medium	8/moderate 8/moderate	Already an upper moderate risk given the potential impact	8/moderate 9/moderate	Medium 8/modera	ate 9/moderate	Medium Highways Authorities maintain current intervention levels, policy and methods	No Variation	Risks to infrastructure services from river, surface water and Risks to infrastructure networks (water, energy, transport, groundwater flooding ICT) from cascading failures
XX37 Asset Power distribution	Location case	Intense rainfall	Direct	Wales & Western Wales & Western	RAM and Professional Head of Power Distribution HV/LV	Linked to trigger level for investment which is asset condition	Water ingress causes failure of/damage to electrical equipment housed in the location cases	4/moderate Medium 6/mod	derate Medium	6/moderate 6/moderate	Location cases have a degree of protection against corrosion from water ingress	5/moderate 6/moderate	Medium 5/modera	ste 6/moderate	Medium Location case protection against corrosion from water ingress does not change	No Variation	Risks to infrastructure services from river, surface water and groundwater flooding
XX38 Asset Power distribution	Location case	Intense rainfall	Direct	Wales & Western Wales & Western	RAM and Professional Head of Power Distribution HV/LV	Linked to trigger level for investment which is asset condition	Water ingress causes failure of/damage to electrical equipment housed in the location cases	6/moderate Medium 8/mod	derate Medium	8/moderate 8/moderate	Location cases have a degree of protection against water ingress	8/moderate 9/moderate	Medium 8/modera	ate 9/moderate	Medium Current policy is already placing location cases above ground level therefore mitigati some of the risk from flooding	⁶ No Variation	Risks to infrastructure services from river, surface water and groundwater flooding
XX39 Asset Track	Flangeways	Snow/ice		Wales & Western Wales & Western	RAM and Professional Head of Track	Advanced weather warning for snow/ice	Risk to service operation and safety	6/moderate Medium 6/mod	derate Medium	6/moderate 6/moderate	The sevenity of the issue varies depending on the sevenity of the winter and mitigation strategies are in place	5/moderate 4/moderate	Medium 5/modera	ate 4/moderate	Medium Current intervention levels, policy and method continue	No Variation	Risks to transport from high and low temperatures, high which is the strength of the strength
XX40 Asset Level crossing	g Track circuit		Interdependency (us on them)	Wales & Western Wales & Western	RAM and Professional Head of Level Crossing	Signs of salts on the rails and impact to track	Inappropriate gritting on or near our crossings causes failures impacting on service and safety. Depends on the frequency of gritting	6/moderate Medium 6/mod	derate Medium	9/moderate 4/moderate	Co-ordination necessary with highways authorities	5/moderate 4/moderate	Medium S/modera	ate 4/moderate	Medium Current intervention levels, policy and method continue	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX41 Asset Track	DC Conductor rails	Snow/ice	Direct	Wales & Western N/A	Professional Head of Power Distribution HV/LV	Advanced weather warning for ice	Icicles shorting DC conductor rails leads to service disruption and workforce safety risk for clearing and repairs	6/moderate Medium 6/mod	derate Medium	6/moderate 6/moderate	This occurs every year, but varies depending on the severity of the winter and is confined to the lines with conductor rails. Mitigation strategies are in place	5/moderate 4/moderate	Medium 5/modera	ate 4/moderate	Medium Current intervention levels, policy and method continue	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX42 Asset OLE	Overhead wires and supporting infrastructure	Snow/ice	Direct	Wales & Western Wales & Western	RAM and Professional RAM Head of Contact Systems Electricfication	Advanced weather warning for ice, seasonal preparation	Shorted OLE Can cause stranded trains with severe service disruptions and safety risks to passengers and staff and is managed by seasonal weather management programmes	6/moderate Medium 6/mod	derate Medium	6/moderate 6/moderate	Under current weather conditions this risk occurs on an annual basis, although it varies from year to year, but is confined to lines with OLE. Mitigation strategies are in place	6/moderate 6/moderate	Medium 6/modera	ate 6/moderate	Medium DLE will rise, but that modern designs will be more resilient	of No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX43 Asset OLE	OLE masts	High winds	Direct	Wales & Western Wales & Western	RAM and Professional RAM	Storm warning, maintenance and seasonal planning	Can cause stranded trains with severe service disruptions and safety risks to passengers and staff. Managed through maintenance and operational risk management such as TSRs	6/moderate Low 6/mod	derate Low	8/moderate 4/moderate	This is variable in severity/impact but occurs each year particularly in stormy winters, but is confined to lines with OLE. It is managed by seasonal planning and maintenance	8/moderate 9/moderate	Low 8/modera	ate 9/moderate	Storms will be come more severe and frequent and the amount of OLE will rise, but t	No Variation	Risks to transport from high and low temperatures, high
XX44 Asset T&RS	Rolling stock	Storms	Direct	Wales & Western Wales & Western	Head of Contact Systems Electricfication RAM and Professional	Storm warning	Statil. Managed unrough manuentance and operational risk management such as 15%	8/moderate Low 10/m	najor Low	10/major 10/major	schedules This is a rare occurrence and is managed by loading procedures	8/moderate 9/moderate	Low 8/modera	ate 9/moderate	Low More modern rolling stock will be more resilient	No Variation	winds, lightning
					Head of T&RS RAM and Professional		This can cause severe service disruption. It is assumed that OLE design contains properties to				This risk varies depending on the severity of the winter and is mitigated by seasonal				The frequency and remeth of cold winter will decrease and that new OLE decises w	libe	winds, lightning Risks to transport from high and low temperatures, high
XX45 Asset OLE	Pantograph	Snow/ice	Direct	Wales & Western Wales & Western	Head of Contact Systems	Advanced weather warning for ice	ensure reduce the risk with the residual risk managed through seasonal weather management programmes Unmitigated severe contamination is unlikely, but this is a mobile risk which can be worsened b	6/moderate Medium 6/mod	derate Medium	6/moderate 6/moderate	preparation The onset of the issue and its severity is determined by the pattern of the autumn	5/moderate 4/moderate	Medium S/modera	ate 4/moderate	more resilient even though there will be more of the asset		winds, lightning
XX46 Asset Vegetation	Trees/leaf fall	Adhesion	Direct	Wales & Western Wales & Western	Head of Drainage and Off Track	Contamination on the line, seasonal planning, vegetation management schedule	weather events such as storms. The risk is managed by seasonal planned maintenance and first signs of contamination should be dealt with by prompt ad hoc cleaning is implemented in response to incident reports and observations	4/moderate Medium 4/mod	derate Medium	4/moderate 4/moderate	me onset of the issue and its severing is betermined by the pattern of the automn weather with high winds making the issue worse. Mitigation is by seasonal preparation maintenance with known problem areas specifically targeted	5/moderate 6/moderate	Low 5/modera	ate 6/moderate	Low That warmer years will promote more growth and later onset of leaf fail running into autumn storms which will be more frequent and severe	the No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX47 Asset Vegetation	Trees/leaf fall	Adhesion	Direct	Wales & Western Wales & Western	RAM and Professional Head of Drainage and Off Track	Signalling issues, Train detection failures, point switches failure, seasonal planning, vegetation management schedule	signs of contamination should be dealt with by prompt ad hoc cleaning is implemented in	6/moderate Medium 6/mod	derate Medium	6/moderate 6/moderate	The onset of the issue and its severity is determined by the pattern of the autumn weather with high winds making the issue worse. Mitigation is by seasonal preparation maintenance with known problem areas specifically targeted.	8/moderate 9/moderate	Low 8/modera	ate 9/moderate	Low That warmer years will promote more growth and later onset of leaf fall running into autumn storms which will be more frequent and severe	the No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX48 Asspt Vocatatio	Trees/leaf fall	Adhesion	Direct	Wales & Western Wales & Western	RAM and Professional Head of Drainage and Off RAM GLD	Reports of issues braking, seasonal planning, vegetation	response to incident reports and observations This has a potentially catastrophic outcome if unmitigated, however as the risk is managed by seasonal planned maintenance and first signs of contamination should be dealt with by prompt	5/moderate Medium 5/mod	derate Medium	5/moderate 5/moderate	The onset of the issue and its severity is determined by the pattern of the autumn weather with high winds making the issue worse. Mitigation is by seasonal preparation	10/maior	Low 10/majo	r tola in	Low That warmer years will promote more growth and later onset of leaf fail running into	the No Variation	Risks to transport from high and low temperatures, high
wegetation		Providential and			Track	management schedule	ad hoc cleaning in response to incident reports and observations unmitigated severe contamination is unlikely	Junear Strategy Strat	wedum	symbol symbol symbol at	weather with high winds making the issue worse. Mitigation is by seasonal preparation maintenance with known problem areas specifically targeted				Low autumn storms which will be more frequent and severe		winds, lightning
XX49 Asset Buildings	Platforms	Snow/ice	Direct		RAM and Professional Head of Buildings and Architecture	Advanced weather warning for ice	Risk to safety of staff and passengers from slips trips and falls	6/moderate Medium 6/mod	derate Medium	6/moderate 6/moderate	The severity of this impact varies from year to year depending on the severity of the winter	4/moderate 3/minor	Medium 4/modera	ate 3/minor	Medium Reductions in snow and frost days	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX50 Asset Signalling	Signalling capability	Sea level rise/Storms	Direct	Wales & Western Wales & Western	RAM and Professional Head of Signalling RAM Signalling	Storm/high winds warning	Salt water spray can lead to accelerated corrosion of assets and or ingress can short equipment	6/moderate Low 8/mod	derate Low	8/moderate 8/moderate	For areas of track in close proximity to the sea this is already a risk	4/moderate 2/minor	Low 4/modera	ate 2/minor	Low That we follow the current long-term signalling deployment plan	No Variation	Risks to Infrastructure services from coastal flooding and Risks to transport from high and low temperatures, high winds, lightning
XX51 Asset Structures	Coastal and estuarial protection	Sea level rise/Storms	Direct	Wales & Western Wales & Western	RAM and Professional Head of Structures RAM Structures	Linked to trigger level for investment which is asset condition	Wave damage/erosion of the sea wall/defence or the substrate it sits on can impair the protection level/function of the asset and lead to damage to assets behind it. This can pose a safety risk and performance risk and repair costs	6/moderate Low 8/mod	derate Low	8/moderate 8/moderate	Existing sea walls are likely to be sufficient currently to withstand storm surge	6/moderate 9/moderate	Low 6/modera	ate 9/moderate	Low That existing sea walls are not replaced	No Variation	Risks to Infrastructure services from coastal flooding and Risks to transport from high and low temperatures, high winds, lightning
XX52 Asset Track	Coastal and estuarial protection	Sea level rise/Storms	Direct	Wales & Western Wales & Western	RAM and Professional Head of Structures	Linked to trigger level for investment which is asset condition	Domogod defenses can expere defended accets to direct domogo period a cafety and	6/moderate Low 8/mod	derate Low	8/moderate 8/moderate	Existing sea walls are likely to be sufficient currently to withstand storm surge	9/moderate 12/major	Low 9/modera	ate 12/major	Low That existing sea walls are not replaced	No Variation	Risks to infrastructure services from coastal flooding and Risks to transport from high and low temperatures, high winds, lightning
XX53 Asset Signalling	Signals	Sun glare	Direct	Wales & Western Wales & Western	RAM and Professional Head of Signalling	Reports of obscured/impaired sighting of signals/SPADS by driv	Pisruption to drivers ability/confidence. Potential risks to train operation, safety and performance	8/moderate Medium 8/mod	derate Medium	8/moderate 8/moderate	Whilst this is a seasonal issue primarily occurring in the autumn to spring months when the sun is low in the sky rather than a weather issue it can vary from year to year as cloud cover can play a part in reducing it	4/moderate N/A	Medium 4/modera	ate N/A	Medium Assuming NR follow the current long term deployment plan	No Variation	
XX54 Asset Buildings	Platforms	Snow/ice	Direct	Wales & Western Wales & Western	RAM and Professional Head of Buildings and Architecture	Asset condition	Risk to passengers and staff on the station and safety and performance risks to trains	6/moderate Medium 6/mod	derate Medium	6/moderate 6/moderate	This is caused by frost heave and varies from year to year depending on the severity of the winter cold weather	5/moderate 4/moderate	Medium S/modera	ate 4/moderate	Medium That no design changes are made	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX55 Asset H&S/Welfare	: Staff	Extreme hot temperatures	Direct	Wales & Western Wales & Western	RAMs, Professional Head of Buildings and Architecture and local Maintenance Teams	Advanced weather warning for extreme heat	Current risk is managed through risk assessments, working practices and welfare provision	8/moderate Medium 8/mod	derate Medium	6/moderate 10/major	Extreme temperatures and heatwaves are already experienced, particularly over the last few years, current practices are feit to be adequate	9/moderate 10/major	Low 9/modera	ste 10/major	Low That existing risk assessment methods will allow sufficient planning and response to mitigate the majority of the increased risk	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XXS6 Asset H&S/Welfare	: Staff	Extreme cold temperatures	Direct		RAMs, Professional Head of Buildings and Architecture and local Maintenance Teams	Advanced weather warning for cold conditions	Current risk is managed through risk assessments, working practices and welfare provision	9/moderate Medium 9/mod	derate Medium	10/major 6/moderate	Current winters already pose this risk and current practices are felt to be adequate to manage them	8/moderate 6/moderate	Medium 8/modera	ate 6/moderate	Međum N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX57 Asset Structures	Wall	Higher average temperature		Wales & Western Wales & Western	RAM and Professional Head of Structures RAM Structures	Linked to trigger level for investment which is asset condition	The majority of the masonry asset stock is very old and lacks the expansion joints required for modern materials and required by current design codes of practice. Risk management is through condition assessment and intervention		derate Medium	4/moderate 8/moderate	Whilst the old asset stock means that this risk is already felt current asset management methods are adequate to manage the risk	8/moderate 9/moderate	Medium 8/modera	ate 9/moderate	Medium That current investment profile is maintained	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX58 Asset Structures	Footbridges	High winds	Direct		RAM and Professional Head of Structures	Storm/high winds warning and trigger level for investment whice asset condition	h Is Risk managed by structure risk assessment, condition monitoring and triggered intervention	6/moderate Low 6/mod	derate Low	8/moderate 4/moderate	Current assessment and management practices control this risk	8/moderate 9/moderate	Low 8/modera	ate 9/moderate	Low That current investment profile is maintained	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX59 Asset Vegetation	Trees	High winds	Direct	Wales & Western Wales & Western	RAM and Professional Head of Drainage and Off Track	Storm/high winds warning and vegetation management programme	This risk is contributed to by a number of factors including, frequency/severity of winds, saturation of ground, tree disease/death, tree size and third party tree management	9/moderate Low 9/mod	derate Low	10/major 6/moderate	This is managed by the current vegetation management programmes, however the Varley review has highlighted improvements that form part of the Sustainable Land Use Programme	10/major 12/major	Low 10/majo	r 12/major	Low That the Sustainable Land Use Programme is implemented	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX60 Asset Buildings	Roofs	Higher average temperature	Direct			Linked to trigger level for investment which is asset condition	Risk managed by asset risk assessment, condition monitoring and triggered intervention	6/moderate Medium 6/mod	derate Medium	4/moderate 8/moderate	Current assessment and management practices control this risk	9/moderate 9/moderate	Medium 9/modera	ate 9/moderate	Medium That current investment profile is maintained	No Variation	Risks to transport from high and low temperatures, high winds, lightning
W/fit Accet Buildings			Direct		Architecture RAM and Professional Used of pulldings and			Claudante Madam Claud	in the line	Chardente - Chardent			Notes - Classic				Risks to transport from high and low temperatures, high
XX61 Asset Buildings	Paving	Snow/ice	Direct	wates & western Wales & Western	Architecture	unken to trigger level for investment which is asset condition	Risk managed by asset risk assessment, condition monitoring and triggered intervention This requires a combination of a track lowering scheme and the location being within a flood ris	Medium 6/mod	Medium	o/muderate 6/moderate	Current assessment and management practices control this risk	5/moderate 4/moderate	wearum 5/modera	ate 4/moderate	Medium N/A	No Variation	winds, lightning
XX62 Asset Track	Track bed	Flooding	Direct	Wales & Western Wales & Western	Professional Head of Geotechnical RAM GLD	Linked to trigger level for investment which is asset condition	area/and or the work creating a new 'low point' or flow pathway without appropriate drainage being included in the scheme. This combination could lead to safety and performance risks and repair costs	6/moderate Medium 8/mod	derate Medium	8/moderate 8/moderate		9/moderate 9/moderate	Medium 9/modera	ate 9/moderate	Medium Assuming that track lowering schemes will continue	No Variation	Risks to infrastructure services from fiver, surface water and groundwater flooding
XX63 Asset Track	Track	Higher average temperature	Direct	Wales & Western Wales & Western	RAM and Professional Head of Track	Advanced weather warning for extreme heat, seasonal prepara and operational procedures	tion This leads to an increase in the use of TSRs to manage the risk and/or an increase in buckles. The results in performance reductions and the potential for safety risks	6/moderate Medium 6/mod	derate Medium	4/moderate 8/moderate	TSRs manage the current risk, but frequency and extent is becoming challenge	8/moderate 9/moderate	Medium 8/modera	ate 9/moderate	able to deal with an increasing CK1		Risks to transport from high and low temperatures, high winds, lightning
XX64 Asset Track	Track	Higher average temperature	Direct		RAM and Professional Head of Track RAM, Professional Head of	Advanced weather warning for extreme heat, seasonal prepara and operational procedures	tion Whilst these manage the risk of buckles and the subsequent safety risks they have severe performance impacts	6/moderate Medium 6/mod	derate Medium	4/moderate 8/moderate	TSRs manage the current risk, but frequency and extent is becoming challenge	8/moderate 9/moderate	Medium 8/modera	ate 9/moderate	Medium Assumed that existing contingencies and improved application of track standards will able to deal with an increasing CRT	be No Variation	Ruls to transport from high and low temperatures, high winds, lightning
XX65 Asset Track	Track	Higher average temperature	Direct	Wales & Western Wales & Western	Track and local RAM Track maintenance RAM, Professional Head of	Planned maintenance schedules	Disruption to planned maintenance due to weather and climate conditions, inability to deliver volumes in the available time. Knock on safety and performance risks	6/moderate Medium 6/mod	-		Current processes and resources manage the risk	8/moderate 8/moderate		ate 8/moderate	Medium N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX66 Asset Track	Track	Higher average temperature Higher average	Direct	Wales & Western Wales & Western	Track and local RAM Track maintenance	Linked to trigger level for investment which is asset condition	Track maintenance activity is currently scheduled to avoid periods of high temperature which may lead to CRTs Fouriment is vulnerable to degraded performance in periods of higher diurnal temperature	6/moderate Medium 6/mod			Current process manages the risk	8/moderate 9/moderate		ete 9/moderate		No Variation	Risks to transport from high and low temperatures, high winds, lightning Bisks for transport from high and low temperatures, high
XX67 Asset Signalling	Signalling capability	Higher average temperature Higher average	Direct	wales & western Wales & Western	RAM and Protessional Head of Signalling RAM and Professional	Linked to trigger level for investment which is asset condition	Certain rail factanings increase this risk as well as locations with significant track gradients and	6/moderate Medium 6/mod	_		Current processes manage the risk, but recent extreme summers have challenged this			ate 4/moderate	Medium That we follow the current long-term signalling deployment plan	No Variation	Risks to transport from high and low temperatures, high winds, lighting Risks to transport from high and low temperatures, high
XX68 Asset Track	frack	temperature	Direct		Head of Track	Linked to trigger level for investment which is asset condition	repeated braking of trains. Accelerated by temperature extremes				Current processes manage the risk, but recent extreme summers have challenged this		Medium 10/majo	n 12/major	Medium N/A	No Variation	winds, lightning
XX69 Asset Track	Track	Extreme cold temperatures	Direct	wales & western Wales & Western	RAM and Professional Head of Track RAM Track	Linked to trigger level for investment which is asset condition		10/major Medium 10/m	najor Medium	12/major 10/major	Current practices manage the risks	9/moderate 8/moderate	Medium 9/modera	ate 8/moderate	Medium N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX70 Asset Vegetation	Trees	Lightning	Direct		RAM and Professional Head of Drainage and Off Track	Advanced weather warning for lightning	This can have severe safety impacts if a fallen tree is struck by a train. This is controlled by vegetation management which seeks to eliminate trees tall enough and close enough to pose a risk	9/moderate Low 10/m	najor Low	9/moderate 10/major	Current vegetation programmes are in place to manage the risks. The Sustainable Land Use Programme is improving these	9/moderate 9/moderate	Low 9/modera	ate 9/moderate	Low N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX71 Asset Track	Track	Snow	Direct	Wales & Western Wales & Western	RAM, Professional Head of Track and local RAM Track maintenance	Advanced weather warning for snow	Managed by snow/cold weather fleet and seasonal management practices	6/moderate Medium 8/mod	derate Medium	8/moderate 6/moderate	Current processes and resources manage the risk	5/moderate 4/moderate	Medium 5/modera	ate 4/moderate	Medium Risk of build up of snow can be fairly easily managed to avoid getting to the point that snow is allowed to build up and trains cannot run	No Variation	Bisks to transport from high and low temperatures, high winds, lightning
XX72 Asset Structures		Higher average temperature	Direct		PAM and Professional	Linked to trigger level for investment which is asset condition	Hardwood is being replaced for a number of reasons including our sustainable timber policies	6/moderate Medium 6/mod	derate Medium	4/moderate 8/moderate		5/moderate 4/moderate	Medium S/modera	ate 4/moderate	Medium N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX73 Asset Structures		Higher average temperature	Direct	Wales & Western Wales & Western	RAM and Professional Head of Structures	Linked to trigger level for investment which is asset condition	The majority of the masonry asset stock is very old and lacks the expansion joints required for modern materials and required by current design codes of practice. Risk management is throug condition assessment and intervention		derate Medium	4/moderate 8/moderate	Whilst the old asset stock means that this risk is already felt current asset management methods are adequate to manage the risk	9/moderate 9/moderate	Medium 9/modera	ate 9/moderate	Medium N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX74 Asset Buildings	Floors/pavements	Extreme cold temperatures	Direct		RAM and Professional Head of Buildings and Architecture	Linked to trigger level for investment which is asset condition		4/moderate Medium 4/mod	derate Medium	6/moderate 3/minor		4/moderate 4/moderate	Medium 4/modera	ate 4/moderate	Medium N/A	No Variation	
XX75 Asset Structures	Coastal and estuarial protection	Sea level rise	Direct	Wales & Western Wales & Western	Broforcional Hoad of	Linked to trigger level for investment which is asset condition	passengers and statt on trains and to operational statt responding	6/moderate Medium 6/mod	derate Medium	8/moderate 8/moderate	Current defence maintenance manages this risk	8/moderate 9/moderate	Medium 8/modera	ate 9/moderate	Medium N/A	No Variation	Risks to infrastructure services from coastal flooding and erosion A A A A A A A A A A A A A A A A A A A
	Drainage system	Sea level rise	Direct	Wales & Western Wales & Western	RAM GLD	Linked to trigger level for investment which is asset condition	This can result in flooding either because water backs up in the system due to the inability to discharge or through water flowing into the system from the estuary and can pose risks to passengers and staff on trains and to operational staff responding		derate Medium	6/moderate 6/moderate	Current drainage standards and management addresses this risk	6/moderate 9/moderate	Medium 6/modera	ate 9/moderate	Medium N/A	No Variation	Risks to infrastructure services from coastal flooding and erosion
XX77 Asset Vegetation	Trees	Snow/ice	Direct	Wales & Western Wales & Western	Professional Head of Track & Region	Advanced weather warning for snow, vegetation management schedule and seasonal preparation	Sagging or fallen trees can short OLE stranding trains and can pose a train strike an possible derailment risk. These can result in safety risks, performance reductions and asset damage		derate Medium	6/moderate 6/moderate	Vegetation management programmes manage this risk	4/moderate 3/minor	Medium 4/modera	ste 3/minor	Medium The Sustainable Land Use Programme is implemented fully	No Variation	Risks to transport from high and low temperatures, high winds, lightning
XX78 Asset Track	Track	Intense rainfall	Direct	Wales & Western Wales & Western	Professional Head of Track & Region	Linked to trigger level for investment which is asset condition	Failure mechanisms tend to be sudden and have the potential to result in derailment and track asset damage. They pose safety risks, can severely impact performance and require significant investment	8/moderate Medium 10/m	najor Medium	10/major 10/major	Current geotechnical and drainage asset management address these risks	8/moderate 12/major	Medium 8/modera	ate 12/major	Medium N/A	No Variation	Risks to infrastructure services from river, surface water and Risks to transport networks from slope and embankment groundwater flooding failure flooding
XX79 Asset Vegetation	Signalling	Higher average temperature	Direct		Professional Head of Signalling RAM Signalling	Vegetation management and incident reports	This can greatly increase the risk to the public when crossing the railway	8/moderate Medium 8/mod	derate Medium	6/moderate 10/major	Vegetation management programmes manage this risk	9/moderate 10/major	Medium 9/modera	ate 10/major	Medium N/A	No Variation	Risks to transport from high and low temperatures, high winds, lightning
	Track/OLE/Lineside/passengers and st	staff High winds Higher average		Wales & Western Wales & Western	RAM GLD	Storm/high winds warning and vegetation management programme	Safety risk to train drivers and passengers should a train derail on hitting a fallen tree, This can increase the risk to staff undertaking inspection and maintenance work and can reduce	8/moderate Medium 8/mod	derate Medium	10/major 6/moderate	Based on past history the worst case scenario is highly unlikely and the overall risk is managed by vegetation management programmes	10/major 12/major	Low 10/majo	r 12/major	Low N/A	No Variation	Bisks to transport from high and low temperatures, high winds, lightning Riks to transport from high and low temperatures, high
XX81 Asset Vegetation		temperature	Direct	Wales & Western Wales & Western	Geotechnical RAM GLD	Vegetation management and inspection reports	This can increase the risk to staft undertaking inspection and maintenance work and can reduce the quality of observations compromising planned work There are links to earthworks shrinkage and heave where the boundary at the bottom or top of		inor Medium		Vegetation management programmes manage this risk Shrinkage of the earth in which posts are seated could cause them to loosen leading to	4/moderate 5/moderate		ate 5/moderate	Medium N/A Dependent on future earthworks programme. Development of more resilient	No Variation	Risks to transport from high and low temperatures, high winds, lighting Risks to transport from high and low temperatures, high
XX82 Asset Boundary	All fence types	Drier summers	Direct	Wales & Western Wales & Western	Geotechnical and RAM	Maintenance or renewal required	There are times to earthworks shrinkage and heave where the boundary at the bottom or top of the embankment could be at risk	6/moderate Medium 9/mod	derate Medium	4/moderate 9/moderate	possible failure of the boundary measure potentially resulting in livestock incursion/trespass	8/moderate 9/moderate	Low 8/modera	9/moderate	Low Dependent on future eartmoorks programme. Development of more resilient embankments or cuttings should mitigate the increase in risk	No Variation	nsis u daniput in dminge and low temperatures, nigh winds, lightning

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Asset Information		Action Infor	mation				Action Target			Deliver	ry Yea	r	Climate Adaptation / Resilience		Monitoring
Asset Class / Lead Team Resilience	Sub-Asset Class Multiple Assets	Category Developmen	Name t Resilience Schem	Location ne Regional	Description NRDD to develop 12 highest priority resilience schemes in CP7	Cost (£m) £1.0		Unit Schemes	Monitoring	1 2	2	3 4 5	Benefit Establishes a representative risk for the region which will establish	Risks Addressed Weather events occur that induce failure of sites that have been	Monitoring Regime Linked 11 levers All
Resilience		Developmen	Development		year 1 which will likely result in 6 schemes being developed within the control period. Development will include modelling and risk assessment for each site to determine the priority.	21.0	0	Schemes		ľ			a prioritised list of sentence has for the region which will establish predictions. Modelling and desk study will have been completed for the	modelled and deemed low risk and pushed into the next control period. More than 6 sites are deemed high risk and more budget is	
		<u>.</u>											majority of sites with potential options available for development at a later date.	required than is currently allocated to the programme. Legislation restricting necessary works on infrastructure.	
Resilience	All Assets	Strategy	Adaptation Pathways	Regional	Adaptation Pathways program to be developed over the whole of CP7 for both the Wales and Western routes to determine the highest risk lines of route along the railway due to climate change Adaptation pathways for railways involve dynamic, flexible strategies to respond to climate change and evolving needs. They		Multiple	Schemes			1	1 1 1	By adopting flexible and dynamic approaches, the region can incrementally adjust its infrastructure and operational strategies, ensuring resilience to future uncertainties. Adaptation pathways enable efficient resource allocation, facilitating timely upgrades and innovations. Additionally, the	Uncertainty surrounding future climate scenarios and accurately forecasting the most effective adaptations. The prolonged timeline of adaptation pathways may expose the region to short-term vulnerabilities if immediate action is not taken. Striking the right balance between flexibility and timely	All
					provide a structured framework for incremental adjustments in infrastructure and operations. This approach enables timely upgrades, efficient resource allocation, and stakeholder collaboration. Adaptation action plans will be developed based on modelling of								adaptive nature of the approach promotes stakeholder engagement, fostering collaboration between communities, authorities, and businesses to collectively address the evolving demands of the rail network.	decision-making is crucial to mitigate these risks and ensure the long-term success of adaptation strategies.	
Castad	Find and the sect 9	Manitarina	Fasthursda	Designal	climatic risk to the infrastructure and options proposed for the route	£11.0	Multiple	Calcara		1 1	1	1 1 1	Frathundum of the income to strate at the state		
Geotech	Embankment & Cuttings	Monitoring	Earthworks Monitoring	Regional	Enhanced earthworks monitoring of earthwork assets to better understand the risk across a portfolio level. The monitoring will be put in place at the most at risk assets as a result of the increased frequency of increment weather condition that affect the stability of the earthworks as a result of climate change.		Multiple	Schemes			1		Earthworks monitoring enhances construction safety, detects potential issues early, and ensures project compliance. It improve efficiency, reduces costs, and aids in optimizing resource allocation.	Challenges in data accuracy and interpretation may pose risks. s Overreliance on technology can lead to false positives or neglect of on-site conditions. Regular calibration and skilled interpretation are essential.	All
Resilience	Cutting	Renewal	MLN1	Sonning Western	Based on the outcom Adverse weather site east of reading which affects elizabeth line	e of analysis	at -number 1, six	of the following Schemes	schemes (4-18) will be pro	ogressed w	within 0	this budget the r	emaining resilience budget of £18m Reduced flooding damage to the track, and disruption to the	Flood risk from extreme weather. Contamination of track	
Kesmence	cutting	Kenewai		Soming, western	and GWR. Slope and crest drainage. Resilience not BAU.		ľ	Schemes			0		railway network. Reduced delay minutes from extreme weather and repair time. Reduced repair costs. TSR will become redundant. Reduced maintenance time and costs.	equipment. Performance of railway. Landsliding. Damage to electrical equipment.	
Resilience	Embankment	Renewal	SWM2	St Fagans, Wales	Once flowing beneath the bridge at 174.61 M.Chns, the River Ely changes direction 90 degrees northeast 50 metres downstream. At high water levels, this river bend could slow water flow leading to flooding of the land surrounding the railway. A flood level could be reached which means water overtops the railway. In January 2023, high water levels in River Ely led to flooding of the railway and washout events. These events will likely increase in the future with climate change.	1	1	Schemes		0 1	1		Reduce damage to bridge and increase life span. Reduce repair cost and time. Lower disruption time. Reduce flooding in surrounding areas as well.	Flood risk from extreme weather. Contamination of track equipment. Performance of railway. Structure damage. Long term disruption. Structure integrity. Damage to electrical equipment.	All
Resilience	EmbCokment	Renewal	SWM2	Clawd-Coch, Wales	The highest recorded river level of the river that flows beneath the railway at this site is 1.5m below the height of the embankment. In the future, it is expected with climate change that higher river levels will occur. Flood levels could reach the height of the embankment and therefore the railway could be overtopped. Tan 15 flood maps show that the railway at this site is in a flood zone.	2	1	Schemes		0 0	0	0 1	Reduce damage to bridge and increase life span. Reduce repair cost and time. Lower disruption time. Reduce flooding in surrounding areas as well.	Flood risk from extreme weather. Contamination of track equipment. Performance of railway. Structure damage. Long term disruption. Structure integrity. Damage to electrical equipment.	All
Resilience	Embankment	Enhance	SWB	Chipping Sodbury Western	P. Determine size and capacity requirements of the proposed system which is operating at full capacity to provide resilience in the face of increased extreme weather and Climate Change. This is a repeat failure location with 8 major floods occured in the last 13 years.	1	1	Schemes		1			Avoid wet beds and voiding which can lead to damage to to rail and trains as well. Eliminate main line cosure during extreme weather conditions. Quick recovery from extreme weather. Reduced disruption. Reduced repair costs and time.	Main line disrupion between Paddington and Cardiff. Contamination of track equipment. Cyclic top derailment. Performance of railway. Damage to TQ. Damage to electrical equipment.	All
Resilience	Embankment	Renewal	HNL1	Llangua court, Wales	"At this site, the railway bridge squeezes the channel of the River Monnow. Therefore, at high river levels, it is likely water will build up before the bridge and spill on to the floodplain upstream of the railway. This floodplain has a pinch point due to a road being build close to the railway. As a result, when the flood plain reaches its maximum capacity, water would likely be pushed on to the railway and a washout event could occur. Tan 15 flood maps show that the railway at this site is in a flood zone."		1	Schemes		0 0	0	1	Reduce repair time and costs. Increased protection of railway. Avoid flooding in areas surrounding the railway. Redcued disruption and eliminate TSR.	Bllast washout. Damage to electrical equipment. Structural integrity of track and bridge.	All
Resilience	Embankment	Renewal	MLN1	Nailsea, Western	"At this site, the railway bridge squeezes the channel of the River Kenn. Therefore, at high flood levels, it is likely water will build up along the railway at the base of the hills. This floodplain has a pinch point due to hills on both sides of the railway pushing flood water to collect along the railway. This site is in a known floodplain, and it is expected to get worse due to sea level rise as it is exposed to tidal flooding." Increase brdige size? Excavate pinch point? Drainage?		1	Schemes		0 0	0	0 1	Reduce repair time and costs. Increased protection of railway. Avoid flooding in areas surrounding the railway. Redcued disruption and eliminate TSR. Reduce saltwater detoriation.	Bllast washout. Damage to electrical equipment. Structural integrity of track and bridge.	All
Resilience	Cutting	Renewal	SD12	Llangyfelach, Wales	Up size drainage system which is operatuing at full capacity to proivde resilience in the face increasing extreme weather caused by climate change. 500m earthwork renewal ditch/channel and 5 Schl Earthwork Refurb, 1100m track drainage		1	Schemes		0 1	1		Reduced flooding damage to the track and disruption to the railway network. Reduced delay minutes from extreme weather and repair time. Reduced repair costs. TSR will become redundant.	flood risk due to long spells of rainfall. ballast washout - contamination of track bed. Damage to electrical equipment.	All
Resilience	Cutting	Renewal	MLN1	Flax Bourton, Western	Install infrastructure to protect cutting from flooding in adverse weather. Bringing the existing Rosemount Road SUDS pond back online. Replacing the existing partially blocked culvert. Upsizing approximately 170m of existing track drainage from 450mm diameter to 500mm/525mm		1	Schemes				1	Avoid flooding damage to the track and disruption to the railway network. Reduced delay minutes from extreme weather and repai time. Avoidrepair costs. TSR will not be implemented.		All
Resilience	Cutting	Renewal	MLN1	Wootton Bassett, Western	Remove the pinch point where water drains under the railway into a canal on the down side (south). When this floods both routes between Swindon and Bristol are closed. Take cognisance of recent and planned housing developments to north.	,	1	Schemes		1	1	1	Avoid wet beds and voiding which can lead to damage to to rail and trains as well. Eliminate main line cosure during extreme weather conditions. Quick recovery from extreme weather. Reduced disruption. Reduced repair costs and time. Protect	Main line disrupion between Paddington and Cardiff. Contamination of track equipment. Cyclic top derailment. Performance of railway. Damage to TQ. Damage to electrical equipment.	All
Resilience	Cutting	Renewal	MLN1	Dauntsey, Western	Outside party drainage here has caused flooding several times a year including in jan 2023 and Jan 2024 when a train ran into floodwater at 125mph. Recent targeted intervention to drainage has helped but not prevented flooding. Probably would look like some enhanced maintenance needed to address the problem.	-	1	Schemes			1	1	equipment. Avoid wet beds and voiding which can lead to damage to to rail and trains as well. Eliminate main line cosure during extreme weather conditions. Quick recovery from extreme weather. Reduced disruption. Reduced repair costs and time. Protect equipment.	Main line disrupion between Paddington and Cardiff. Contamination of track equipment. Cyclic top derailment. Performance of railway. Damage to TQ. Damage to electrical equipment.	All
Resilience	Cutting	Renewal	CCL	Somerton, Western	Frequent flood site and closes off fast route from Reading to Wes Country via Westbury. If coupled with a closure at Flax Bourton means both main routes out of west country are closed. Planned for intervention in year 3	t	1	Schemes				1.00	Avoid wet beds and voiding which can lead to damage to to rail and trains as well. Eliminate backup for main line cosure during extreme weather conditions. Quick recovery from extreme weather. Reduced disruption. Reduced repair costs and time. Protect equipment.	Main line disrupion between Paddington and West Country via Westbury. Contamination of track equipment. Cyclic top derailment. Performance of railway. Damage to TQ. Damage to electrical equipment.	All
Resilience	Sea Defence	Renewal	AMB	AvonMouth, Western	Flood defence protects railway from sea level rise creating salt water marsh nature area.		1	Schemes			1		Reduce repair time and costs. Increased protection of railway. Avoid flooding in areas surrounding the railway. Redcued disruption and eliminate TSR. Reduce saltwater detoriation.	Bllast washout. Damage to electrical equipment. Structural integrity of track. Flooding.	All
Resilience	Sea Defence	Renewal	MLN	Powderham, Western	Protect main line to Devon and Cornwall from threat from erosion of sand spit at mouth of exe estuary accelerating erosion and frequency of overtopping of powderham banks.		1	Schemes			1		Strengthen track stability and support. Reduce flood risk and avoid voids and wetbeds. TSR would become redundant. Performance of railway equipment would improve.	Alignment of track. Flooding in extreme weather. Derailment. Disruption. Perfomrance.	All
Resilience	Culvert	Renewal	DCL	Oxford, Western	Enlarged culverts under road bridge adjacent to railway to preven build up of flood water to north imapcting railway	t	1	Schemes			1.00		Reduced flooding damage to the track and disruption to the railway network. Avoid voids and wet beds that may lead to serious failure events. Reduced delay minutes from extreme weather and repair time. Reduced repair costs. TSR will become redundant	flood risk due to long spells of rainfall . Wet beds and voids cause contamination of ballast and track resulting in failure of track support (rounded ballast) - cyclic top risk of derailment (similar to gloucester derailment event). Damage to electrical equipment.	All