1 Purpose

This document provides guidance on how to effectively carry out a weather and climate change risk assessment for those involved in Design, Construction and Maintenance projects and activities. This supports:

- The requirements set out in the Level 2 Environment and Social Minimum Requirements (ESR) standard NR/L2/ENV/015,
- Further assessment of risks and opportunities identified through use of the Environment and Social Appraisal (ESA) Tool, and
- The Environment and Social Performance Policy NR/L1/ENV/100 which states;
    - We will adapt at construction and at asset renewal in order to provide resilience in the most cost-effective manner by designing schemes to be resilient to future weather conditions and/or with a view to providing passive provision for future weather conditions.

This document should be used in conjunction with the Climate Change Projections guidance note (NR/GN/EDS23).

The document is also applicable to any projects and activities that fall outside the scope of NR/L2/ENV/015, but which have the potential to be vulnerable to current and/or future weather impacts.

This guidance and its actions should be applied by the person accountable for the delivery of the project or the role that they have designated as responsible for managing the risks to the project and asset.

The consideration of adverse and extreme weather in projects and activities is necessary because current conditions already significantly impact the reliability of our assets and the performance and safety of the railway. The frequency and severity of when and how badly we suffer these impacts will be altered by climate change as it shifts the historic patterns of weather events. Maintaining the safety and reliability of the railway into the future means that we have to adopt new ways of assessing and managing the risk from current and future weather events.

Weather risks and the effects of climate change should be considered in any project or activity that will design, create or maintain an asset. It should also be taken into account when planning operational regimes or undertaking activities that will influence the operation of an asset.

2 Weather and climate change risk assessment process

This document, summarised in *Figure 1*, provides a basic process that any project or activity can use to identify, quantify and mitigate the weather and climate change risks that it may encounter. For projects or activities subject to the Governance for Railway Investment Projects (GRIP) process it highlights the stage gates at which the relevant risk assessment steps should occur.

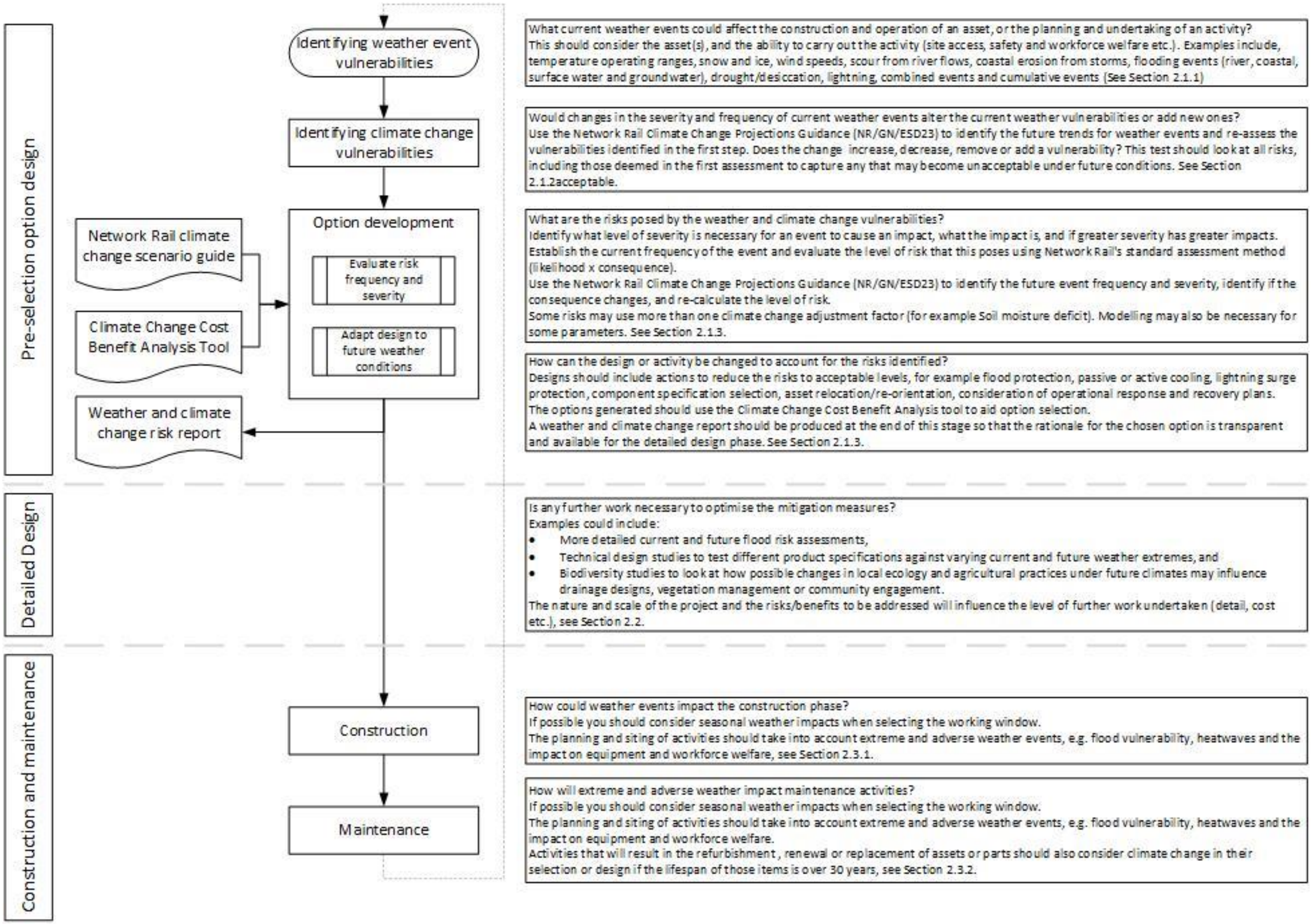
This process should seek to understand the following during the main stages of the project or activity:

- **Pre-selection option design** (Section *2.1*) - understand the key weather and climate change risks over the asset or activity life and determine if any could make implementation unfeasible. Incorporate assessments of the risk into the development of all options and explore risk mitigation solutions. Include weather and climate change risk and mitigation costs and benefits in option evaluation to enable informed whole life cost-based option selection decisions (GRIP stages 1 to 3),
- **Detailed design** (Section *2.1.3.4*) – for the selected option use specifications adequate to reduce operational weather and climate change risks to acceptable levels (GRIP stage 4 and 5), and

- **Construction and operation** (Section *2.3*) - construction activities, temporary facilities and operational activities should consider the potential impact of adverse and extreme weather events. Appropriate task risks assessments should be conducted and health and safety plans put in place (GRIP stages 6 to 8).

Although the above gives basic guidance, every project or activity will be different. Each will define its own specific assessments based upon its component parts, location etc., with the level of detail necessary for the assessments varying with the nature and development stage of the project or activity. The remainder of this guidance note therefore gives further detail on how this process could be carried out for each development stage.

Figure 1: **Weather and climate change impact assessment process**



2.1 Pre-selection option design

2.1.1 Identifying weather event vulnerabilities

Adverse and extreme weather creates safety, performance and financial risks for Network Rail, our projects and our day to day operations and activities. Understanding what vulnerabilities your planned project or activity has too current weather events is therefore the first step in assessing how it might be impacted by climate change. All projects or activities should apply this step in the early planning stages. GRIP projects or activities should carry it out in stages 1 to 3 as follows:

- If addressing a weather/climate change vulnerability is the prime driver - start at stage 1, or
- All other projects or activities - start at stage 2.

A weather vulnerability assessment should examine the potential for weather impacts on rail infrastructure which is directly or indirectly affected by the work and/or by impacts on or from neighbouring communities and the local environment. Examples of impacts could include damage to our infrastructure, effects on dependencies (power, water, goods and services), constraints on site access, construction delays and future operational restrictions and safety issues. The types of questions that this assessment could ask include:

- Is the activity vulnerable to the effects of flooding (coastal, river, surface water/rainfall and groundwater)?
- Could extreme weather pose a risk to the workforce?
- Does the asset have a temperature threshold after which its operation is impaired, or it fails?
- Can successive weather events reduce the lifespan of the asset?
- What severity of weather event causes a problem for example a heatwave or an intense rainstorm? and
- Will the failure of the drainage system affect lineside neighbours?

Factors to consider when using such questions to assess the impact include, but are not limited to:

- Temperature operating ranges (ambient and inside structures),
- Solar gain,
- Snow and ice,
- Flooding events (river, coastal, surface water and groundwater),
- Erosion and scour from river and flood water flows,
- Wind speeds,
- Coastal erosion,
- Drought/desiccation,
- Lightning,
- Combinations of events, and
- The cumulative effects of events.

2.1.1.1 Data sources

Useful data sources for the information to be used in the weather vulnerability assessment include:

- The Climate Change Projections guidance note (NR/GN/ESD23) for future climate information (*Safety Central*),
- Historic weather related incidents on the railway – data for Schedule 8 payments linked to weather events (April 2006 to present) is available on *Safety Central*. This is location specific and linked to stanox sections,

- Incident or Rail Accident Investigation Branch (RAIB) reports or other analysis of related activities in the area (for example the Safety Management Information System (SMIS) database),
- Anecdotal evidence – engineers and staff familiar with locations can indicate areas with (repeated) issues which may not be in the incident data. External stakeholders may also have additional information e.g. landowners and utilities,
- The Environment Agency, Natural Resources Wales and the Scottish Environment Protection Agency have access to;
  - Detailed flood maps for the whole of Great Britain indicate the existing risk from river, coastal and surface water flooding[1], and
  - In depth knowledge of flood and coastal erosion risk in Great Britain and engagement with staff may identify opportunities for collaboration,
- Met Office – weather data, including past adverse and extreme weather events, past weather station records and UK extremes for some variables, can be found on the *Met Office web site*,
- Media reports for extreme weather events in the area of the project or activity,
- The Network Rail Weather Service (*www.nrws.co.uk*), and
- The appropriate Route Weather Resilience and Climate Change Adaptation (WRCCA) Plan which may include proposed investments that have information on vulnerabilities and/or which may influence the vulnerabilities of the current project or activity.

2.1.2 Identifying climate change vulnerabilities

Climate change will cause current weather patterns to shift altering the severity, frequency and impact of weather events. This will:

- Amplify many of the risks and impacts of asset failures, possibly to unacceptable levels, making the maintenance and improvement of our resilience increasingly challenging. Examples include increased severity and frequency of flooding, storms and heatwaves. ***Error! Reference source not found.*** illustrates this process, but is not intended for use in designs,
- Potentially reduce the risks and impacts of some asset failures, making maintenance and improvement of our resilience easier, for example a fall in the frequency of severe winters[2], and
- Mean that historic records of weather event and asset failure likelihood, severity and impact cannot be relied upon to inform our future operational and investment decisions.

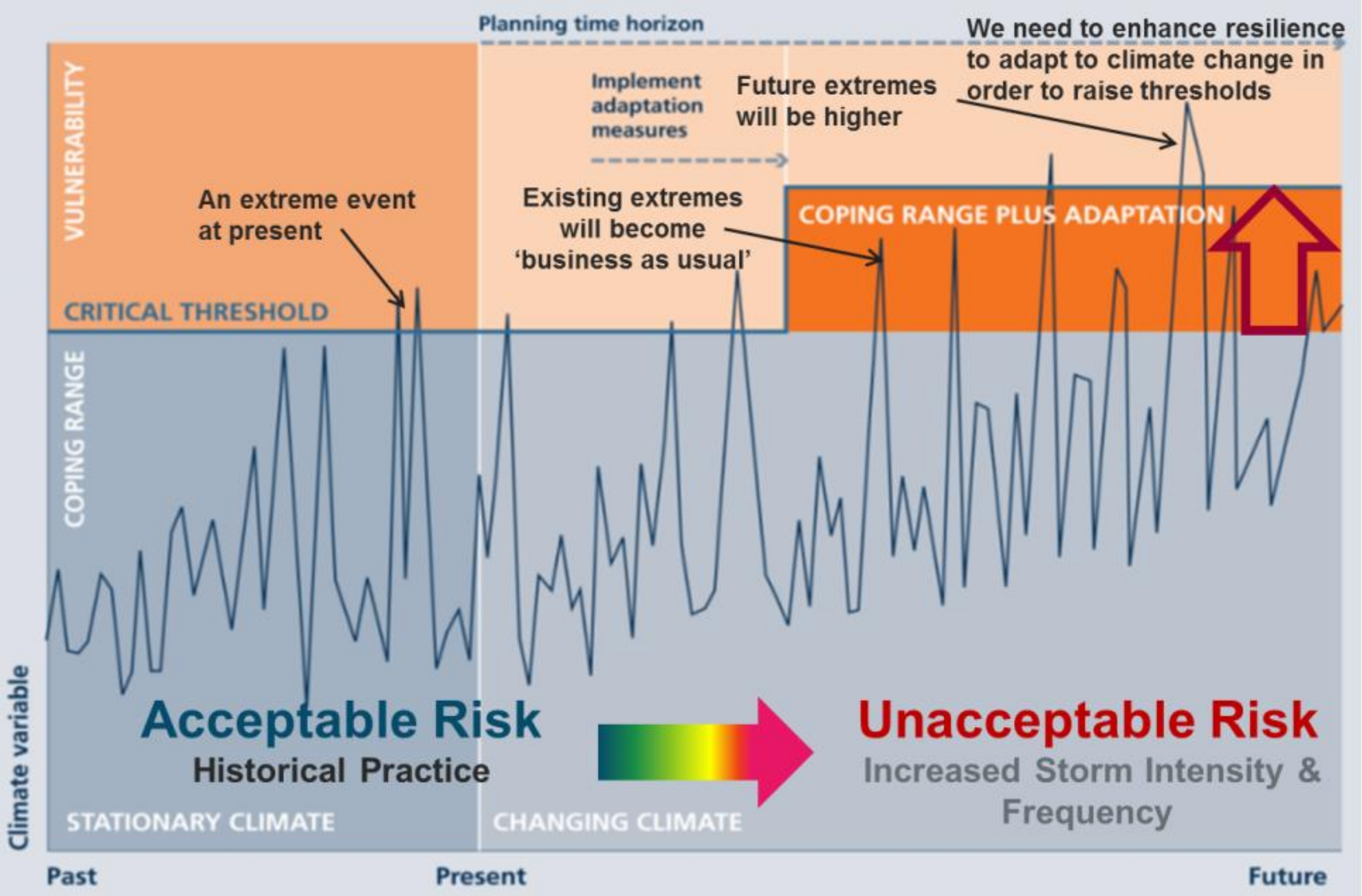
Planning and delivering assets and activities that are resilient to future weather events therefore requires any project or activity to consider the potential effects of climate change.

All projects or activities should apply this step in the early planning stages. GRIP projects or activities should carry it out in stages 1 to 4 as follows:

- Addressing a weather/climate change vulnerability is the prime driver - start at stage 1, and
- All other projects or activities - start at stage 2.

[1] Maps for England and Wales also show Reservoir flooding.
[2] Climate change is projected to change the frequency of severe winters, but not the severity.

Figure 2: **Climate change impact on risk levels**[3]



In 2018 we concluded research to identify the most appropriate UK Climate Projections (UKCP) scenario for use in assessing the impacts of climate change on our assets and in planning our adaptation response. This identified a Primary planning scenario and a Higher sensitivity test scenario for both the UKCP09 the newer UKCP18 data sets as follows:

- Primary = UKCP09 Medium 90th percentile and UKCP18 Representative Concentration Pathway (RCP) 6.0 90th percentile, and
- Higher = UKCP09 High 90th percentile and RCP 8.5 90th percentile.

Details of the most appropriate future projections to use under these scenarios are outlined in the Climate Change Projections Guidance Note (NR/GN/EDS23) on Safety Central. This guidance should be used in conjunction with the relevant Route WRCCA Plan to ascertain what the future climate changes will be for the location of the project or activity in the short, medium and long term. This should then form the basis of a reassessment of the current weather vulnerabilities identified in *Section* 2.1.1.

The whole life of the asset or activity should be explored to understand if and when any of the vulnerabilities will change under future climate conditions. Weather events previously discounted under current conditions should be included as climate change may elevate their severity and or frequency beyond coping thresholds. Any increases or decreases in vulnerability should be recorded.

[3] Adapted from: Willows, R.I. and Connell, R.K. (Eds) (2003) *Climate adaptation: Risk, uncertainty and decision-making*, UKCIP Technical Report, UKCIP, Oxford.

An example would be:

- Site flooding;
    - Identify if there will be any changes in rainfall (patterns, intensity or frequency), river flows or sea level,
    - Did Section *2.1.1* identify a flooding vulnerability (river, coastal, groundwater, surface water) and if so will the future climate make it worse? and
    - If flooding was discounted as a current issue will climate change cause the future impacts to become unacceptable at some point? Is the flood zone bigger, is the flood depth higher or is the flood frequency increased?

2.1.3 Option development

The development of options should take account of their weather event and climate change vulnerabilities (including combined and cumulative events). Designs should seek to avoid locking in current and future vulnerabilities and should improve the resilience of the assets and activities by; mitigating unavoidable impacts, enabling continued operation under adverse conditions and promoting rapid recovery from weather related failures. They should also seek to maximise any benefits from projected reductions in vulnerability, for example fewer frost days and less snow in warmer winters as projected by UKCP09.

The level of resource and the degree of detail employed in assessing and evaluating the weather and climate risks should be related to the scale and nature of the project or activity. Those projects and activities with higher risks should have a level commensurate to their value and complexity.

For GRIP projects or activities this equates to stage 3.

2.1.3.1 Evaluating risk frequency and severity

To understand the design challenges and opportunities that weather events and climate change will pose for each option, the vulnerabilities identified in Sections *2.1.1* and *2.1.2* need to be converted to quantified risks. This is done in three steps:

- Step 1 – For each option select the identified weather event vulnerabilities and determine the event threshold(s) (e.g. flood depth) that cause impacts. Guidance on precipitation, temperature, snow, wind and humidity can be found in the Weather Thresholds and Asset Sensitivities guidance note (NR/GN/ESD33).
- Step 2 Use the Climate Change Projections guidance note (NR/GN/ESD23) to understand the current frequency with which these are exceeded and identify if changing the severity of events beyond the threshold influences the scale of the impact (e.g. a high temperature that reduces the efficiency of Overhead Line Equipment (OLE) transmission or a very high temperature that causes line sag, trips etc.). Use the existing Network Rail risk assessment methodology to calculate the risk, and
- Step 2 – Use NR/GN/ESD23 to obtain the future climate frequency adjustment factor for each relevant weather event and lifespan of the option[4]. Combine this with the current weather event frequency to establish how often the current failure threshold would occur in the future and/or how the severity of the impact may change. Compare this value with the baseline and then recalculate the risk.

[4] You may choose a climate change adjustment figure from a time period shorter than the lifespan of the option if:
a) the lifespan exceeds the climate change projections timeline in the guidance; or
b) if significant interventions are planned during the option lifespan further resilience could be added at a later stage.

Worked example: 1

Replacement of an electrical panel:

Step 1 – determine how often (if ever) the existing panel has failed in low or high temperatures and at what temperature this occurred. Identify how this threshold relates to the ambient temperature. If it has not failed, understand if similar panels have and at what temperature. If you can find no failure records, note the design tolerance at which it is expected to fail and establish a relation to ambient temperature. Use the Weather Thresholds and Asset Sensitivities guidance note (NR/GN/ESD33) in this step.

Step 2 – Use the Climate Change Projections guidance note (NR/GN/ESD23) to identify the frequency with which the threshold is exceeded and if the severity of the event has any additional impact. Repeat this for any options that would have different impact thresholds (panels with higher specifications, different cabinet designs etc.). This will establish the baseline risk for comparison with the future risks.

Step 2 – Use the Climate Change Projections guidance note to identify the temperature range projected for the timescale most appropriate to the asset lifespan. Reassess the risk of threshold exceedance/asset failure under future conditions for each of the options.

Once the current and future risks are quantified you need to assess the implications for your options:

- Do currently acceptable risks worsen, possibly becoming unacceptable? and
- Do unacceptable risks improve, possibly becoming acceptable?

You can then investigate the range of possible business impacts and benefits the risks may have (financial, safety, performance etc.) and create a 'weather and climate risk profile' to inform the planning, design and evaluation of the options.

2.1.3.2 Key decisions for option design

Some weather event and climate change risks can be eliminated, and benefits realised through early and appropriate design consideration. Key decision points should be identified where weather and climate change risk data is needed to inform design. Whilst not a comprehensive list some examples include:

- Project or activity footprint – the size, location and orientation of the activity and/or assets and any associated infrastructure during construction and operation can significantly influence the level of risk exposure from adverse and extreme weather,
- Design specifications – asset specifications should take account of the current and future variability in weather events, for example; temperature operating envelopes, design rainfall events in drainage systems, maximum wind speeds, soil moisture, sea level, storm water storage, flood protection etc.,
- Dependencies – weather events can impact the ability to source and the cost of inputs such as raw materials, plant and equipment, power and water,
- Logistics – the accessibility or reliability of key transport routes and their alternatives can be heavily influenced by weather events such as heat, snow, ice, rain and flooding, and
- Engagement with communities – our projects and activities can have positive and negative impacts outside of our footprint. Benefits can include additional flood protection, improved/alternative access routes, service improvement or economic development opportunities. Negative impacts include noise, dust and other emissions, land drainage changes leading to flooding and access restrictions for residents or businesses.

The project or activities' safety, environmental and technical/engineering functions should agree on the key weather and climate risks to it over its lifespan, the extent to which these can be mitigated through option designs, and whether the residual risks after mitigation constitute fatal flaws to the project or activity concept. Identification of significant weather and climate change risks, the discussion of their implications for key decisions and the avoidance of mitigation of the impacts should be integral to the progression of the pre-feasibility stage.

2.1.3.3 Adapting design to future weather conditions

Adaptation is an 'Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities'[5]. For us this means considering the impacts of weather and climate change on our assets and activities, reviewing our 'normal' ways of doing things and making appropriate changes in order to enable optimal performance under future weather conditions.

Where current and/or future impacts have been identified you should review the original design and identify ways to avoid and/or minimise the risk and mitigate the consequences (including impact recovery). This process should examine the whole range of controls from 'hard' engineering (traditional methods), through 'soft' engineering (landscape solutions) to operational/administrative solutions. To maximise benefits the results of other assessments (for example Health and Safety or Biodiversity and Natural Capital Assessments) should be considered in solution generation. For some options the adaptation measures that are most appropriate for managing the risks and opportunities, most commonly hard solutions, may change the design sufficiently for it to be classed as a new option.

In some cases it is possible that the changes in the future impacts may be so significant that an option, options or even the whole project or activity may become unviable or unnecessary. Examples would be; flooding of a depot or its access routes becoming more frequent and severe, or temperature extremes in buildings and cabinets exceeding the operational tolerance of electrical equipment. Under such circumstances you should consider:

- Eliminating the option(s) and generating completely new ones that avoid or reduce the risk/account for the benefit, and
- Reassessing what constitutes an acceptable level risk. Reducing the threshold for benefits or increasing it where there are no alternatives and the project or activity is critical to our operations, performance or safety.

Where a new option is generated it will have its own technical, commercial and risk profiles and it should replace the previous sub-optimal option. It should therefore be considered in its own right in the options appraisal process.

For each option, cost benefit analysis should be conducted across the lifespan of the project or activity using the WRCCA Cost Benefit Tool (see *Safety Central*). This should compare the un-adapted option and variants with different adaptation measures/levels of resilience to support the selection of the optimal design to take forward into detailed design.

2.1.3.4 Weather and Climate Change Risk Report

A record of the weather and climate change impact assessment process and outcomes should be produced so that the reasoning behind the risk mitigation actions and the option selection are transparent and available for the detailed design process. This should include, but not be limited to:

- A description of any current weather and future climate event that could cause significant positive or negative impacts to the project or activity,

[5] IPCC, 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (Field, C.B et al)

- A record of the activity element(s) and asset(s) that could be impacted by the above event(s) and their causal event(s),
- A description of the safety and performance impact(s) and consequence(s) for the project/activity and its operation (including indicative costs where available),
- A description of the climate change adaptation measures that have been incorporated into the designs of the options,
- The output from the WRCCA Cost Benefits Analysis Tool detailing;
    - The potential benefit of the adaptation measures (e.g. risk or costs avoided, value protected and performance improvements),
    - Estimated capital or operating costs associated with the adaptation measures,
- The rationale for progressing or eliminating options and the final option selection, and
- The residual risk in the final option selection.

This document should live and evolve throughout the development and delivery of the project or action. Amendments and additions to it should be made (as necessary) to incorporate any new or changed decisions, actions or data that arise in the detailed design, construction and operation stages of the project, asset or activity lifespan.

To ensure that the impact and risk assessment data, the design decisions and information on the residual risk are available to inform future investments copies of the final report should be:

- Kept in the project files,
- Appended to the relevant asset register, and
- Sent to the STE WRCCA team.

2.2 Detailed Design

Although the option selected will contain mitigation measures designed to reduce the risk or enhance the benefits identified in the option generation stage, further work may be necessary to optimise them. The nature and scale of the project or activity and the risks/benefits to be addressed will influence the level of further work undertaken (detail, cost etc.). Some examples include, but are not limited to:

- Detailed current and future flood risk assessments including; rainfall projections, topographical surveys, historical records searches, scour assessments, coastal erosion risks, storm surge heights, surface and ground water hydrology studies to establish how changing precipitation and evaporation might affect stream flow, soil moisture and ground water flooding;
- Technical design studies to test different product specifications against varying current and future weather extremes such as increased temperatures, changing precipitation patterns, higher wind speeds, combined and cumulative events etc. For example; different flood protection products or methods (water proofing, elevation, operational options such as powering down) and
- Biodiversity studies to look at how possible changes in local ecology and agricultural practices under future climates may influence drainage designs, vegetation management or community engagement.

Although this section is called Detailed Design, for those projects or activities following the GRIP process it encompasses both stages 4 and 5 - Single Option Development and Detailed Design.

2.3 Construction and maintenance

2.3.1 Construction

Although the construction phase is temporary, it can last from a few weeks to a few years, stretching across seasons. It can therefore be impacted by a wide range of adverse and extreme weather events and the potential impacts should be assessed to:

- Include their consideration in site health and safety risk assessments and control procedures, for example heatwaves and drought, snow and ice, heavy rainfall and flooding, high wind, lightning, combined and cumulative events etc.;
- Inform the selection of appropriate risk avoidance measures such as locating temporary facilities (warehouses, stockpiles, maintenance depots, site offices, parking, welfare facilities etc.) outside flood risk areas or areas prone to sources of sedimentation and
- Select protection measures appropriate to the risk level and the duration of the project or activity where risk avoidance is not possible. For example; flood barriers, alternative access routes, alternative water supplies, additional welfare facilities and their specification/purpose such as heat refuges.

For GRIP projects and activities this section of guidance applies to stage 6 and beyond.

If construction work is being planned as part of a larger project or activity it should already have completed this assessment in line with Section *2.1.1*, and those outputs can be used. Where this guidance has not been followed throughout the option development and detailed design stages, an assessment will need to be completed. This will not need to have the level of depth and rigour expected in Section *2.1.1*, but it should consider the issues noted in the guidance provided.

The 'short term' nature of construction phases means that they do not need to consider climate change impacts beyond implementing and enabling any mitigation actions included in the asset design.

Design changes, new data, risk re-appraisals etc. that occur or are generated in this stage of the project or activity should be added to the record of WRCCA activities and actions laid out in Section *2.1.3.4*.

2.3.2 Maintenance

As with construction, maintenance projects and activities need to undertake an assessment of their vulnerabilities to weather events. Although their duration window is likely to be shorter reducing the possible exposure, they should still take the same assessment approach as outlined in Section *2.3.1*.

Maintenance projects and activities that will result in the refurbishment, renewal or replacement of assets or asset parts should also consider climate change if the lifespan of those items is long enough (over 30 years[6]) that climate change risks may need to be considered in their design or selection. The assessment can be carried out in accordance with Section *2.1.2* but the level of resource and the degree of detail employed should be related to the scale and nature of the project or activity. Those with higher risks should have a level commensurate to the value and complexity of the project or activity.

Maintenance projects or activity solely concerned with the servicing and testing of assets or asset parts should consider the impacts of weather events on site-based activities. The impacts of climate change do not need to be considered until asset refurbishment, renewal or replacement.

[6] Climate modelling uses 30 years as the minimum time period over which climate changes should be modelled and measured

2.3.3 Data sources

For both construction and maintenance assessments, the data sources listed in Section 2.1.1 can provide insights into the potential range of events that are possible for that location.

This should be supplemented by the use of the Network Rail Weather Service (www.nrws.co.uk) to obtain more detailed near term forecasts of adverse and extreme weather conditions in order to facilitate work planning.

Climate change data should be sourced from the Climate Change Projections Guidance Note (NR/GN/ESD23).

3 Glossary

Adaptation	Climate change adaptation is action taken to improve the resilience of assets, networks and systems to future weather conditions, avoiding, minimising or mitigating the impact of more severe or frequent adverse and extreme weather events and gradual or erratic changes in weather patterns due to climate change.
Climate	Defined as average weather over a longer time period (ranging from months to many years). The classic period for averaging these variables is 30 years, as defined by the World Meteorological Organisation. For the definition of weather see below.
Climate Change	A change in global or regional climate patterns, attributed to changes in levels of atmospheric greenhouse gases.
Climate Projection	The modelled response of the climate system to a scenario of future greenhouse gas emissions (or of greenhouse gas concentration levels). For example, the UKCP18 RCP2.5 scenario assumes rapid decarbonisation of the world economy and a rapid shift to renewable energy.
Climate Scenario	A projection of future greenhouse gas emissions used by analysts to assess future vulnerability to climate change using future population levels, economic activity, the structure of governance, social values, and patterns of technological change. Economic and energy modelling can be used to analyse and quantify the effects of such drivers.
Coastal Flooding	Is where high tides and/or storm surges raise the sea level and/or wave height above that of the natural coastline or defences causing over topping.
Environment Agency	English environmental regulator.
Greenhouse Gases	The main greenhouse gases are; water vapour, carbon dioxide, methane, ozone, nitrous oxide are chlorofluorocarbons.
Groundwater Flooding	When snow melt or rainfall soaking into the ground raises the level of the water table until it is above ground level.
Natural Resources Wales	Welsh environmental regulator.
RCP	Representative Concentration Pathways are the current IPCC climate projection scenarios There are four: RCP2.6, RCP4.5, RCP6.0 and RCP8.5. These scenarios have been used in the UKCP18 climate projections.

RCP6.0	A Representative Concentration Pathway. In RCP 6.0, emissions peak around 2080, then decline.
RCP8.5	A Representative Concentration Pathway. In RCP 8.5, emissions continue to rise throughout the 21st century.
Resilience	The ability of assets, networks and systems to anticipate, absorb, adapt to and rapidly recover from disruptive events. This includes the adaptive capacity gained from understanding current and future risks to our assets.
River Flooding	Also known as fluvial flooding. Caused by the migration of snowmelt or rainfall into watercourses raising their flows to the point where they exceed the channel capacity and overtop the banks and/or flood defences into the flood plain.
Scottish Environmental Protection Agency	Scottish Environmental Regulator.
Storm Surge	An increase in sea level under storm conditions, beyond the normal tidal maximum, due to low atmospheric pressure and gale force winds forcing water towards the coastline.
Surface Water Flooding	Also known as pluvial, rainfall or flash flooding. The result of rapid snowmelt or intense or prolonged rain falling onto land and accumulating at low points in the topography.
Threshold	Value of a climate variable which when exceeded causes significant or very significant increases in asset failures/daily disruption incidents. Values are based on analysis in the TraCCA (Tomorrow's railway and climate change adaptation) WP1B Operations weather thresholds analysis report updated to account for additional Network Rail weather related asset failure data. The thresholds of interest may also change in future if asset design or operation changes.
UKCP09	National climate projections for the UK produced in 2009.
UKCP18	National climate projections for the UK produced in 2018.
Vulnerability	the propensity of predisposition to being adversely affected by, in this case by weather events or impacts.
Weather	The occurrence of weather variables such as temperature, precipitation and humidity, in the short term, as opposed to the long-term definition of climate. See above.
Weather resilience	Weather resilience is the ability of assets, networks and systems to anticipate, absorb, adapt to and/or recover from disruptive weather events.

APPENDIX 1 – Version Control

Date	Change description	Change owner	New document version
14/08/19	**1st published**	**David Quincey, Climate Change Adaptation Manager**	**Issue 1**
06/11/20	**Updated to UKCP18**	**David Quincey, Climate Change Adaptation Manager**	**Issue 2**
05/03/21	**Issue 3 removal of reference to NR/GN/ESD33**	**David Quincey, Climate Change Adaptation Manager**	**Issue 3**