



Customer Supplier Agreement

For the provision of the UK Public Weather Service

2022-26

Date agreement comes into effect: 1st April 2022

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Foreword

Welcome to the updated CSA 2021-2026. Last year the 5 year CSA represented a fundamental rewrite on the previous versions, and was driven by two key factors. The first was the new Met Office Strategy published in late 2019, which provided a very clear and considered approach to how the Met Office intended to deliver its public tasks, central to which is the Public Weather Service. The second reflected the renewed focus of the Public Weather Service Customer Group (PWSCG) on the products and services that are needed to keep our fellow citizens **safe** and allow them to **thrive**. Consequently, the approach in the CSA focused on **what** the PWSCG judges our citizens, whether professional responders or private citizens, want and need, following wide external consultation and public research. Compared to the last CSA it left much of the **how** to the experts in the Met Office and the governance of the Met Office Board. The CSA applied as much to violent storms where risk to life is encountered, as to the hundreds of small, often subconscious, daily decisions people make in response to the prevailing and forecast weather.



In the first year we have seen the CSA, as well as the governance and meeting schedule around it, bed in, and it is clear that the new processes and requirements in the **stay safe** and **thrive** areas, as well as the **national capability and international commitments** area are delivering what is required. This updated CSA is therefore very much a continuation of what was started in Year One. However, it quickly became apparent that the metrics set out in the '**authoritative voice**' theme, that is the theme around how the Met Office communicates the weather story, were not working. The PWSCG therefore requested that the Met Office develop an engagement strategy. Whilst this is not yet fully developed and agreed, it has fed into more of a rewrite of this area of the CSA, although the work from year one will not be lost and will continue to be taken forward.

This has been another challenging year, with the backdrop of COVID-19, supply chain issues and now inflation. I would like to offer my deep thanks to the BEIS Secretariat Team for continuing to drive the delivery of this CSA, and also the Met Office PWS Team for their wholehearted and collegiate support, where they have unquestioningly bent themselves to requests, demands and timescales, which at times have been challenging. However, I believe this CSA continues to provide the basis to focus the PWS on what people really need to make a difference to their lives and wider society.

A handwritten signature in blue ink, appearing to read 'Duncan L Potts'.

Duncan L Potts CB

Chair of the Public Weather Service Customer Group

1. Introduction

The UK Government through the Department for Business, Energy and Industrial Strategy (BEIS) funds the Met Office to provide a public weather service for all citizens of the United Kingdom. The Public Weather Service (PWS) exists to provide a trustworthy and reliable public forecast for UK citizens at home and abroad, including the provision of a National Severe Weather Warning Service.

As a BEIS Partner Organisation, the Met Office is an Executive Agency of the Department with Trading Fund Status. The Met Office is the delivery body for the PWS with the owning Department, BEIS, setting the organisation's Public Task through the PWS.

To ensure the PWS is delivered in a way that meets the needs of all users of these services, an independently Chaired Public Weather Service Customer Group (PWSCG) provides a crucial role in representing the interests of the wider public sector and government, including the interest of the general public. Further details on the role of the PWSCG can be found [here](#) and in Annex D.

1.1. Public Weather Service (PWS) Scope

The PWS must equip the UK public, responder organisations and other users of the outputs of the Met Office National Capability with information that enables them to take appropriate decisions and actions to stay safe and thrive. It will provide advice and support learning to enable the effective use of weather, climate, and climate change information.

On behalf of UK citizens at home and abroad, the PWSCG requires the Met Office to provide accurate warnings of severe weather and seamless, timely and accurate weather forecasts for all time periods from nowcasting up to 6 months. Forecasts will cover the whole of the UK, including mountains, islands, and coastal areas.

The products and services are defined by the Customer Supplier Agreement (CSA) and must be delivered to agreed performance standards.

1.2. Public Weather Service (PWS) Principles

The following additional principles will guide development and delivery of PWS services:

- **Value for money** – all PWS services, products and the underlying capability should provide value for money to the taxpayer and deliver social and economic benefits to the UK;
- **User insight** – the development of services and products will be based on a sound understanding of user needs, informed by user engagement, user testing and research together with usage statistics and digital channel analytics;
- **Partnerships and collaboration** – requirements will be developed and delivered working with or collaborating with partners where relevant;
- **Consistency** – products and messages across all delivery channels will be as consistent as possible. User feedback shows that consistency between products and channels is critical for gaining trust in forecasts;
- **Integrity** – all products will be based on sound scientific principles and provide demonstrable value;
- **Resilience** – operational services will be delivered with a high level of resilience and with appropriate levels of support;
- **Verification** – where possible all forecasts will be verified against observations;
- **Compliance** – PWS services and products will comply with all relevant legislation.

1.3. What the Public Weather Service is not

The Public Weather Service provides products and services that are within the scope of PWS and follow the principles laid out above. It does not provide **specialist** products and services; specialist forecasts should be paid for under a commercial contract with the Met Office. The final decision for including a service within the PWS CSA rests with the PWSCG after consideration of the PWS scope and principles.

1.4. What is National Capability?

National Capability comprises the essential observations, common forecast capabilities and infrastructure that underpin all Met Office weather services for PWS and wider UK Governments.

1.5. The Customer Supplier Agreement (CSA)

The CSA is the agreement that is in place between the Secretary of State at the Department for Business, Energy and Industrial Strategy and the Met Office to set out the detailed outcomes that the Met Office must deliver as part of the Public Weather Service. The CSA is signed by three parties; the Senior Civil Servant with policy responsibility for the PWS at BEIS on behalf of the Secretary of State, the Chief Executive Officer at the Met Office and the Chair of the Public Weather Service Customer Group.

The CSA describes the full range of expectations of capability and services that the PWSCG require from the Met Office. It outlines what products and services are required and is focussed on outcomes and outputs, with a series of associated metrics (performance measures) by which the Met Office will be assessed. Deliverables are also defined detailing PWSCG requirements for pieces of work designed to improve PWS services. The products and services described in the CSA cover a 5-year period, however the CSA is designed to be flexible in the face of evolving circumstances, for example to digital developments, forecasting capability and financial settlements. Therefore, metrics and deliverables will be assessed each year to ensure that they continue to be appropriate, with new deliverables developed each year.

It is recognised that over the timescale of this 5-year agreement, there is potential for some external factors to impact and influence the priorities within the CSA and may impact upon the Met Office's ability to deliver the full ambition described in this Customer Supplier Agreement (CSA). The PWSCG will monitor progress throughout and prioritise delivery as appropriate. These factors include

- o The COVID-19 pandemic*
 - o The implementation of a new supercomputer and adjacent supporting technologies*
-

The CSA is written and owned by the PWSCG, with support from the Met Office. The Met Office will write and maintain a service delivery plan to describe how the performance measures and deliverables will be met.

1.6. How does this Customer Supplier Agreement link to the 2019-2024 Met Office strategy

The Met Office strategy is *'helping you make better decisions to stay safe and thrive'* (Figure 1). The PWSCG CSA has been developed to help ensure the Met Office delivers this strategy.

The Met Office vision is to be *'recognised as global leaders in weather and climate science and services in a changing world'*, always striving to be among the world's best national weather and climate services. The PWSCG CSA aims to give the Met Office a framework to deliver services that are focussed on what people, organisations and responders actually want and need, provide good value for money to the UK population, and deliver extraordinary impact and benefit.

The CSA also links to the Met Office values as shown in Figure 1, in the way that PWSCG requires the Met Office to deliver weather forecasts.



Figure 1: Met Office strategy and values (<https://www.metoffice.gov.uk/about-us/who>)

1.7. How does the Public Weather Service tie in with broader UK aims?

The PWS provides direct and indirect benefits to the UK that go beyond the well-known forecast and warning services. Investing in a public weather service and all the underpinning UK infrastructure, science and expertise needed to produce and communicate weather forecasts nationally and internationally provides the UK with an enviable scientific meteorological infrastructure. This infrastructure, which includes world leading supercomputing capability, allows the UK to remain at the forefront of weather and climate science. The services that are provided help to reduce the impact that severe weather has on our lives, not only to stay safe but to mitigate against disruption that would otherwise hit the nation's productivity.

The PWS supports jobs in the Science, technology, engineering, and mathematics (STEM) sector both in regions of the UK where these opportunities are less prevalent such as the South-West but also in many other regions with a dispersed workforce across the UK, including operational capability in Aberdeen.

The underpinning national capability that the PWS pays for supports the Hadley Centre for Climate Change to carry out its world leading science and research which is key to putting the UK on a path to Net Zero by 2050.

By providing critical services to the Civil Contingency community, the PWS supports the Government to mitigate four National Security Risk Assessment (NSRA) risks owned by the Met Office: low temperatures and snow, storms, heatwaves and space weather (not PWS) and those risks owned by other departments including floods, droughts, poor air quality and wildfires.

The PWS funds the Met Office to represent UK national interests within several important international organisations. The UK leverages influence on the back of this expertise and reputation forged over many years as a leading player in the field of meteorology. This gives the UK a strong voice in organisations such as The European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), ensuring the financial contribution from the UK delivers value for money for UK taxpayers. The PWS provides the means for the Met Office to enhance the UK's reputation overseas both amongst its allies but also develop relationships that are within the strategic benefit of the nation. Maintaining diplomatic relations within organisations such as the World Meteorological Organization (WMO), all play their part in ensuring the UK can use its 'soft power' influence to achieve consensus to the benefit of national interest.

Public Sector Information made available for reuse as part of the Met Office's Public Task helps to stimulate a competitive market for weather products and services. This aligns with wider Government objectives to ensure an innovative sector that supports job creation in the fields of artificial intelligence and geospatial data.

1.8. Partnership working

The Met Office should develop services and products, collaborating and working with partners. Where possible it should use groups which are already established such as the Natural Hazards Partnership (<http://www.naturalhazardspartnership.org.uk/>).

The Natural Hazards Partnership (NHP) is a consortium of 19 public bodies (mainly government departments and agencies, trading funds and public sector research establishments) which aims to build on partners' existing natural hazard science, expertise and services to deliver fully coordinated impact-based natural hazard advice for civil contingencies and responder communities and governments across the UK. PWS funds the production of the Daily Hazard Assessment which brings together information in an 'at a glance' overview of potential natural hazards and health implications that could affect the UK over the next 5 days. (<http://www.naturalhazardspartnership.org.uk/products/dha/>) It provides a hazards summary to help increase UK's ability to respond to, and be prepared for multi-hazard events. The Met Office should build upon relationships within NHP where appropriate as it develops services and products within this CSA.

2. Summary

2.1. Executive summary

This CSA was developed in 2021 to cover a period of 5 years (2021-26), with metrics being assessed each year to ensure that they continue to be appropriate, and new deliverables developed each year. Requirements are based on consultations and research and are outlined in detail in this document which describes what the PWSCG require from the Met Office. Four overarching themes are shown in Figure 2.

In summary, the PWSCG requires the Met Office to improve the accuracy of the warning and forecasts that people see and use, get the information to people when and where they need it and ensure the science and collaborations needed to do this are improved. Met Office products and services should be: **Discoverable Accurate, Consistent, Timely and Useful.**

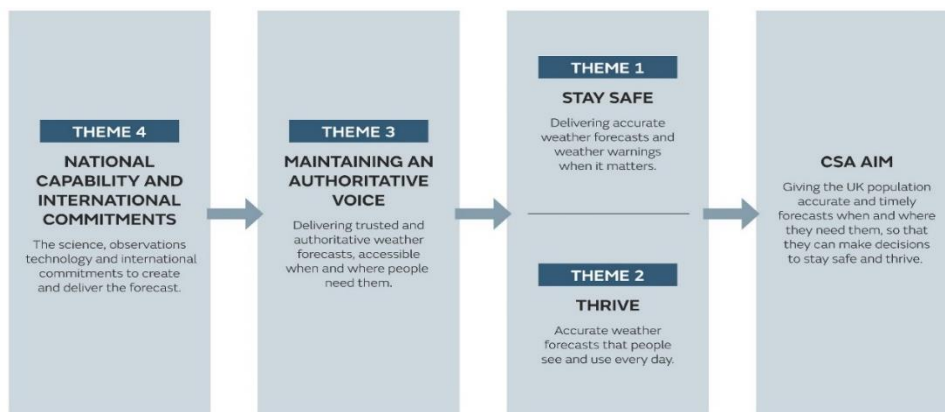


Figure 2: A summary of the CSA themes which define the requirements of the CSA.

In year one of the CSA, '21-'22, the Met Office delivered against performance measures and provided regular reports for Theme 4 of the CSA which provides assurance on the national capability and international commitments of the Met Office. During this period, the Met Office also delivered work to meet deliverables across all themes:

- Within the Stay Safe theme (Theme 1), the Met Office launched the Extreme Heat Warning Service and undertook work to understand how the Met Office can increase engagement with community resilience groups, improve the context and advice in warnings, pull through improvements on short notice warnings, and better understand how to improve safety forecasts;
- Within the Thrive theme (Theme 2), the Met Office developed a roadmap to ensure that future improvements to accuracy are realised for the PWS, undertook research to develop a plan for improving perceptions of accuracy via improving communication of the weather;
- Within the Authoritative Voice theme (Theme 3), highlights include work to summarise the underpinning evidence used to develop metrics within this area, a review of how forecasts are seen and understood and recommendations for improving understanding, recommendations for rationalisation of direct digital channels to improve efficiencies for PWS, research to develop an understanding of Met Office audience type to better understand those who do not see Met Office forecasts, and new methods which were established understand broadcast media satisfaction with PWS services.

The results of this work will be carried forward into future years of the CSA, with ongoing performance measures and milestones tailored to reflect the outcome of this work.

3. Themes

The following themes have been developed based on the consultations and research, and to tie in with the Met Office Purpose.

Performance metrics and deliverables have been developed using evidence and information that has been gathered from surveys and research undertaken by the PWSCG, the Met Office and other independent research organisations. These surveys include the Public Perception Survey, reach surveys, ad-hoc weather and warning surveys.

3.1 Theme 1: Weather forecasts and warnings when it matters – stay safe:

Accurate weather forecasts and warnings that help people make decisions and change their behaviour

The Met Office should deliver authoritative, trusted, timely and useful forecasts and warnings when it matters. Warnings for high impact weather should be made available to all users – this includes the public, communities, responders, the media, and government - in a timely way through the National Severe Weather Warnings Service (NSWWS) and Civil Contingency Services. These warnings and their supporting services should provide information and advice to help mitigate the impacts of the weather that may pose an immediate risk to life or property, such as that shown in Figure 3.

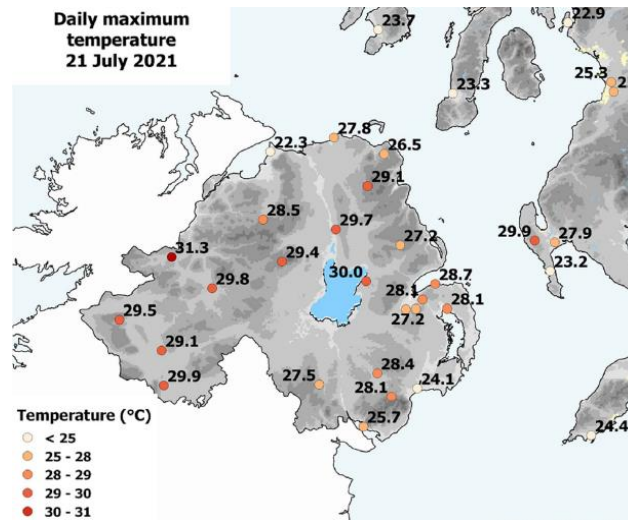


Figure 3: Record breaking temperatures in Northern Ireland during the first Extreme Heat warning issued by the Met Office in 2022.

To meet this aim, there are a range of improvements that the Met Office should seek to make. These improvements are described in full in the following sections, but include improving the accuracy of warnings, including advice on impacts to help people make decisions and drive behaviour change, as well as maintaining and improving the advisor service and the technology used by responders (currently Hazard Manager (HM))

Why is this a priority?

Warnings and advice from the Met Office, working with partners where appropriate, will enable the public, responders (for example Category 1 and Category 2 responders, community resilience, voluntary organisations etc) and government (for example the Cabinet Office COBR unit) to take action to mitigate the impacts of weather events that may cause danger or disruption to people, property or infrastructure.

The services and outputs from this theme:

The National Severe Weather Warning Service

The PWS provides the UK's warnings service which issues timely, accurate and authoritative advice to the public, communities, responders, the media, and government about weather which may cause danger or disruption to people, property or infrastructure. This service should be made up of the National Severe Weather Warning Service (NSWWS) impact-based colour coded product, supporting communication information, engagement, education, and civil contingencies services. Figure 4 shows an example of a National Severe Weather Warning.

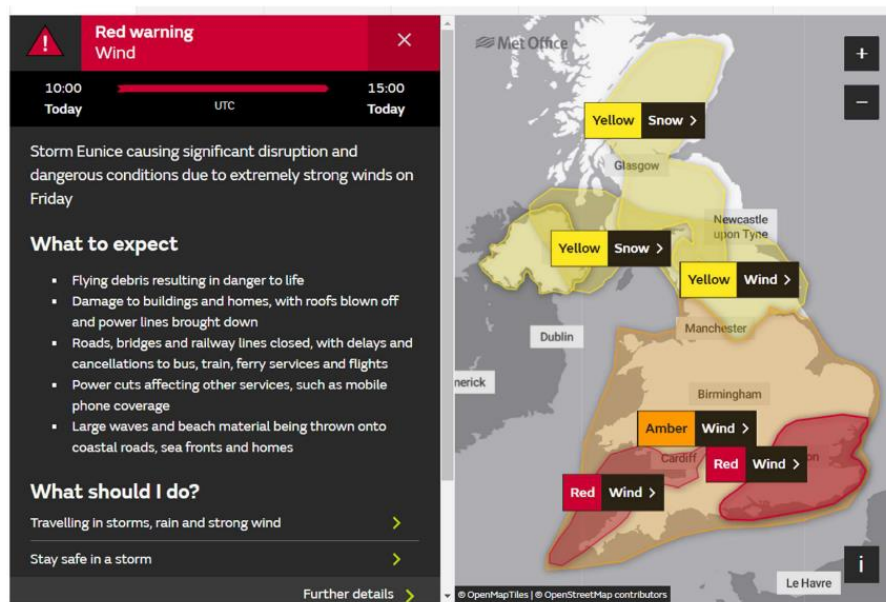


Figure 4: The map of UK warnings for Storm Eunice on the 18th of February 2022. Within the space of one week in February 2022, three named storms affected the UK. This is the first time that this has occurred since storm naming was introduced in 2015/2016.

Civil Contingency Services

The PWS should provide the UK Civil Contingencies Community with relevant, accurate and trusted advice around impactful weather and weather-related natural hazards. A team of Met Office Civil Contingencies Advisors distributed across the UK should integrate with and advise Local Resilience Fora, Civil Contingencies Groups and Partnerships as well as the UK Government and Devolved Administrations. By working closely with responders, the Advisors should interpret the risks of weather in the context of responder decisions, supported by appropriate online information and expert advice or support.

The Advisors should also provide trusted advice to UK Government around weather and natural hazard events affecting UK interests worldwide. The PWS should also provide forecasts and advice to UK government for weather and atmospheric pollution events that pose a risk to UK citizens, property, or infrastructure abroad. The Met Office should work with partner organisations to coordinate and understand impacts of warnings, including the Environment Agency (EA), Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW), Northern Ireland Rivers Agency (NIRA), UK Health Security Agency (UKHSA) and their equivalents in the devolved administrations and other members of the Natural Hazard Partnership (NHP). The Met Office should continue to own risks on the National Security Risk Assessment – cold and snow, heat and storms (the Met Office also own Space weather but as this is not a PWS service it is not covered in this CSA).

Safety forecasts

The Met Office should provide weather forecasts and warnings in areas of heightened risk, to ensure the safety of users. This will include mountain, and beach forecasts. These forecasts should be readily available, and developed in partnership with other organisations, such as the Maritime and Coastguard Agency recognising that ‘when it matters’ may also include what may be thought of as benign weather (e.g. hot, calm weather on the beach) and people can become ‘at risk’ when in a situation that is unfamiliar to them or when they are unable to take appropriate action.

PWSCG outcomes required in this theme:

Weather warnings should:

- Be accurate, timely and consistent with other forecast information both within channels and across different channels:
 - Clear start and end times;
 - As much notice as possible (dependent upon confidence);
 - Include context -compared to recent weather/memorable events/weather in the future;
 - Include clear messages around uncertainty, communicating the true risk level;
 - Include warnings of short notice weather events, pulling through nowcasting capabilities and operational improvements made during year 1 of this CSA.
- Give clear and relevant geographical detail:
 - Take a holistic view of warning services; not just warnings but the advice, communications and educational services which support them;
 - Ensure messages are clear and simple even when faced with a complex weather event;
 - Ensure warnings are issued where possible at times when they will get the most impact – e.g. at times when broadcasters can present the information.
- Include context and appropriately tailored advice to drive action and change behaviour:
 - This should be done in collaboration with partners and the media - Key messages with clear advice should be communicated consistently between the Met Office and partner organisations;
 - This advice should be clear about when people should act and what they should do;
 - The true risk level should be clearly communicated;
 - The way confidence and uncertainty of warnings is conveyed should be improved;
 - This should employ social science and marketing and communications expertise to optimise understanding and to drive action.
- Be communicated clearly and appropriately:
 - Be developed, produced, and owned in collaboration or partnership with other organisations and departments, for example through the NHP, to ensure correct messaging,

reduce duplication of work whilst allowing all parties to disseminate the same message, reduce confusion and enhance clarity;

- Be tested with users to ensure clear communication;
- Be accessible via a wide variety of platforms, direct and indirect, improving reach and access;
- Facilitate sharing of authoritative Met Office warnings by and between partners and third-party platforms and systems following guidelines to ensure that they are used appropriately;
- Ensure published advice can be integrated into other systems where possible;
- Ensure there is a suitable platform for civil contingency practitioners which meets their needs, life cycling and updating the technology (e.g. Hazard Manager) as appropriate;
- Provide global weather advice and information to Government in order to keep UK citizens safe when abroad.
- Align work within a wider UK vision and framework for risk and resilience:
 - Continue to set the standard for weather warning and civil contingency services worldwide;
 - Investigate ways to tailor information to specific users (whilst not creeping into what are rightly specialist services).

There should be a network of Civil Contingency Advisors, which should:

- Be UK-wide, covering all nations and regions;
- Be resilient, with a team structure that enables them to provide a service to responders when required, with additional support from the wider Met Office to provide cover out of hours;
- Give additional information and advice around warnings, weather related hazards and impacts of weather;
- Provide training to responders on weather, natural hazards and use of Met Office products and services;
- Provide support for risk assessment and resilience planning to responders and government;
- Provide information, support and advice to government as requested, for example to support COBR and the resilience aspect of high-profile events such as COP;
- Work with partners to ensure advice to government and responders is consistent and authoritative.

The Met Office should also investigate ways to help keep people safe by:

- Investigating requirements for an extreme cold warning service;
- Implementing recommendations for ensuring that safety forecasts are available when and where they are needed as agreed in the first year of the CSA.

These outcomes will be measured by the following performance measures:

PM1.1: Deliver timely and accurate warnings to the public and responder community.

PM1.2: Ensure warnings reach as much of the UK population as possible

PM1.3: Increase the usefulness of warnings in order to increase action and drive behaviour change.

PM1.4: Maintain and develop the Met Office Civil Contingency Services.

The following deliverables are in place to support reaching the required outcomes:

D1.1: Implement strategy developed in year 1 of the CSA ('21-22) to engage with community resilience groups, and the voluntary sector with a report to deliver to PAG1 in April 2023 on progress and changes made so far.

D1.2: Improve the context and advice in warnings as agreed in year 1 of the CSA ('21-22, MS1.2b).

- D1.3:** Complete a review of how warnings are seen and understood on a national scale. Make recommendations to ensure greatest understanding, decision making and action amongst the public, broadcasters and national responders.
- D1.4:** Following the delivery of the Extreme Heat warning in 2021, review the need for, and if required launch a cold weather warning. This should be done in collaboration with partners, including health departments across the UK.
- D1.5:** Review the communication of short notice warnings (heavy rain and thunderstorms) following the implementation of the improved nowcasting services which are being implemented from Spring 2022. This should explore how Nowcasting information can be provided to users in a way that will enable them to see the additional information and take action upon it, and to explore how this is best used and managed alongside, or integrated into, NSWWS, communications and provision of safety critical information from partners in the future.

The following work will contribute towards the requirement for an improved safety forecast and warning service:

- D1.6:** Develop the PWS offer for safety forecasts – including a definition of what is a safety forecast, and implement recommendations to improve safety forecasts agreed in year 1 of the CSA.

3.2 Theme 2: Weather forecasts every day – thrive:

Accurate weather forecasts that people see and use every day.

The Met Office should enable members of the UK public to thrive every day. This means that the Met Office should provide weather information that helps people to make informed everyday decisions that improve their lives and wellbeing, and helps businesses to make decisions that enable them to work more effectively and increase productivity.

To do this, the Met Office should provide authoritative, comprehensive, accurate, trusted and seamless forecasts for all time periods from hourly to 6 months in the context of a changing climate, and at a quality and accuracy that compares well to other providers. Forecasts will cover the whole of the UK, including mountains, islands, and coastal areas. The most important aspect is that the forecast that people use should align with the weather that they experience. To meet this aim, there are a range of improvements to accuracy that the Met Office should seek to make, described in full in the following sections.

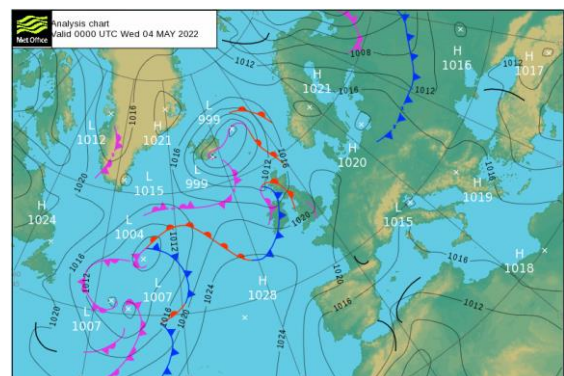


Figure 5: An analysis chart showing Met Office predictions of pressure.

Why is this a priority?

Every year the PWSCG ask the Met Office to work with an external agency to survey the public. This survey asks a representative sample of the public across the UK how they access weather and climate information,

how important they think weather forecasts are, how satisfied they are with the key elements of weather forecasts and the survey also assess awareness and usage of forecasts. This is known as the Public Perception Survey (PPS) and the results of this survey in 2021 showed that the most important aspects of a weather forecast are:

- Accuracy;
- Local detail;
- Giving useful information of how a forecast is going to change;
- Usefulness;
- Ease of understanding;
- Ease of use;
- Clear presentation;
- Being provided by a trusted supplier.

Accurate weather forecasts will enable the UK public to thrive in their everyday lives. By providing clear weather information that the public trusts, the Met Office is enabling the public to either perform their daily activities without the concern of weather disruption or to take action to mitigate weather impacts. All improvements in actual accuracy will feed through to improvements in forecasts that people use to stay safe when in unfamiliar situations.

Accurate weather forecasts will also enable businesses (for example agriculture, building, leisure, tourism, green power) to make better decisions to drive effectiveness, improve productivity and efficiency. This will therefore improve their economic impact.

The Met Office should continue to improve the accuracy of weather forecasts throughout the period of the CSA. There are three aspects of accuracy that are important – actual accuracy, perceived accuracy and accuracy relative to other providers (comparative accuracy). Improvements to actual accuracy and actual accuracy relative to other providers are included in this theme, perceived accuracy is covered in Theme 3.

The services and outputs from this theme:

- Be accurate, timely and consistent with other forecast information both within channels and across different channels;
- Accurate weather forecasts for all time periods from Nowcasts to 6 months;
- The provision of forecasts relevant to health and wellbeing, including for example UV, pollen, and air quality.

PWSCG outcomes required in this theme:

Improvements should be made to accuracy of forecasts:

- The actual accuracy of precipitation forecasts should improve (this includes rain and snow):
 - Will it be wet or dry?
 - When will it start and stop?
 - Where exactly will it occur?
 - How long will it last?
 - How hard will it be?
- There should be a focus on improving the actual accuracy of predicted temperature, especially when it is extreme and newsworthy;

- The Met Office should produce weather forecasts which remain world class in terms of accuracy;
- Ensure that the improvements to local forecasts from IMPROVER are pulled through to all PWS services;
- As the new supercomputer comes online, the PWSCG expects the improvements in underpinning modelling to pull through to improvements in forecast accuracy;

Longer range forecasts should be improved:

- Improve the utility and understanding of the three-month forecast for government and responder communities;
- Implement 14 day forecasts on all Met Office channels;
- Investigate ways of communicating seasonal forecasts to the general public and broadcasters, assessing whether there is anything that this audience can do with seasonal forecast information and whether it would be potentially confusing.

Health forecasts should improve:

- The Met Office, working with partners and other Government Departments as necessary, should investigate ways of pulling through science and delivering useful forecasts for health such as for UV, Air Quality and pollen – all of which are extremely weather dependent - with improvements identified and made.

These outcomes will be measured by the following performance measures:

PM2.1: Ensure availability of products and services, including digital channels, scripts, forecasts, observations, and the Public Weather Media Service (PWMS):

PM2.2: The Met Office should be in the top 3 of reported weather providers, based on results from an independent provider averaged over a calendar year (Dec-Dec).

Please note that this is a 3rd party provider, and not all weather providers submit forecasts to them, however it will give a good indication of the relative position of the Met Office.

The following deliverables are in place to support reaching the required outcomes:

D2.1: Develop new measures of actual accuracy for probabilistic forecasts. As the Met Office moves away from deterministic forecasting, to improve the accuracy and usefulness of forecasts of extremes and precipitation (in particular), new methods of assessing the accuracy of probabilistic forecasts will be required up to day 14.

D2.2: Investigate ways to pull through the science and information relating to health, including forecasts of UV, pollen & air quality.

D2.3: Make data up to day 14 available for use on web, app and Hazard Manager by August 2024.

Other required reports:

To monitor progress of this theme, and improvements in actual accuracy, the PWSCG ask the Met Office to provide the following reports ahead of the PAG2 meeting.

R 2.1: As IMPROVER is implemented, the PWSCG expect the accuracy of the weather forecast which most people see and use to improve, most of the time. However, the only benchmark that the Met Office

can provide is that which has been developed using best data on 123 specific sites. We understand that the accuracy of these sites may reduce slightly, whilst the improvements are seen for the vast majority of people in the UK.

To monitor the accuracy of the forecast, the Met Office should write a yearly report detailing accuracy of specific parameters and metric set by the PWSCG.

R 2.2: Deliver improvements to actual accuracy of forecasts based on the roadmap developed in the first year of this CSA.

The Met Office will deliver a report detailing implementation of the improvements to accuracy, demonstrating that overall improvements in accuracy are being made.

3.3 Theme 3: Maintaining an authoritative voice – recognised as global leaders in weather and climate services

Trusted and authoritative weather forecasts, accessible when and where people need them

The other themes of this CSA require the Met Office to produce accurate weather forecasts especially through improvements in the science and technology. However, the Met Office could produce a perfectly accurate forecast, but if this is not getting into the hands of the people who need it, in a way that is useful and helps them to make decisions then that investment and work is wasted. It is therefore important that the Met Office should continue to improve the communication and context of weather forecasts throughout the period of the CSA, ensuring that they are discoverable, accurate, consistent, useful and timely.

Met Office products and services should be:

Discoverable; Accurate; Consistent; Useful; Timely.

As the UK's national weather provider, the Met Office should be the primary source of weather information for the UK population. This can be through direct reach, indirect reach or using data which has been made available via other sources (indirect tertiary reach). The Met Office should maintain the authoritative voice that establishes it as a trusted and reliable source of weather information, communicating weather forecasts, extreme weather events and climate information in a clear, accessible, consistent, informative, and engaging way.

The Met Office should reach the majority of the UK population across all ages and social demographics. It should demonstrate that it is reaching 'harder to reach' audiences and those who are most vulnerable to the impacts of the weather and climate. It should demonstrate the effectiveness of its reach through direct, indirect and indirect tertiary channels and engage with different audience groups, some of whom may not traditionally access weather information.

The success of Theme 3 is dependent upon the success of theme 1, 2 and 4 – without the improvements in the science, technology, accuracy and warnings, the Met Office will not be able to maintain its authoritative voice.

Why is this a priority?

Ensuring the Met Office has an authoritative voice and communicates forecasts that are both accurate and useful on a day-to-day basis will ensure that people are aware of the weather and climate, understand how it might impact them and act in order to stay safe and thrive.

The provision of a high-quality authoritative and consistent service will establish trust and brand loyalty between customers and the Met Office, resulting in greater engagement with Met Office Weather Warnings and improving the likelihood that appropriate behaviour change will occur every day and during extreme weather.

Building and maintaining an authoritative brand through Met Office direct channels, such as the Met Office App shown in Figure 6, will encourage third party media channels and organisations to work with it, which increases the reach, use and display of data, forecasts, and warnings.

As described in Theme 2, the most important aspects of a weather forecast as evidenced by the Public Perception Survey are:

- Accuracy;
- Local detail;
- Giving useful information of how a forecast is going to change;
- Usefulness;
- Ease of understanding;
- Ease of use;
- Clear presentation;
- Being provided by a trusted supplier.

It is important that weather forecasts give information that help people make decisions, both when the weather is severe and on a day-to-day basis.

There are three different types of accuracy. Actual accuracy and comparative actual accuracy are covered in theme 2, but the perception of accuracy is interlinked with how the weather is communicated and so perception of accuracy is included here in Theme 3.

The services and outputs from this theme:

- Clearly communicated, accessible, consistent, timely and engaging provision of weather forecasts and weather information that reach the UK population and help them to make decisions and change their behaviour (direct channels);
- High quality presentation of weather forecasts, content and data that are shared with, and where possible developed in conjunction with, partner organisations (indirect channels);
- Maintenance of the Met Office Library and archive, which is a legal obligation under the Public Records Acts 1958 <https://www.metoffice.gov.uk/research/library-and-archive/about-us/our-policies>.

PWSCG outcomes required in this theme:

- The Met Office should provide trusted weather and climate information and advice to UK citizens in situations when they need to make decision and act for themselves and others for reasons of safety,



Figure 6: The Met Office app.

health, or lifestyle. This can be through direct reach, indirect reach or using data which has been made available via other sources (indirect tertiary reach).

- The PWSCG will continue to work with the Met Office to develop their Citizen Engagement Strategy over the summer of 2022. This strategy will help define the relative proportion of direct and indirect reach required, as well as outline the ways in which the Met Office will reach different sections of the UK population.
- The Met Office should continue to provide direct channels which are world class and maintain their authoritative voice. Requirements for these direct channels include:
 - Improve the way weather is communicated, thus improving the perception of accuracy of Met Office forecasts:
 - Improve the communication of how the weather will *feel*;
 - Review how symbols or other ways of representing weather in forecasting are seen and understood and make improvements, for example by including ways to represent how heavy rain will be and to fully tell the weather story.
 - Provide forecasts and warnings that enable the general public to understand the weather within the context of a changing climate and within appropriate historical context: – this information should be provided working in conjunction with the Met Office’s Hadley Centre for Climate Change;
 - Include comparison to historical events where appropriate;
 - Include more information on how seasons will change, trends of severe weather changes, frequency of severe weather events, comparison of predicted future weather to current extreme weather;
 - Raising awareness of climate change and how it will change the weather in the future amongst the public both directly and indirectly.
 - Give more information to help people make decisions;
 - Use clear language to explain probability and uncertainty in all forecasts and warnings;
 - Explain how the forecast is going to change;
 - Improving direct engagement with ‘harder to reach’ audiences and those who are most vulnerable to the impacts of the weather and climate.
- The Met Office should also extend the reach of Met Office information and forecasts by:
 - Widening partnership working via, indirect and tertiary channels to ensure authoritative advice provided by the Met Office has extensive reach to drive action and change behaviours;
 - Data should be easily accessible, useable, and where possible attributed Met Office;
 - Content should be relevant/bespoke for indirect channels - content partnerships and syndication;
 - The use of partner organisations should be capitalised on;
 - Work with partners to increase the authority of our service by providing content relevant to their area of expertise;
 - Work strategically with weather partners who have competitive capability (whether this be technology or data) to enter different markets;
 - Target harder to reach audiences and drive action;
 - Build social media partnerships (for example via ambassadors or influencers);
 - Encouraging wider use of Met Office data, making it quick and easy to download and use by individuals and government, especially when it comes to warnings.
- The Met Office should ensure that the weather story is the same whatever communication channel is used to view it, and that the information within a channel is also **consistent**:

- Ensure that communication of forecasts is consistent within all channels -for example, the forecast should match the radar picture, the weather script should match the spot forecast information etc;
- Show consistent weather forecasts and key messages across channels (website, app etc.).
- The Met Office should continue to raise awareness of the weather and climate change in schools;
- The Met Office should also seek to maintain its authoritative voice via the delivery of a Met Office National Meteorological Library and Archive service that provides weather and climate information to enable the general public and specialist users (i.e. academia) to research and understand the science and history of meteorology and ensures compliance with the Public Records Act 1958.

	Definition	Example	Why is this important?	
Branding and control ↑	Direct: Primary	Strongly branded Met Office reach through Met Office owned channels direct to the public.	Met Office apps Met Office website Met Office Weather Desk Met Office social media channels	Control of our brand and authority. Build strong relationship with the public. Get direct public feedback.
	Indirect: Secondary	Through a partner . Limited degree of intervention between the information leaving the Met Office and it arriving with the general public. Agreement in place with partner. Branded content.	Channel 5 / BFBS ITV NSWWS Some content syndication (e.g. news channels) Paper published in a science publication	To achieve reach volume with some editorial control of the content. To reach different audiences cost effectively.
		Through a 3rd party . Could be Met Office attributed. Less control of the final message.	PWMS - Sky New stories (press releases) DataPoint Some content syndication	To achieve reach volume with some control. To reach different audiences cost effectively. Less editorial control or positioning of content.
Indirect: Tertiary	Not attributed to the Met Office. Data often blended with other types of data.	Re-use data e.g. provided to MeteoGroup and used in public services (e.g. native phone apps).	Allow wide ranging use of our data for general public good and benefit to the UK economy. Free data links to consistency with NSWWS.	

↓ Reach volume potential

Figure 7: Examples of direct and indirect reach.

The PWSCG sub-group, the PAG 3 provides additional scrutiny of how the Met Office communicates weather and will be used to inform the development of reports for the PWSCG. The Media and Reach Group (MARG) will also challenge and steer the Met Office to ensure adequate reach through broadcasters and advise on increasing the reach of PWS outputs.

Measuring performance of this theme:

Many of the performance measures and deliverables are a continuation of work done in the first year of the CSA. The PWSCG will assess this theme at the mid-year PWSCG meeting in Autumn 2022 to ensure that the requirements are still relevant and based on the priorities set by the Citizen Engagement Strategy.

Performance will be reviewed by PAG 3 through submission of Assurance Reports twice per year in the form of an agreed structured paper. These papers will provide quantitative and qualitative information detailing the reach, impact and benefit to UK citizens delivered through services and other outputs. This report will be in addition to other material provided to PAG 3 covering development deliverables that apply to Theme 3.

The Met Office must assure PAG 3 that progress is being made against the PWSCG requirements included within this theme.

Information within the reports will explain the factors influencing trends in performance and any dips or peaks which occur. Factors which are outside of the influence of the Met Office will be stated.

Subject matter experts within the Met Office representing Direct & Indirect Channels, Data Services and User & Corporate Impacts will present the report to PAG 3 and be available for questions and discussion, to support the PAG in providing their assurance.

	Reporting frequency	Overview of Assurance Reporting
Direct & In-Direct Channels, Data Services	6-Monthly and Ad-hoc (by exception)	<p>September (Interim) - Update on Delivery Metrics and supporting business-as-usual activities. This is separate activity from reporting against deliverables.</p> <p>March (End of Year) – Full assurance report including end of year performance against metrics and debrief on results from Public Perception Survey (PPS), evaluation against Consumer Accuracy Index (CAI), analytic tools and other sources required to report against the metrics</p> <p><i>[Note: PAG 3 in FY'22-'23 - September '22 and March '23]</i></p>

R3.1: Engagement through Direct Channels

Over a three-year period demonstrate improvements in engagement and decision making via Met Office channels (Met Office Website and Apps).

R3.2: Engagement through Indirect Channels

Over a 3-year period, increase the percentage of the population accessing Met Office information and content via indirect channels. Demonstrate indirect partner satisfaction with the services they receive from the Met Office.

R3.3: Impact, Building Trust and Maintaining an Authoritative Voice

Over a 3-year period demonstrate that the Met Office provides trusted, accurate services and is recognised by the public as the engine behind forecasts in the UK.

Performance Measures:

PM3.1: Action taken by the public after seeing or hearing a Met Office forecast. Reported annually as measured via the Public Perception Survey and compared to previous years.

PM3.2: Trust held by the public in the Met Office measured quarterly via the Corporate Trust Tracker; reported quarterly within the year, and as an average across the year-to-date and compared to previous years.

PM3.3: Public Perceptions of forecast accuracy (direct channels), measured and reported quarterly per year using the Consumer Accuracy Index (CAI) and compared to previous years.

PM3.4: Public Perceptions of forecast accuracy (*UK weather market*), measured annually via the Public Perception Survey; categories 'Very accurate' and 'Fairly accurate' will be reported separately and combined. Reported annually and compared to previous years.

PM3.5: Public Perceptions of forecast usefulness (UK weather market), measured annually via the Public Perception Survey. Categories 'Very useful' and 'Fairly Useful' will be reported separately and combined. Reported annually and compared to previous years (21/22 CSA PM3.1e). 40% of the public should rate the usefulness of forecasts as 'very useful' and more than 87% should rate forecasts as 'fairly useful' or 'very useful';

PM3.6: Increase awareness of the Met Office as the source of weather in the UK measured and reported quarterly via the Corporate Trust Tracker with the average score over the year being used as the performance level

Deliverables:

The deliverables below are the continuation of work done in the first year of the CSA 21-26 and are dependent on prioritisation and the outcome of the Citizen Engagement Strategy.

D3: Citizen Engagement strategy:

Write a paper to outline the Met Office Citizen Engagement Strategy and make recommendations for any changes required in this Customer Supplier Agreement based upon priorities from that strategy.

D3.1 Direct Reach:

D3.1a: Improve communication of forecasts to drive action and reach of Met Office Channels:

Informed by the results of previous work during 2021/22, gauge public responses to adapted communication of data points, the weather story and uncertainty.

D3.1b: Improve how the Met Office communicates its forecast accuracy to improve perceptions of accuracy:

Deliver communication campaign to improve perceptions of accuracy, evaluate success and provide recommendations for future communications.

Improve evidence base for communicating what the weather feels like, how unusual it is, context of the weather and uncertainty.

D3.1c: Communicate weather up to day 14 on all channels:

D3.1d: Improve consistency of weather forecasts:

Pull-through improvements to spot data on the website and app to improve forecast accuracy for most users and introduce a greater level of forecast consistency.

Pull-through improvements to map based forecasts on the website and app to improve forecast accuracy and further reduce inconsistency. Implement recommendations to express forecast uncertainty, and further reduce inconsistency with forecasts created manually.

D3.1e: Implement recommendations for visualisation of weather forecasts:

For multiple audiences, when and where it matters (including safety information). Implement recommendations agreed by PWSCG in 21/22 to deliver the consolidated briefing service.

D3.2 Indirect Reach:

D3.2a: Develop and implement a strategy for reaching people who are not getting weather information, and those who are most vulnerable to impacts from the weather and climate:

Undertake research to identify vulnerable groups and provide recommendations about how to reach them and what information should be provided.

D3.2b: Evaluate options to increase the reach and impact of warnings through third parties:

D3.2c: Develop recommendations to grow third party services:

Develop recommendations to grow third party services taking Met Office forecast data and content. .

D3.2d: Develop a new approach and framework to data attribution:

D3.3: Impact, Building Trust, and Maintaining an Authoritative Voice:

D3.3a: Develop a strategy for increasing awareness of the Met Office as the provider of weather forecasts in the United Kingdom for all members of the population, and reaching audiences that are not currently aware:

D3.3b: Consider ways to demonstrate the economic benefit of the weather forecast and warnings:

Working with PWSCG, other departments and other areas of the Met Office, consider ways which the Met Office can demonstrate how they deliver benefit to the economy both every day and in times of severe weather.

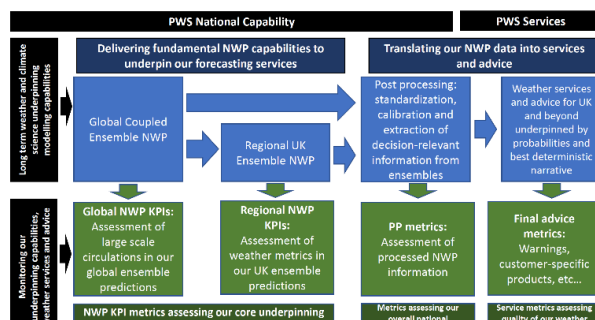
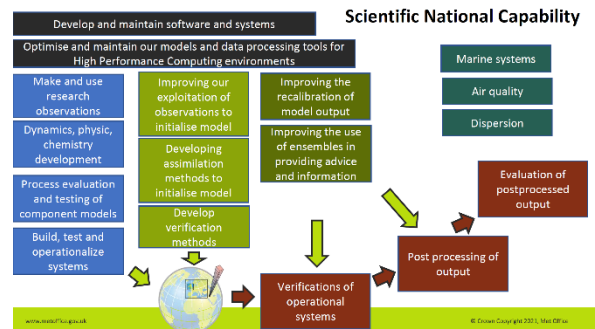
3.4 Theme 4: National capability and international commitments - recognised as global leaders in weather and climate science.

Science, observations, technology and international commitments that underpin weather forecasts and warnings.

The National Capability of the Met Office comprises the essential observations, common forecast capabilities, supercomputer, and infrastructure that underpin all Met Office weather services for PWS and the wider UK government (see figure 8). The Met Office should ensure that the contribution of science, observations and technology continues to improve the capabilities which enable the requirements set out above to be delivered, i.e. to stay safe, thrive and maintain an authoritative voice. This includes continuing to improve the accuracy of forecasts and warnings, and the provision of consistent information for use within services. Top priorities include improving the accuracy and precision of forecasts of exceptionally high and low temperatures, precipitation (intensity, duration and location) and forecasts of severe weather whose impacts may be reflected within a warning. An additional focus on services that support health and well-being to help the public to stay safe and thrive may require the Met Office to develop capabilities that assist in the evaluation or prediction of UV, pollen and air quality.



Figure 8: The National Capability.



The Met Office Science programme forms part of this National Capability by combining scientific expertise with the subject-matter knowledge and technical skill required to develop and deliver operationally robust forecast systems. This starts with underpinning research into numerical and physical processes, including the coordination of, contribution to and collaboration with targeted observational campaigns. This research feeds into the development of world-class seamless models, which in turn are used to build forecasting and post-processing systems providing output from hourly to centennial timescales. Collaborative development between scientists and scientific software engineers provides the assurance that these systems are scientifically and technical suitable to meet current and potential future requirements.

Observations are a crucial component and form the start of the chain of what is required to produce a weather forecast. Observations are primarily used to create accurate forecasts (via assimilation into the forecast models), verify the accuracy of forecasts & warnings, directly for users to view within products & services (to enable users to 'see' the current weather) and by meteorologists to provide guidance (especially for short term weather, including severe weather) and to improve the accuracy and usefulness of forecasts curated by a human. Observations are provided in accordance with international standards and to common user requirements which are informed by the scientific value of each observation type.

The Met Office should continue to evolve and enhance its observing networks to address identified capability gaps to enable the delivery of the highest quality forecast possible for the available PWS funding.

The National Capability is dependent upon the global exchange of essential data using common standards for use within forecast and observing systems. Collaboration with international organisations to enhance the exchange of essential data, with a particular aim to address the worsening data gaps globally, is an important component of the National Capability.

A key component of the underpinning national capability is access to supercomputing capability. It is only with the right level of investment in supercomputer resource and the means to efficiently manage the large amount of data that effective pull through of science into improved weather and climate services can be achieved.

The outputs of the National Capability required by the PWSCG include UK, some global observations, and seamless UK & global forecasts from hours to 6 months ahead. These outputs are mostly in the form of data and are used within PWS products & services and to provide advice to the public and UK government. These outputs are also provided to a wide range of government departments and for re-use by academia and by the private sector. Use of the National Capability by sector is summarised in Annex B.

The Met Office as the UK's national met service is well respected and highly regarded internationally and plays an important role in deploying a degree of 'soft power' to the overall benefit of the U K. The Met Office should maintain and where possible increase its influence within key organisations and collaborations to ensure that UK interests are served. When representing the UK on the international stage the Met Office should seek to maximise the impact of any financial contributions made by the UK Government. If circumstances allow, the Met Office should ensure that interventions and decisions support and further widen UK Government aims and objectives that may be closely linked or aligned to those in weather and climate.

On behalf of the UK, the Met Office is an active member within a number of international organisations and has also established itself as a trusted partner with a number of overseas governments.

The key organisations and institutions that Met Office should maintain an active role in and maintain engagement with to the benefit of the PWS are:

- EUMETSAT
 - The European Organisation for the Exploitation of Meteorological Satellites is an intergovernmental organisation based in Darmstadt, Germany. Currently with 30 Member States, it develops and operates 24/7 primary weather satellites for Europe. It also provides its members access to meteorological satellite data from other agencies.
- ECMWF
 - The European Centre for Medium-range Weather Forecasts. An intergovernmental organisation of 23 member states responsible for delivering numerical weather predictions on the medium and extended range timescales for its members.

- WMO
 - The World Meteorological Organisation is the United Nations specialised Agency responsible for international cooperation in weather, climate, and water. Through its programmes it coordinates the exchange of real time meteorological information between its 193 members and facilitates the capacity development of National Meteorological Services (NMSs) in developing countries through its Voluntary Cooperation Programme (VCP).
- EUMETNET
 - European Meteorological Services Network. An economic interest grouping of European Meteorological Services which organises cooperative programmes relating to surface observations and weather forecasting, to ensure cost-efficient, optimised, Europe-wide composite observing system. Based in Brussels, Belgium.
- ECOMET
 - Economic interest grouping of the National Meteorological Services of the European Economic Area. Operates and maintains an administrative framework to increase access to data and products throughout Europe (for ECOMET Members and 3rd parties). Based in Brussels, Belgium.

The PWS Assurance Group PAG 4 will scrutinise this theme and the Met Office should produce a report as outlined below.

Why is this a priority?

The National Capability underpins the PWS and weather services provided to a wide range of government departments as described above, providing accurate and timely observations and forecasts, and the means through which information is disseminated to users.

Without the national capability and International co-operation and commitments there would be no weather forecasts, the UK would not be able to provide the public or responders with information that will help them stay safe and thrive and the Met Office would not be able to fulfil their public task¹.

The services and outputs from this theme:

- Outputs essential to deliver PWS Services listed within the Annex to this CSA;
- Outputs that provide advice to multiple UK government departments to assist in the mitigation of weather-related risks within the National Risk Register;
- Outputs to Civil Aviation which are regulated by the Civil Aviation Authority (CAA) and which are required to perform to quality standards in accordance with the UK's international obligations, and additional national requirements as applicable;
- Capability essential to underpin outputs to UK government which enable multiple Departments to discharge their responsibilities in line with the UK's National Security Strategy;
- Capabilities that improve the quality of PWS services to meet performance levels required by the PWSCG in this CSA;

¹ The PWS Services and outputs of the National Capability which are listed within the Service Catalogue of this CSA form the Met Office Public Task.

- Capability that exists as part of the Met Office’s recognised role by the World Meteorological Organisation (WMO) as the UK’s National Meteorological Service;
 - Pull through of new capabilities running on the new supercomputer – in conjunction with partners;
- A full list of services can be found in the Annex A at the end of this document.

PWSCG requirements for this theme:

The Met Office should focus on:

- Ensuring national capability is constantly developed and its outputs are pulled through from the science to the wide range of users, focussing improvements on accuracy for forecasts that matter most to the user, with a particular focus on precipitation and extreme temperatures, whilst recognising that improvements in the accuracy of all warnings is required to stay safe.
- Ensuring that forecast capabilities on the supercomputer are developed to deliver the performance gains which are reflected within this Customer Supplier Agreement. A new supercomputer with significantly greater capacity is expected to be implemented during 2023, followed by a second capacity upgrade, that will require implementation of a next generation modelling capability, pulling through improvements from the new supercomputer into improved accuracy, products, and services.
- Ensuring that the substantial increase in data volumes from the next supercomputer can be managed efficiently. Service continuity should also be maintained whilst transitioning to the new supercomputer.
- Evolve and life-cycle the UK observational network for the next generation of models, including observations from satellite, radar, surface (land and marine), upper air and from emerging novel sources (including exploiting the internet of things). This should be continuous to deliver the outcomes required through services and to ensure that the next generation models have access to the appropriate quantity and types of observations.
- Engaging with WMO, EUMETSAT, ECMWF, EUMETNET and the wider international community in line with UK Government policy and its priorities, in order to operate as a member of the global weather and climate community.
- Ensuring that absolute and relative verification capabilities are kept up to date and relevant to ensure that the Met Office can measure and report on the accuracy of forecasts as required.

Assurance will be provided through Assurance Reports to the PWS Assurance Group (PAG 4)

The key output of the National Capability is to constantly improve forecasts to stay safe and thrive; the specific service measures are within other themes. For the improvements required in other parts of the CSA to be realised it is critically dependent on the requirements in this theme. Performance will be reviewed through submission of a series of Assurance Reports, in the form of an agreed structured paper detailing development and delivery activities, for discussion with the PWSCG as outlined below. These reports will include a variety of performance information that apply to the outputs from the National Capability.

The Met Office must therefore assure the PAG that progress is being made within this theme. This should be done through a report to the PAG for their scrutiny at each meeting, outlining any developments or issues which may impact upon the delivery of the Met Office’s National Capability. The PWSCG chair, supported by the PWSCG secretariat should also be invited to The Met Office Scientific Advisory Committee (MOSAC) meetings.

	Reporting frequency	Overview of Assurance Reporting
1) Technical Services (Observations) 2) Science 3) Technology	Annual + Interim	October (Interim) – Provide update on Delivery Metrics and BaU activities primarily, interim review on development activities. March (End of Year) – Full assurance report including final position on BaU metrics. Annual review of development activities. Also provide roadmap development activities for the following year.
4) International Commitments	Annual + Ad-hoc following meetings	Annual Review – (March) Review of previous year’s activities – as well as forward look and plans for following year. Ad-hoc information and papers presented following International conferences and meetings of note.
5) Finance	Annual + Interim	October (Interim) – Review of 6 month position of PWS finances March (End of Year) – Review of Annual PWS Finances

The format of the Assurance Reports varies, and the structure of each report is summarised in the information below.

1) Technical Services (Observations)

The Technical Services Assurance reports provided to the PWSCG will detail:

Service Delivery Activities:

- The quality, availability, and timeliness of observations from across the networks;
- The availability and timeliness of essential data from satellites.

Development Activities:

- Updates on developments that will help deliver the outcomes for PWS outlined in Themes 1-3 of the CSA, including enhancements to observations networks that will result in improved and more resilient measurement of high impact, convective scale weather, including UK rainfall and lightning strikes.

End of year report:

- An annual summary report, focussed on service delivery and development activity, and including key achievements, risks and a roadmap for next year.

2) Science

The Science Assurance reports provided to the PWSCG for will detail:

Service Delivery Activities:

- Quality (forecast accuracy) of underpinning NWP forecasts;
- Quality of science as reported by Chair of Met Office Service Advisory Committee (MOSAC);
- Relative performance of medium range forecasts provided by ECMWF relative to other global providers.

Development Activities:

- Updates on developments that will help deliver the outcomes for PWS outlined in Themes 1-3 of the CSA, including operational implementation of new post processing capability.

End of year report:

- An annual summary report, focussed on above service delivery and development activity, and including key achievements, risks and a roadmap for next year.

3) Operational Technology

The Operational Technology Assurance reports provided to the PWSCG for discussion will detail:

Service Delivery Activities:

- Availability of critical, underpinning IT infrastructure.
- Availability and timeliness of common forecast capabilities.
- Exchange of essential data between Met Office and other National Meteorological Centres.

Development Activities:

- Updates on developments that will help deliver the PWS outcomes outlined in Themes 1-3 of the CSA.
- Provide updates on the progress of porting essential forecast model capabilities to the new supercomputer
- Service continuity maintained and data flows transitioned to technologies adjacent to new supercomputer (22/23 End of Year Report).
- Benefits of new supercomputer to PWS priorities (21/22 End of Year Report, then annually).
- Update on Met Office Data Roadmap (annual)

End of year report:

- An annual summary report, focussed on above service delivery and development activity, and including key achievements, risks and a roadmap for next year.

4) International Commitments

The International Commitments Annual Assurance report provided to the PWSCG for discussion will detail:

Service Delivery Activities:

- Report on WMO, ECMWF, EUMETSAT and EUMETNET Council/Assembly meetings decisions against Top Level UK/Met Office Objectives and impacts to PWS;
- Report from Met Office staff within influential positions at WMO Technical Commissions: **SERCOM** – The Commission for Weather, Climate Water and Related Environmental **SER**VICES and Applications;
- **INFCOM**– The Commission for Observation, **INF**rastructure and Information Systems;
Note: These influential positions may change and will be reviewed annually.
- Delivery of Voluntary Cooperation Programme against plan, budget and assessment of value for money;

Development Activities:

- UK warnings provided via Meteoalarm issued with messaging that is consistent with direct channels.

End of year report:

- An annual summary report, focussed on above service delivery and development activity, including key achievements, risks and a roadmap for next year.

5) Finance

The bi-annual Finance assurance reports provided to the PWSCG will detail current in-year PWS finances. Reports to include a 5-year forward look, incorporating anticipated changes arising from international subscriptions.

Annex A: Products and Services Catalogue

List of all the products and services that constitute the Met Office Public Task. Some of these products and services are not directly mentioned in the CSA but are included here for completeness.

All products and services are delivered against at least one of the Theme aims and are included only once in the below summary under the Theme they are most aligned to. However, please note that some products and services do contribute to the success of more than one Theme.

Theme Products and Services

Theme 1 – Weather forecasts and warnings when it matters – Stay Safe	
UK	
Services	Civil Contingency Advisors Hazard Manager NSWWS [National Severe Weather Warning Service] (service) – includes supporting communications, engagement, and education provision. Avalanche support services Gov e-mail Delivery Central Guidance Unit services (UK Operational forecast expertise)
Products	NSWWS (product) Daily Hazard Assessment Short notice warnings CHEMET (Area and Plume forecast for hazardous chemical releases) Three-month Outlook Heat warnings
International	
Services	RSMC (Regional Specialist Met Centre) – allocated by WMO for Atmospheric Transportation Modelling Services Meteoalarm (European warnings information service) Atmospheric pollution service Advice to Government Hurricane Season Forecasts Crisis Area Modelling International support services (briefing to UK government) Global Guidance Unit Services (GGU) (Global Operational forecast expertise)
Products	Global Long Range Outlook (Produced by Science) Global daily weather impact assessment Global incident forecasts International atmospheric pollution services Severe weather assessments

Theme 2 – Weather forecasts and warnings everyday - thrive	
Services	Met Office Website Met Office Mobile Apps Met Office Mobile Widget Alexa skill and Flash briefing
Products	7-day site specific and mapped forecasts across the UK Operational Forecasts <ul style="list-style-type: none"> • National and Regional video forecasts • Text forecasts • Weather forecast charts Weather related website and App content (text chart and video) Pollen forecasts (5 day pollen forecast service March-October) Mountain forecasts Beach forecasts UK event forecasts UK climate information UV forecasts Current Observations, including radar, satellite and surface based Historical Observations

Theme 3 – Maintaining an authoritative voice – recognised as world leaders in weather and climate services.	
Services	New and Emerging channels Social Media Channels Management Weather Desk (Met Office 24hr helpdesk) National Meteorological Library and Archive (digital and analogue archives) Public Weather Media Service (PWMS) Presenter Visual Cortex licence and support (with 3 rd party funding) Design Services Press Office Communications and weather campaigns Syndication services Marketing and market intelligence Schools Programme of services
Products	Bespoke Graphics Production Media Briefings from specialists (media services team and others) Briefings and scripts Downloadable weather-related curriculum for 7-14 year olds
Data Services	Weather DataHub (Link here) Datapoint (deprecated to be decommissioned) (Link here) Data Provisioning (PSI re-use data catalogue) (Link here) Weather observations Website (WOW) (Link here)

Theme 4: National capability and international commitments - recognised as global leaders in weather and climate science

Reports from Technical Services (Observations), Science, Operational Technology, International Commitments and Finance are provided to the PAG for assurance purposes, giving detail on the performance of service delivery and progress made in development activities which contribute to the lifecycle plans of products and services detailed above under themes 1 to 3.

Observations, Science and Technology capabilities listed within tables below undergo regular life-cycling which includes transformation to cloud based technologies. Tables will be refreshed annually and may not precisely reflect the latest configuration of underpinning capabilities.

<p>Technical Services (Observations)</p>	<p>Global satellite reception UK radar network UK land observations UK upper air observations Marine observations (Buoys, Voluntary observing ships, Argo Floats) Lightning observations UK AMDAR (Aircraft Meteorological Data Relay) WOW observations (Weather Observations Website) (Also included above in Theme 3) European and Global observations – exchange and collaborations Spectrum and Safeguarding Observations data quality control Climate Observations Historical Data</p>
<p>Science</p>	<p>Forecast Models <i>Atmospheric NWP</i> Global Model Deterministic UK Model Deterministic Local Area Model London Global Ensemble UK Ensemble (available for re-use 2022)</p> <p><i>Atmospheric – Extended range</i> Met Office Global Seasonal Forecasting System – Monthly (with 3rd party funding) Met Office Global Seasonal Forecasting System – Seasonal (with 3rd party funding) Met Office Global Seasonal Forecasting System – Hindcast (with 3rd party funding) <u>(Data available for re-use through Copernicus – link here)</u></p> <p><i>Dispersion Models</i> NAME (Numerical Atmospheric Dispersion Modelling Environment) UK Air Quality Unified Model (UK AQUM)</p> <p><i>Marine Models</i> Global Wave Model UK Wave Model Atlantic Wave Model Ensemble</p>

	<p>OSTIA Foundation Sea Surface Temperature and Sea Ice Analysis Global Forecasting Ocean Assimilation Model (Global FOAM) North West Shelf Seas Forecasting Ocean Assimilation Model European Shelf Seas (AMM15) (with 3rd party funding) UK surge model UK surge ensemble model Global Ocean (with 3rd party funding)</p> <p><i>Science Capability</i> Atmospheric model evaluation & development Atmospheric physics & parameterisations Data Assimilation Satellite applications Verification (capabilities and outputs) Dynamics research Post processing (Gridded, Site specific, climatological record) Impact modelling Observation based research Observations systems Research Weather Science IT Informatics Atmospheric dispersion Science partnerships Ocean forecasting Climate science IT Climate monitoring & attribution</p> <p><i>Other Centres - ECMWF</i> European Centre for Medium Range Weather Forecasting (ECMWF) - Global Deterministic Model, - Global Ensemble Model, - Monthly - Seasonal</p>
Technology	<p><u>Technology</u> Supercomputing (HPC Exeter, HPC ECMWF) Other Compute (Physical, Virtual, Container, Function) Hosting (On Premise, Public Cloud) Storage (Object, Block, File System) Connectivity (LAN, WAN, Internet, Partner)</p> <p><i>Technology Applications</i> Platform Engineering (Databases, IDAM, Machine Learning etc) Software Development (Design, Build, Test, Integrate, Deploy) Application Lifecycle Management (On-Board, Configuration, Customisation, Retirement) IT Service Management (Design, Transition, Operation, Improvement, Retirement)</p> <p><i>Data</i></p>

	<p>Data Transport (Data Transfer, Data Traffic Management)</p> <p>Data Management (Common Reference, Common Metadata, Data Catalogue, Common Functions)</p> <p>Data Platform (Data Services, Data Pipelines, Data Lake, Interactive Data Environments)</p> <p>Data Supply (Observation, Simulation, Standardise, Post-Processing, Productise, Supply)</p> <p><i>Data Science (Data Science Research)</i></p>
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International Commitments	<p>World Meteorological Organisation (WMO)</p> <p>European Centre for Medium-Range weather forecasts (ECMWF)</p> <p>European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)</p> <p>EUMETNET (network of 31 European National Met Services)</p> <p>WMO Voluntary Co-operation Programme (VCP)</p> <p>European Economic Interest Group (ECOMET)</p>

Annex C: Glossary and Terms of Expression

Accuracy	<p>There are three types of accuracy typically referred to by the Met Office. Actual accuracy represents how well the weather forecast at a particular location represents the true weather conditions observed at that location. Perceived accuracy represents how accurate Met Office users/customers believe the forecast(s) to be, based on feedback from market research. Comparative accuracy refers to how accurate the Met Office is compared to other weather providers, and this can be judged via actual accuracy measures or and perceived accuracy measures. However, the definitive comparison is based on actual accuracy</p>
Ad hoc surveys following severe weather	<p>The Met Office commission surveys a number of times each year in consultation with the PWSCG Secretariat after the issuing of an amber or red warning. The surveys aim to monitor the awareness and usefulness of the warnings and establish any actions taken by the public as a result. Up to 6 surveys are carried out per year.</p>
Authoritative voice	<p>The term 'authoritative voice' is being used here as a general term to describe the Met Office as a trusted, expert service provider that partners choose to use. It should be noted that across the international meteorological community it is used for a more specific purpose, to describe the NMHS responsibilities for delivering non-discretionary services that provide safety of life services – such as NSWWS for example. It's a concept designed to guard against contradictory warnings in serious weather situations. Work is currently underway in the Met Office to better define the different uses of the term authoritative voice and this will be shared with the PWS Customer Group when it becomes available.</p>
BGS	<p>British Geological Survey is a partly publicly funded body which aims to advance geoscientific knowledge of the United Kingdom landmass and its continental shelf by means of systematic surveying, monitoring and research</p>
CAA	<p>Civil Aviation Authority is a DfT agency and the UK's specialist aviation regulator</p>
CAI	<p>Consumer Accuracy Index is an output measure from the Perceptions of Accuracy Omnibus survey which helps the Met Office to understand and monitor the drivers of consumer accuracy ratings amongst weather service users.</p>

CCS	Cabinet Office Civil Contingency Secretariat supports the Prime Minister and Cabinet, and leads the wider government effort, on civil emergency planning and response.
Channels	<p>Direct channel: Met Office provides content or services directly to the public and where the public are interacting directly with the Met Office. <i>E.g. Met Office website, Met Office app, Met Office weather desk, Met Office social media *</i> *Met Office social media really is a ‘rented channel’, e.g. through Facebook or Twitter, as the Met Office do not own the platform. However it is included in direct as the public feel that they are interacting personally with the Met Office.</p> <p>Indirect channel: Met Office provides weather services to an intermediary, who then pass this on to the public. It may go through more than one intermediary and the initial content from the Met Office may change as it passes through an intermediary <i>E.g. Public Weather Media Service and broadcast media, data services, content syndication, Met Office for Schools programme.</i></p>
CSA	Customer Supplier Agreement – the document which sets out what products and services the Public Weather Service will provide, which form the basis of the Met Office’s Public Task. The CSA defines the key performance measures that will ensure PWS is being delivered to the required standard and deliverables that will need to be reached in order to ensure the ongoing development of the PWS.
DHA	Daily Hazards Assessment is a provided by the Natural Hazards Partnership, and is an ‘at a glance’ overview of potential natural hazards and health implications that could affect the UK over the next 5 days. It provides a hazards summary to help increase UK’s ability to respond to, and be prepared for multi-hazard events.
D	Deliverables are pieces of work designed to make improvements to PWS services. Deliverables are defined within the CSA and assessed for delivery.
EA	Environment Agency a Department for Environment, Food & Rural Affairs body which works to create better places for people and wildlife, and support sustainable development, and is responsible for flood warnings in England
ECMWF	European Centre for Medium-range Weather Forecasts a non-EU intergovernmental treaty organisation hosted in the UK. It is both a research institute and a 24/7 operational service producing & disseminating medium range numerical weather predictions to its Member States.
ECOMET	An economic interest grouping of European Meteorological Services which operates and maintains an administrative framework to increase access to data and products throughout Europe (for ECOMET Members and 3rd parties). Based in Brussels, Belgium.
Emergency responder survey	The Emergency responder survey is carried out by the Met Office every 2 years to get feedback from the responder community on Met Office services.
Emergency Responder workshops	The Met Office and PWSCG run workshops with the responder community, when appropriate, to test the effectiveness of the current service offer and to inform where changes and improvements to the service could be made in the future.
EUMETNET	A non-EU grouping of 31 European National Meteorological Services that provides a framework to organise co-operative programmes between its Members in the various fields of basic meteorological activities
EUMETSAT	The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) a non-EU intergovernmental treaty organisation responsible for the launch and operation of European weather satellites and delivering satellite data to National Met Services.
Hadley Centre for Climate Science and Services	The Met Office Hadley Centre — named in honour of George Hadley — is one of the United Kingdom's leading centres for the study of scientific issues associated with climate change. It is part of, and based at the headquarters of the Met Office in Exeter. See also (MO)HCCP.

Heat- Health Alert	<p>A heat-health watch alert system² is run by UKHSA and operates in England from 1 June to 15 September each year. The service considers the impact of prolonged extreme heat on public health, especially those with long-term health conditions. The heat-health alert system covers levels 0-4:</p> <ul style="list-style-type: none"> • Level 0 – Long-term Planning • Level 1 - Heatwave and Summer Preparedness • Level 2 - Alert and Readiness (when a heatwave is forecast) • Level 3 - Heatwave Action (triggered as soon as the Met Office confirms that threshold temperatures have been reached in any one region or more) • Level 4 - Major Incident. The decision to go to a Level 4 is made at national level and will be taken in light of a cross government assessment of the weather conditions, co-ordinated by the Civil Contingencies Secretariat.
Heatwave	<p>A heatwave is an extended period of hot weather relative to the expected conditions of the area at that time of year, which may be accompanied by high humidity. A UK heatwave threshold is met when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold. The threshold varies by UK county and can be found on the Met Office website here</p>
Extreme Heat Warning	<p>The Extreme Heat Warning is an impact-based warning designed to highlight the potential impacts of extreme heat to protect lives and property, helping people make better decisions to stay safe and thrive. These are UK wide impact based warnings, with medium or high likelihood of medium or high level impacts to transport, energy supply and other areas as well as health (ie amber or red warnings), will be distinct from the heatwave definition and heat health alerts described above, and cover impacts to the general population (not just the vulnerable) and to infrastructure.</p>
HPC	<p>High Performance Computer or supercomputer</p>
MARG	<p>Media & Reach Group - a sub-group of PWSCG with the mandate to provide assurance to the Chair of the PWSCG in the following areas. The outputs of the Public Weather Service provide adequate 'reach' to help demonstrate value for money for PWS. There is consistency in the delivered message of those outputs across the various media channels. The Public Weather Media Service (PWMS) is operating in a way that meets the needs of the broadcasters using it.</p>
MCA	<p>Maritime & Coastguard Agency – an Executive Agency of the Department for Transport, which works to prevent the loss of life on the coast and at sea.</p>
MOB	<p>Met Office Board - The main role of the Met Office Board ("the Board") is to support, constructively challenge and provide leadership to the Executive Board, including the Accounting Officer. It should also ensure that the Met Office is working within a framework of prudent and effective governance arrangements and controls which enable risk to be appropriately assessed and managed.</p>
(MO)HCCP	<p>(Met Office) Hadley Centre Climate Programme - a programme of work which develops core UK climate science infrastructure and serves the needs of the UK Government by providing policy-relevant scientific evidence and advice in the post-Paris context.</p>
MOSAC	<p>The Met Office Scientific Advisory Committee (MOSAC) a committee of external independent experts which reviews the Met Office's science programmes annually and raises any scientific concerns in relation to the ability of the Met Office's research plans to meet its customer's requirements and its own strategic aims.</p>
NHP	<p>Natural Hazard Partnership is a collaboration between UK public bodies to provide authoritative, consistent, and useful, hazard, impact and risk assessment information to responder communities and governments.</p>

²https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/888668/Heatwave_plan_for_England_2020.pdf

National Capability	National Capability comprises the essential observations, <i>common</i> forecast capabilities and infrastructure that underpin all Met Office weather services for PWS and wider UK Government.
NMS	National Met Service an organisation whose mission is to observe, understand and predict the weather and climate of its country and to provide meteorological and related services in support of its national needs and international obligations. It thus involves an essentially five-fold mission of monitoring, research, modelling, service provision and international co-operation.
NRR	The National Risk Register describes the risks of major emergencies that could affect the UK in the next five years and provides resilience advice and guidance. This is the public facing version of the NSRA
NRW	Natural Resources Wales is a Welsh Government sponsored body, which aims to pursue sustainable management of natural resources in Wales and is responsible for flood warnings in Wales.
NSAG	National Security Advisory Group
NSRA	National Security Risk Assessment is designed to compare, assess and prioritise all major disruptive risks to the UKs national security.
NSWWS	National Severe Weather Warning Service is a service provided by the Met Office in the United Kingdom. The purpose of this service is to warn the public and emergency responders of severe or hazardous weather which has the potential to cause danger to life or widespread disruption.
NSWWS survey	An NSWWS survey is an online survey following severe weather events with Emergency Responders. They are commissioned when required.
PAG	Public Weather Service Assurance Group - a sub-group of Public Weather Service Customer Group which provides additional scrutiny of each theme of the CSA and provide assurance of the financial management of PWS funds by the Met Office.
PM	Performance Measures are metrics used to assess PWS performance during the year, as defined by the CSA.
Perceptions of Accuracy Omnibus	The Perceptions of Accuracy Omnibus survey is performed to understand and monitor the drivers of accuracy amongst the Met Office and other weather service providers. Output is a Customer Accuracy Indicator.
PPS	The Public Perception Survey is commissioned annually by the Met Office (usually in the autumn) with the aim of assessing the satisfaction levels of the general public in respect of the weather forecasts generally and the services provided by PWS.
Public Sector Information	Public Sector Information means information produced, held or disseminated by the Met Office within its Public Task and in scope of the Re-Use of Public Sector Information Regulations 2015.
Public Task	Public Task means the delivery of the PWS Outputs, which the Met Office is empowered to deliver pursuant to the Meteorological Office Trading Fund Order 1996 No. 774 (as amended).
PWS	The Public Weather Service for the UK as set out in Section 2.
PWS Outputs	The deliverables for the PWS as set out in the Products and Services Catalogue at Annex A of Section 2.
PWMS	The Public Weather Media Service is a package of free (under licence) UK weather services, for eligible UK Broadcasters who sign up to the service, which is delivered by media-specialist Met Office forecasters. It provides Broadcasters with Met Office public weather service information for the UK (forecasts, weather warnings, observations, guidance, scripts and services), tailored for Broadcast media.
PWSCG	Public Weather Service Customer Group – acts as customer on behalf of the public and public sector users of the Public weather Service. Chair is a Ministerial appointment, membership includes an independent member (receives an honorarium from BEIS) to represent the views of the public, representatives from the emergency response community, the Devolved Administrations and Departmental and Arms Length Body users of the PWS.
Reach	Met Office Reach The number of people who see Met Office information or accesses its products or services via direct or indirect channels. Strongly branded Met Office reach through Met Office owned channels direct to the public.

	<p>Indirect reach: Branded reach of Met Office forecasts of information achieved via a partner or 3rd party. Information provided through a partner has a limited degree of intervention between the information leaving the Met Office and it arriving with the general public due to an agreement with the partner, and includes branded content. Information provided through a third party could be Met Office attributed and the Met Office has less control of the final message.</p> <p>Indirect tertiary reach: Reach of Met Office data and presented via a third party, not attributed to or branded Met Office. Data often blended with other types of data.</p>
Share of Claimed Usage	The Met Office's claimed share of usage is a statistic derived from Public Perception Survey responses about where and how often people access weather forecasts, which provides an indication of the most used sources of everyday weather information in the UK.
SEPA	Scottish Environment Protection Agency is Scotland's principal environmental regulator, protecting and improving Scotland's environment and is responsible for flood warnings in Scotland.
Trust	Trust is a general brand perception measure. Brand trust is defined as the willingness of the average consumer to rely on the ability of the brand to perform its stated function (Journal of Global Strategic Management) The Met Office measures its trust score via its quarterly trust tracker survey via the following question: The Met Office is the UK's national meteorological service. It provides a range of weather and climate services for the public, governments and businesses. To what extent do you trust the Met Office in general?
UKHSA	UK Health Security Agency which exists to protect and improve the nation's health and wellbeing, and reduce health inequalities.
WMO	World Meteorological Organisation – the specialised agency of the United Nations for meteorology (weather and climate), operational hydrology and related geophysical sciences. It is an intergovernmental organization with a membership of 193 Member States and Territories.

Annex B: PWS Reporting and Assurance

A high level of assurance is required by the PWSCG to ensure that services are provided to agreed standards. Performance Measures (PMs) and Deliverables (Ds) are used to define performance in the CSA. Governance mechanisms as outlined below will be used to review progress in delivering the PWS PMs and MSs and ensure that they undergo the appropriate scrutiny.

Monthly Performance Review Meetings

This meeting is conducted on a monthly basis and is attended by the BEIS PWSCG Secretariat and Met Office PWS team. The purpose of the meeting is for the Met Office to update the PWSCG Secretariat on current performance relating to the PMs and Deliverables.

NSWWS Assessment Meetings

This meeting is conducted on a monthly basis if there have been any notable weather events within the preceding month for which a NSWWS has been issued, or for which evidence suggests that an event may have been missed. The meeting will be attended by the PWSCG Secretariat, a Met Office Civil Contingencies Advisor and a Met Office Senior Civil Contingencies Advisor. This purpose of the meeting is to subjectively assess the performance of each Amber and Red (and by exception, Yellow) NSWWS warning by reviewing a broad evidence base of impact information collated by the PWSCG Secretariat and the Met Office.

PWS Assurance Groups (PAGs)

To tie in with the structure of the CSA 2021-26, the PWSCG secretariat undertook a review of the assurance groups in order to provide additional scrutiny for the different themes.

Two PAGs had been running since 2014, one providing additional scrutiny for the National Capability and International Commitments of the PWS and provide assurance of the financial management of PWS funds by the Met Office, and another for the Public Services Theme of the PWS (since April 2017). Following the separation of the CSA into 4 themes in 2021, these subgroups are extended to:

PAG 1 – stay safe

PAG 1 will assure the metrics and deliverables for theme 1. Including assessment of the National Severe Weather Warning Service (NSWWS) and Civil Contingency Services. This will include going through any Ad Hoc surveys, responder surveys etc. It will also assess and make recommendations regarding updates to deliverables and metrics for the yearly CSA update

As this theme is such a fundamental part of the performance of the Met Office, all members of the PWSCG will be involved in this assurance. For this reason, assurance of the deliverables and metrics in theme 1, along with a review of the weather and warnings, will be a standing agenda item in each PWSCG meeting.

PAG 2 – thrive

PAG 2 will assure the metrics and deliverables for theme 2, and will include agreement of the accuracy measures in year 1.

PAG 2 will meet once per year to assure all the deliverables and metrics in theme 2, including a full assessment of the accuracy measures, and will be run in conjunction with PAG 4 as below. It will also assess and make recommendations regarding updates to deliverables and metrics for the yearly CSA update.

This meeting will take place ahead of the PWSCG meeting in March in person, with the option to join by MStems if necessary. The PAG will prepare a report for the PWSCG.

PAG 2 Membership

Chair PWSCG	Independent member
Civil Aviation Authority	Ministry of Defence
Environment Agency	Maritime and Coastguard Agency
Maritime and Coastguard Agency	Others on request

PAG 3 – authoritative voice

PAG 3 will provide assurance and scrutiny of the authoritative voice and parts of the accuracy theme of the PWS. It will also assess and make recommendations regarding updates to deliverables and metrics for the yearly CSA update.

The Group will normally meet twice a year – in late March ahead of the PWSCG meeting, and in September. These meetings may be fully virtual, or in person, with the option to join by MStems if necessary. The PAG will prepare a report for the PWSCG.

PAG 3 Membership

Chair PWSCG	Independent member
Scottish Government	Welsh Government
Northern Ireland Government	Environment Agency
Maritime and Coastguard Agency	UK Health Security Agency

PAG 4 – national capability and international commitments

PAG 4 will provide the assurance and scrutiny for the national capabilities and the international commitments. The PAG is expected to use the existing assurance mechanisms within the Met Office to inform its work (e.g. the Met Office Audit Committee and Met Office Scientific Advisory Committee) and not duplicate the work of any existing assurance mechanism. The PAG will prepare a report for the PWSCG.

	Reporting frequency	Overview of Assurance Reporting
1) Technical Services (Observations) 2) Science 3) Technology	Annual + Interim	September (Interim) – Provide update on Delivery Metrics and BaU activities primarily, interim review on development activities March (End of Year) – Full assurance report including final position on BaU metrics. Annual review of development activities. Also provide roadmap development activities for the following year.
4) International Commitments	Annual + Ad-hoc following meetings	Annual Review – (March) Review of previous year’s activities – as well as forward look and plans for following year Ad-hoc information and papers presented following International conferences and meetings of note.
5) Finance	Annual + Interim	September (Interim) – Review of 6 month position of PWS finances March (End of Year) – Review of Annual PWS Finances

This group will meet once a year in March ahead of the PWSCG on the same day as PAG 2 to present the assurance reports as outlined in the CSA (and see table above). Interim reports will be sent around by correspondence.

PAG 4 Membership

Chair PWSCG	Independent member
Civil Aviation Authority	Ministry of Defence
Environment Agency	Maritime and Coastguard Agency
Maritime and Coastguard Agency	Others on request

PWS Customer Group (PWSCG) Meetings

PWSCG Formal Meetings

PWSCG meetings will be the forum for strategic discussion, looking forward, discussing the bigger, more strategic issues and will set the direction of PWS. These meetings will include summaries of the PAG meetings.

Formal PWSCG meetings will normally be held twice a year in April & October. All members and Met Office delegates are expected to attend and if unable to do so are asked to provide a deputy. On an annual basis at the April PWSCG meeting, the members will form a recommendation to the Department for Business, Energy and Industrial Strategy (BEIS) as to delivery of the performance measures and deliverables, as defined within the CSA. These will have been run through in depth at the theme PAG's as described above. Official sign off or any challenges to sign off will be recorded at this meeting. Also at this meeting the CSA for the subsequent FY will be agreed including the Public Performance Measures and Deliverables. The meetings are timetabled and coordinated by the PWSCG Secretariat.

A formal meeting of the PWSCG will be considered quorate provided no more than one half of members and one of the independent members are absent. An inquorate meeting may proceed in an advisory capacity to the Chairperson.

Voting will be on a two thirds majority basis and the Chairperson will have the casting vote.

Additional meetings within the Devolved Regions will take place most years and will be chaired by the PWSCG Member within the Devolved region. Representation will normally include the Chair and Independent Member of the PWSCG, Head PWSCG Secretariat and Head Citizens and Media Business (Public Weather Service) plus representation from across government departments within the Devolved Region.

Media and Reach Sub-Group (MARG)

The Media and Reach sub-Group (MARG) is a sub group of the PWSCG with the mandate to provide assurance to the Chair of the PWSCG in three principal areas. Firstly, that the outputs of the Public Weather Service provide adequate 'reach' to help demonstrate value for money for PWS. Secondly that there is consistency in the delivered message of those outputs across the various media channels. Thirdly, that the Public Weather Media Service (PWMS) is operating in a way that meets the needs of the broadcasters using it. The MARG provides challenge and steer to the Met Office to ensure adequate reach through UK broadcasters and where possible provide advice and direction in order to increase the reach of PWS outputs. The Media and Reach sub-Group (MARG) is chaired by the independent member of the PWSCG.

End of Year Signoff for performance measures

- There are 10 Performance Metrics in the 2022-2026 CSA, with some PMs comprising multiple elements.
- There are 9 assurance reports in the 2022-2026 CSA, with some comprising multiple elements.
- Monthly monitoring will be performed on all PMs and assurance reports as described above.
- The PWSCG expect that the Met Office will endeavour to ensure that all of the agreed performance measures are met and that the assurance reports are delivered. However, sometimes performance

measures will not be met and that there may be circumstances beyond Met Office control which impact on PM delivery.

- To receive end of year signoff that the CSA has been delivered:
 - The Met Office are required to achieve all 10 PMs in the CSA;
 - The Met Office are required to deliver all 9 assurance reports as specified in the CSA;
 - However, if a PM does not meet the end of year target, then the PWSCG will accept a written description of why the target has not been met and will use the relevant PAG or PWSCG meetings to discuss whether the PWSCG will accept the missed target and approve it for signoff in the CSA for that year. The PWSCG will consider whether there have been circumstances that are beyond the control of the Met Office, situations whereby the monthly monitoring has highlighted an issue with a PM that requires an improvement plan, or other circumstances resulting in a missed PM and have the opportunity to signoff the PM.

End of year Signoff for Deliverables

- To assure PWSCG members that each Deliverable has been met, the Met Office will submit a paper describing the outcome of the Deliverable to the BEIS Secretariat team on or before the due date of that deliverable.
- The paper will be discussed in detail at the relevant PAG meeting, and the PAG will make a recommendation to the PWSCG end of year meeting
- The PWSCG group will be asked to agree or disagree that the Deliverable should be signed off.

Annual CSA signoff

- For the CSA to be signed off at the end of each year the Met Office must achieve all 10 PM's and deliver all 9 assurance reports, unless they have had agreement from the PWSCG at the end of year meeting that the Met Office have had good reason to miss a target;
- The Met Office must also achieve all Deliverables. Again, however, there will be flexibility so that the Met Office may submit reasons for any deliverable that has not been met due to circumstances beyond their control for assessment by the PWSCG;
- This process will be reviewed annually.