

Bank of England

Prudential Regulation Authority

General Insurance Stress Test 2022

Scenario Specification, Guidelines and
Instructions

4 May 2022



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Introduction

The document provides instructions for completing the PRA's General Insurance Stress Test (GIST) 2022.

The deadline for submission for this exercise is: 5pm, Wednesday 28 September 2022

The previous exercise was conducted in 2019, with the industry feedback published in June 2020¹.

For the 2022 exercise, we have made some notable changes as set out below.

We have removed the following components:

- general insurers are not asked to run an economic downturn scenario in 2022. Instead the GIST 2022 scenarios only focus on the insurance liability and property risks. All insurance scenarios in Sections A and B are separate, with no overlays;
- general insurers are not asked to provide details of their direct commercial exposures by sector.

We have reclassified the cyber scenario from “exploratory” to “core”:

- following an exploratory cyber scenario in GIST 2019, this exercise includes a set of core cyber underwriting scenarios. The implication of this reclassification is the intention to publically communicate aggregate sector results. Consequently, consistency and cross firm comparability will be important.

We have added a request for additional qualitative details that will inform our view of a firm's stress test governance and risk management:

- In addition to the quantitative templates, firms are asked to provide a “Results and basis of preparation” (RBP) report. Each firm is required to set out in the RBP report its governance process and quality assurance in completing this exercise, as well as to provide a narrative around the results, including the conclusions, limitations, data or modelling issues and its approach to validation of the results.

For completeness, the overall structure of the documents provided is as follows:

- this document provides the instructions for completing the quantitative templates;

¹ <https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2020/insurance-stress-test-2019-feedback.pdf>.

- the quantitative templates specify the nature and structure of the numerical information that needs to be provided for each material scenario; and
- the requirements for the RBP report document sets out the qualitative information that firms need to submit.

Objectives

The PRA has three objectives in conducting this exercise:

1. **Assess sector resilience to severe but plausible adverse scenarios:** For general insurers, we are focussing on natural catastrophes and cyber events.
2. **Guide supervisory activity:** the process of stress testing yields valuable information about a firm's potential vulnerability as well as modelling and risk management capabilities. For example, it might highlight shortcomings in excessive reliance on liquidity in particular financial markets or exposure levels for certain perils which have not been highlighted by the firm's monitoring systems. We will follow up any such findings, if material, in our assessment of key risks with firms and in setting supervisory priorities and work plans.
3. **Enhance the PRA's and firms' ability to respond to future shocks (support capacity building):** The information we gather enhances the PRA's ability to run desk-based analysis of new shocks and be better prepared to assess sector resilience and respond in the event of similar scenarios occurring. Aggregating responses to questions about management actions will allow the PRA to plan better to mitigate the collective, systemic impacts of such actions, and will support firms in understanding the potential market implications of their decisions.

The GIST 2022 results will guide supervisory activity and focus; it is not a pass/fail exercise.

Entities in scope

Participants have been selected on the basis of expected significant exposure to one or more of the proposed scenarios. See **Annex 2** for entities in scope for this exercise.

Where firms have not received a request to participate, they do not need to submit a response. Should firms wish to be included in the exercise, they should contact their supervisor at the PRA, copying in IST.2022@bankofengland.co.uk.

Structure of the general insurance stress test

This exercise consists of two parts:

- Section A contains a set of three natural catastrophe scenarios;
- Section B contains a set of three cyber underwriting scenarios.

Section A: Natural catastrophe scenarios

Scenario A1: A US hurricanes scenario, comprised of three events.

Scenario A2: A California Earthquake scenario comprised of two severe earthquake events in northern California.

Scenario A3: A UK windstorm and flood scenario comprising of two UK windstorm events and one UK inland flood event.

Section B: Cyber underwriting scenarios

Scenario B1: A “cloud down” scenario exploring the impact of the largest Cloud Service Provider (CSP) suffering a catastrophic outage from a cyber attack.

Scenario B2: A “data exfiltration” scenario assessing the extent of underwriting losses triggered by large data loss across multiple sectors.

Scenario B3: A “systemic ransomware” event testing the impact of underwriting losses from a large ransomware event.

In addition, we ask the firms to provide details of their own existing cyber underwriting scenario if the loss for such scenario is larger than in any of the PRA scenarios in Section B. To be clear, firms are not being asked to design a new cyber scenario for the purposes of IST2022.

The PRA does not expect personal lines insurers to complete the cyber scenario or develop their own where they do not have significant commercial exposures.

The PRA has designed these scenarios, including all parameters and calibrations, for the purpose of this stress testing exercise only. Firms should not interpret them as indicators of a PRA position on risk calibrations.

Accounting and reporting

Accounting Basis

Firms are requested to provide a separate submission, on a Solvency II basis, for the relevant entities as set out in **Annex 2**. Where firms are uncertain as to the scope of their submission, they should consult with and obtain the agreement of their PRA supervisor.

General description

The stress testing quantitative templates have been developed in Microsoft Excel. Data requested in the templates needs to be submitted to the PRA via the BEEDS portal (see Section C “Data submissions process”).

In the template provided with these instructions, the following worksheets are included:

- firm info (basic information about the firm or Lloyd’s syndicate);
- 2021 year-end balance sheet (Solvency II balance sheet and analysis of basic and eligible own funds);
- capital (diversified capital requirements allocated to standard formula risk categories);
- reinsurer information (data on the participant’s top 40 reinsurers);
- 2022 projection (planned movement in basic own funds for the year ending 31 December 2022);
- 7 sets of templates for scenarios (recording the effect of the 3 cat scenarios, 3 PRA cyber underwriting scenarios and, where applicable, the firm’s own existing cyber scenario); and
- standalone cyber exposures (in force exposures at 01 January 2022 split by class of business and sector; as well as availability of data for business critical functions for cloud reliance).

The required input cells are clearly labelled within the workbook. Do not add any rows, columns or new worksheets to the Workbook.

General basis of preparation

The sign convention for the 2021 balance sheet and Capital worksheets should match the following quantitative reporting templates (QRTs) as applicable: S.02.01 (balance sheet), S.23.01 (own funds), and S.25 series (SCR analyses).

In the projection and scenarios:

- inflows, gains, and amounts which increase net assets should be recorded as positive;
- outflows, losses, and amounts which decrease net assets should be recorded as negative.

Translation of foreign currencies: The 2021 balance sheet and capital worksheets should be completed on the same basis used in the year end S.02 and S.23 QRTs. The 2022 Projection and scenario specific data templates should be prepared using the same method and assumptions used in the firm's own base case projections and disclosed in the RBP report. The 2022 Projection and scenario data templates include a row to record net foreign exchange translation gains and losses.

2021 Balance sheet

This is presented on a Solvency II basis **and should match the amounts reported in the year end QRTs**. The worksheet derives basic own funds from balance sheet net assets using adjustments which should match those recorded in the S.23 QRT. A breakdown of basic, ancillary and eligible own funds by tier is also requested. The worksheet includes the row and column references of the relevant QRTs.

Capital

This analyses the SCRs at 31 December 2021 (opening) and at 31 December 2022 (closing) by risk categories and records the Lloyd's Economic Capital Assessment (ECA) if applicable. The opening SCR should be consistent with the SCR reported on the year end 2021 S.25 QRT. The closing SCR should be an estimate which is consistent with the base case projection for the year ending 31 December 2022. The closing SCR should be on a "best endeavours" basis and a model run for this recalculation is not mandatory. The risk categories specified are those of the standard formula SCR. Internal model firms should report an allocation to those risk categories which is consistent with their internal model outputs, representative of simulation outcomes around the 1 in 200 level.

2022 Projection (base case projection)

This shows the projected movement in basic own funds between 31 December 2021 and 2022, using a format based on UK GAAP financial accounting. The 2022 projection should be consistent with the firm's business plan and the basic own funds as at 31 December 2022 associated with that plan (base case projection).

The movement is divided into three sections:

- a technical account which is to capture all items for which Solvency II requires the future cash flows to be included in the best estimate in claims and premium provisions, together with risk margin and discounting movements;

- a non-technical account to capture investment return, changes to pension obligations, any other items of non-technical operating income and expense, and taxation; and
- other movements in net assets. These include movements in own funds items issued or redeemed, and the costs of servicing own funds items (eg interest on sub-ordinated debt). The effect of any transitional measures and adjustments (where approved), and other adjustments which are specifically required by the Rulebook and delegated regulation in arriving at basic own funds (eg own shares and foreseeable distributions) should be made here.

The non-technical account in the projection would normally follow IFRS recognition and valuation because under the Solvency II regulatory framework, IFRS is the default treatment for most assets and liabilities other than technical provisions. Amounts in the non-technical account will therefore be similar to the equivalent amounts in the financial statements, except for a firm which does not use fair value in the calculation of unrealised gains and losses, and for movements in deferred tax.

The technical account will differ from the equivalent amounts in financial statements prepared under UK GAAP or IFRS4. Under Solvency II there are no adjustments for unearned premium or deferred costs; the best estimate of claims expected and expenses associated with the premium provision need to be included, and all costs associated with the administration of insurance contracts, including eg investment management expenses, need to be recognised on the same basis that they are included in the Solvency II best estimate.

Opening basic own funds from the working in the balance sheet worksheet are linked to the 2022 projection and added to the projected movement to give the projected closing basic own funds.

The 2022 projection is the baseline for the Natural Catastrophe scenarios against which the effects of these are to be assessed, and the projection is carried forward to the scenario worksheets (see Section “Scenario Specific Data Templates”).

Scenario templates

A “Scenario” worksheet and a “Scenario specific data” worksheet is provided with tabs for each scenario.

Each Scenario worksheet uses the projection format to record the impact of the relevant scenario on basic own funds. Three columns are provided to analyse separately: the losses caused directly by the stress; any consequential reassessment of unexpired risk, and any management actions. The Scenario worksheet is prepared on a Solvency II basis and the

effect of discounting and of any adjustments to the risk margin and tax from the scenario are recorded on this worksheet.

Firms should calculate any adjustments to tax using their Solvency II basis, and use the RBP report to explain any material differences which would result if loss relief assumptions for IFRS purposes were used.

As a simplification the natural catastrophe scenarios (Section A) are assumed to occur towards the end of 2022, such that firms do not need to consider mid-year adjustments to their existing plan when assessing their projected own funds at 31 December 2022. The starting point for these scenarios is therefore the 2022 base case projection and scenarios are in addition to this.

The cyber underwriting scenarios (Section B) are assumed to be instantaneous and to occur at the beginning of 2022. The impacts of these scenarios are therefore assessed on the basic own funds as at 31 December 2021 which are brought forward from the 2021 Balance sheet worksheet.

Unexpired risk which may require reassessing in the cyber underwriting scenarios will correspond to the premium provision carried in the balance sheet immediately after each instantaneous stress.

Unexpired risk in the natural catastrophe scenarios will correspond to insured losses arising between the catastrophe and 31 December 2022, together with the premium provision carried in the balance sheet at 31 December 2022.

Reinstatement premiums receivable or payable arising from the direct stress should be included in the Direct Stress column and not as an adjustment relating to unexpired risk.

Where there is likely to be a material change to the SCR post stress, firms are asked to provide an estimate of the post stress SCR on the Scenario worksheet. Firms should make reasonable assumptions eg scaling is acceptable where it would not lead to materially different results to a more detailed calculation. Furthermore, changes in risk margin can be approximated when estimating the post stress SCR.

The Scenario specific data worksheets are to provide further analysis only of the losses caused directly by the stress. On these worksheets the loss data should be undiscounted and stated before any adjustments to the risk margin or tax.

Management actions

Firms should consider what management actions they may take following the events. These include changes to their reinsurance programmes, changes to their planned premium income or rating structures, and re-capitalisation plans. While some of these management actions will impact the year-end 2022 Own Funds, the full impact may not be captured. Any assumed management actions must be consistent with those that can be taken given the scenario narrative and that are realistic in the context of the firm's normal risk management governance.

Firms should report the impact of all such management actions in the "Management Actions" column of the Scenario worksheet for each scenario.

For the avoidance of doubt, reinsurance reinstatement of cover which was in place prior to an event (including any reinstatement premiums) is to be treated as part of the direct stress. Any new reinsurance purchased following the first and subsequent events should be reported in C0040. For example, any recoveries after the first event will be allocated to C0020 if they relate to pre-existing cover, otherwise they should be reported in C0040.

For all management actions firms are asked to provide adequate descriptions in the RBP report, including lead time to deliver the implementation.

Where a firm anticipates re-capitalisation plans, the firm should provide this information, but should not assume new capital will be in place before year-end 2022 unless existing contractual arrangements allow for this. Details of any such contractual arrangements should be included in the RBP Report.

Reinsurance

Firms should identify their top 40 reinsurers (ranked according to the expected recoveries across all their material scenarios). For each identified reinsurer, firms need to provide details of the LEI and LORS codes as well as the jurisdiction and LEI of the ultimate parent of the reinsurer.

The amount of expected reinsurance in each scenario, together with information about any collateral provided by each insurer should be reported in the individual Scenario tabs.

Materiality

Firms should complete all scenarios unless they can demonstrate that, given their specific risk coverage, the impact is immaterial. In this case, immateriality is defined such that the loss before allowance for any reinsurance is less than 5% of total 2022 projected gross

written premium at the reported entity level. Firms are asked to set out why the scenario did not meet the materiality threshold in the RBP report.

In addition, we expect any insurer writing standalone cyber to complete a minimum of two of the cyber scenarios, even if they fall below the threshold unless the gross premium written of stand-alone cyber in 2021 and intended to be written in 2022 is less than £10 million.

Public disclosure

The PRA will not publish any firm specific information as part of this exercise. Where there is a need to take firm specific supervisory action, the PRA will do so as part of normal supervisory engagement with the firm.

The PRA intends to publish a Dear CEO letter containing our findings at an aggregate level, drawing attention to sectoral findings or learnings of interest at a market level.

Queries

All queries should be submitted to IST.2022@bankofengland.co.uk, copying in the firm's PRA supervisor. Please ensure that the Firm Name and FRN number is included in the subject of the email.

Enclosures

- | | |
|---|--|
| a) General Insurance Stress Test 2022 - Template | Structured data template to record results |
| b) RBP report requirements | Document setting out the requirements for the RBP report |

Section A – Natural catastrophe scenarios

Scenario A1: US hurricane set of events

The US hurricane scenario is comprised of three events. The first event impacts Florida with a significant surge component; the second is a tropical cyclone precipitation-induced flooding event in the Gulf; and the third is an Ike-like event with significant inland penetration. This scenario assesses firms' modelling capabilities for storm surge, precipitation-induced flooding, and hurricane losses stemming from inland states.

1.1 Event definition

This scenario is similar to the 2019 US hurricane scenario. It includes three major hurricane events making landfalls in different regions along the US coastline in the same hurricane season. At today's values, the three hurricanes are specified to cause a total industry loss in excess of US\$210 billion, based on a range of vendor model event IDs. Firms are to assume that the hurricanes are sufficiently separated in time to be considered as three separate events for the purposes of reinsurance recoveries. For the avoidance of doubt, the starting point for the scenario is the 2022 base case projection and the scenario is in addition to this.

1.2 Assumptions

In estimating the gross loss, firms should allow for storm surge, precipitation-induced flooding, policy leakage (across different Lines of Business) and post event loss amplification (demand surge as well as adjustments reflecting possible supply chain challenges, increased price of raw materials, energy and labour costs). Firms should assume that the time between events maximises the potential for post event loss amplification (PLA). For this scenario the estimate of PLA should include any specific estimate of the impact from the Assignment of Benefits.

Where firms are using external vendor models, firms should adjust the model output to address any relevant model limitations to reflect firms' own views.

Firms should assume events fall under the same reinsurance treaty year, that any changes made to the reinsurance programme do not incept before the first event occurred, and should include the impact of both inwards and outwards reinstatement premiums. Where additional reinstatements or back-up covers are purchased, firms should quantify the likely rate increases and should not factor in reduced attachment points without adequate justification.

In modelling the scenario on gross and net basis, firms should include the impact of both inwards and outwards reinstatement premiums and the impact of any profit commission clawback.

Firms are permitted to assume management actions during the course of the scenario, between events. Firms should include these in the net aggregate loss reported in the template in 'A1 specific data' tab (see also Section "Management actions").

First hurricane: Event impacting Florida with a significant surge component

The first hurricane is an event with significant surge losses near Tampa, Florida. The event forms in the Caribbean and impacts a number of Caribbean islands, the Yucatan peninsula before making US landfall near Tampa as a Category 3 storm on the Saffir-Simpson scale (description based on one vendor model provider - refer to **Annex 3** for figures illustrating tracks from other model providers). The figure and table below provide further details of the hurricane's landfall.

Figure 1.1: First hurricane track



Source: RMS. Refer to Annex 3 for figures from other model provider(s).

Indicatively, the resulting industry loss is assumed to be in excess of US\$60 billion according to the vendor model providers, with 18-20% of the overall industry loss stemming from storm surge. The closest matching vendor model event IDs, estimated industry losses, and details of the hurricane's landfall are provided in the table below. Loss estimates include standard demand surge/post-loss amplification captured in the models. Firms are expected to make further allowances for demand surge/post-loss amplification (see Section 1.3). The PRA is aware that the event footprint, associated parameters and industry loss differ across vendor models.

Table 1.1: First hurricane – further details (wind and surge only)

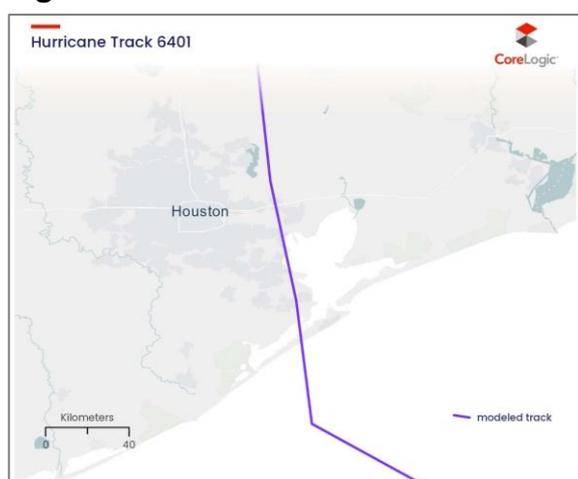
	CoreLogic	RMS	Verisk
Event ID	17502	2864226	270042404
Gross Market Loss (US\$ billion)	64	60	69
Storm surge losses (%)	20	18	18
Saffir-Simpson Category	4	3	2

Central Pressure (mbar)	935.0	967.0	948.2
Maximum Wind Speed (mph)	140.0	116.0	126.5
Forward Speed (mph)	9.0	19.0	12.9
US Landfall Longitude (degrees)	-82.61	-82.74	-82.74
US Landfall Latitude (degrees)	27.55	27.80	27.97
State	FL	FL	FL
US Landfall County	Manatee	Pinellas	Hillsborough

Second hurricane: A Tropical Cyclone Precipitation-Induced Flooding event in the Gulf (updated 09062022)

The second hurricane is similar to the equivalent one included in GIST 2019, which permits the PRA to compare the evolution of firms' resilience, modelling capability and exposure handling for a tropical cyclone precipitation-induced flooding event. This event makes landfall in Galveston, Texas, as a Category 4 (description based on one model vendor provider; please refer to **Annex 3** for figures illustrating tracks from other model providers). The storm moves slowly across Texas with a duration of 54 hours, leading to a significant precipitation-induced flood losses along its path. The hurricane is assumed to cause losses across the Gulf of Mexico before making a US mainland landfall. Whilst the event is exploring the material precipitation-induced flood losses, the hurricane is also assumed to lead to surge and wind losses.

Figure 1.2: Second hurricane track



Source: CoreLogic. Refer to Annex 3 for figures from other model provider(s).

Indicatively, the resulting industry loss is assumed to be in excess of US\$37 billion according to the model vendor providers, which is split between ~50% of wind and storm surge damage and ~50% of precipitation-induced flood damage. The closest matching vendor model event IDs, estimated industry losses, and details of the hurricane's landfall are provided in the table below. Loss estimates include standard demand surge/post-loss amplification captured in the models. Firms are expected to make further allowances for demand surge/post-loss

amplification (see Section 1.3). The PRA is aware that the event footprint, associated parameters and industry loss differ across vendor models.

Table 1.2: Second hurricane – further details

	CoreLogic	RMS	Verisk
Event ID	6401	2864507 ^(a)	270012741
Gross Market Loss (US\$ billion)	40	44	37
Precipitation-induced Flood Losses (%)	46	50	55
Saffir-Simpson Category	4	3	4
Central Pressure (mbar)	942.0	971	929.2
Maximum Wind Speed (mph)	139.0	112	148.6
Forward Speed (mph)	16.0	7.0	5.9
Longitude (degrees)	-94.93	-95.05	-95.68
Latitude (degrees)	29.22	29.13	28.73
State	TX	TX	TX
Landfall County	Galveston	Galveston	Matagorda

(a) If using RMS, firms can work with a combination of the RMS North Atlantic Hurricane Model & US Inland Flood HD Model, or alternatively firms can work with the RMS North Atlantic Hurricane Model and supplementary Tropical Cyclone Precipitation-Induced (TCPI) Flooding loading factors.

Where firms do not licence or use an inland flood model, firms may use alternative methods such as realistic disaster scenarios or pro-rate the wind and storm surge damage proportionally. Firms should provide an outline of the methodology adopted in the RBP report.

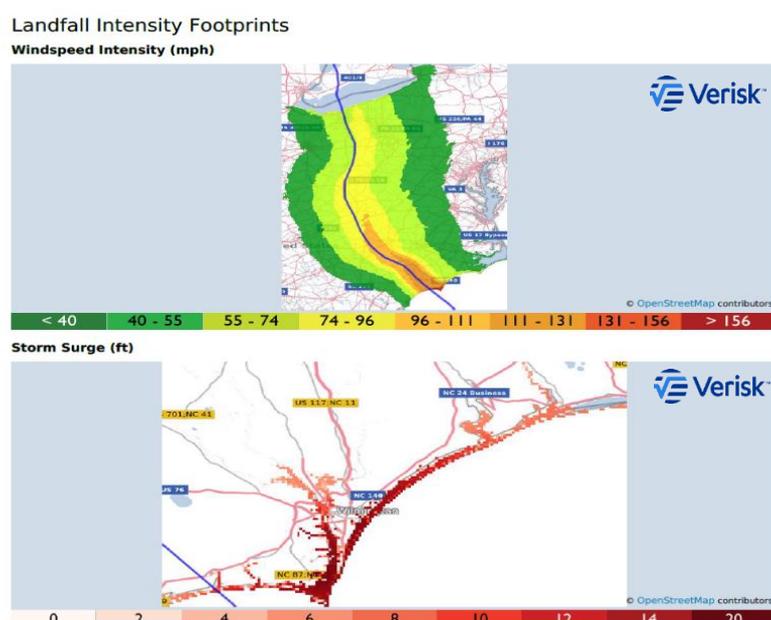
Third hurricane: Ike-like event with significant inland penetration

The third hurricane is a major event with significant inland penetration. The map below illustrates a modelled track for this Category 5 hurricane that makes landfall in Brunswick, North Carolina. After making landfall, the storm is merged with an inland storm system (similar to storm Ike or Sandy), maintaining damaging wind speed tracking through Virginia as Category 4, West Virginia as Category 3 and continues on to Ohio. By the time this storm crosses the great lakes 24 hours after first making landfall, it has downscaled to a Category 2. Please refer to **Annex 3** for figures illustrating other model provider's track. Details of the hurricane's landfall are provided in the table below.

Indicatively, the resulting industry loss is assumed to be in excess of US\$100 billion including demand surge/post-loss amplification captured in the models. The losses from the inland states accounts for ~20% of total industry loss. The majority of losses (>90%) from this hurricane result from wind.

The closest matching vendor model event IDs, estimated industry losses, and details of the hurricane's landfall are provided in the table below. Loss estimates include standard demand surge/post-loss amplification captured in the models. Firms are expected to make further allowances for demand surge/post-loss amplification (see Section 1.3). The PRA is aware that not all model providers cover the modelling of inland states in their North Atlantic hurricane model and in those cases firms need to undertake additional loss estimates to complement model coverage. Note that the RMS event ID (2866131) does not cover all the states in the footprint, and CoreLogic provides one event ID (29351) for modelling coastal state losses and a second event ID (3251057) for modelling inland state losses. The PRA is aware that the event footprint, associated parameters and industry loss across vendor models will differ.

Figure 1.3: Third hurricane track



Source: Verisk. Refer to Annex 3 for figures from other model provider(s).

Table 1.3: Third hurricane – further details

	CoreLogic	RMS	Verisk
Event ID	29351/3251057 ^(a)	2853816 ^(b)	270241858
Gross Market Loss (US\$ billion)	114	86	109
Saffir-Simpson Category	4	4	5
Central Pressure (mbar)	936	942	894
Maximum Wind Speed (mph)	139.0	141.0	166.9
Forward Speed (mph)	15	12	22
Longitude (degrees)	-76.48	-78.47	-78.40
Latitude (degrees)	34.91	33.88	33.90
State	NC	NC	NC
County	Carteret	Brunswick	Brunswick

(a) CoreLogic event ID 29351 is from North Atlantic hurricane model, and event ID 3251057 is from severe convective storm model. Gross market losses are the aggregation of those two events but the rest of the details relates to event ID 29351.

(b) RMS event ID does not cover all states in the footprint.

1.3 Reporting

This section sets out details of the quantitative requirements that support completion of the “A1 specific data” and “A1 Event 3 Loss Reporting” template tabs. In addition, firms need to refer to the guidance in the RBP report, which sets out the required qualitative information to be submitted and that forms an integral part in completing this exercise.

Standard reporting for this scenario

Firms are asked to provide a breakdown of the gross loss estimate by:

- lines of business and coverage (eg residential, commercial, business interruption, contingent business interruption, motor, marine and energy, liability);
- types of peril (eg wind, storm-surge, inland flood);
- post event loss amplification;
- the estimate of secondary uncertainty² (if any) included in their loss estimates.

Firms should include losses from Mexico and Caribbean. Firms should report losses from lines of business and coverage according to the ‘Additional description’ set out in the Scenario specific tab in the template. The PRA understands that catastrophe models do not produce losses for all lines of business and coverages. Where the firms deem that the modelling capabilities they have access to are incomplete to assess the full spectrum of losses, they are asked to estimate the non-modelled components (eg liability or contingent business interruption) using an alternative approach of their choice. The approach should be clearly described, along with key assumptions and expert judgements made to estimate relevant non-modelled components, in the RBP report.

Firms should report PLA, including what is captured by the catastrophe models used, and what they believe is over and above what is captured by the catastrophe models. We expect firms to include adjustments to PLA reflecting possible supply chain challenges, increased price of raw materials, energy and labour costs. Firms should set out in the RBP report how they have assessed the appropriateness of the PLA within the catastrophe models used, how they have established any loading, and what are the most material PLA components.

² Uncertainty associated with the damage and loss estimation should a given event occur.

Firms should provide details of their overall exposures and those that have been impacted (number of risks impacted) in the data template. Firms may make reasonable assumptions to derive their estimates and should exclude immaterial claims if using vendor models.

For the first hurricane event, firms should assess the impact of wind on personal lines properties using Section 706.1.1 of the Florida Building Code (“25% roof rule”) where it is applicable. Data assumptions and adjustments made to the vendor model estimates to reflect firms’ own view of risk should be disclosed in the RBP report.

For all three events, the PRA does not expect flood limits to be considered to be equal to wind limits, and instead intends for the firms to take into account the contractual terms and conditions.

Firms should calculate the net losses for each event individually - and subsequently - in aggregate across all events in the scenario, taking into consideration reinsurance recoveries as described in Section 1.2.

Additional reporting for this scenario

For the second hurricane event, firms should provide their policy ‘leakage’ assumptions in the RBP report. ‘Leakage’ refers to flood related losses (from both precipitation-induced flood and storm surge) paid by wind policies. This event also assesses the impact to non-property lines of business such as motor, off-shore energy and marine, thus firms should report the losses from these lines in the quantitative template.

On the third hurricane event, for the firms who license a model that does not cover the modelling of inland states, the PRA provides the hazard data (average wind speed)³ for all affected counties for firms to develop their own bespoke damage ratios to calculate losses for inland states. For instance, firms may decide to use a blended approach, applying an event ID for modelling coastal state losses and a damage ratio approach for inland state losses. The hazard data can be found in the quantitative template tab ‘A1 Event 3 Hazard Information’.

Additional reporting requirements for the third hurricane event are:

- For direct and facultative book, firms should report gross total sum insured (ie exposed value) by line of business for both modelled and non-modelled states. For treaty book, firms should report sum of exposed limit and % of sum of exposed limit that is modelled and non-modelled by treaty type (i.e. Pro rata, Cat XL, Risk XL).

³ The average wind speed values are 1 minute sustained and after surface roughness has been applied, ie real terrain. The wind speeds are calculated at a high spatial resolution, then averaged to the county resolution, for the purpose of this exercise.

- All firms should report gross total sum insured and sum of exposed limit in tab 'A1 Event 3 Loss Reporting'. Only firms with total sum insured for inland states higher than 5% of overall total sum-insured affected *by this event* are required to report gross insured losses for the inland states.

Note: Firms that have not relied on catastrophe models to estimate any aspect of the inland state losses should specify the approach and assumptions used to estimate losses for the impacted inland states in the qualitative questions in the RBP report.

Scenario A2: California earthquakes

This scenario tests firms' resilience to two severe earthquake events in northern California affecting the San Francisco Bay area. This scenario also explores the model uncertainty with regard to the hazard component of catastrophe models through the adjustment of ground motion estimation assumptions.

2.1 Event definition

This stress test is for two severe earthquakes in northern California affecting the San Francisco Bay area, a region that has been subject to material urbanisation in recent years. More specifically, this scenario comprises of a sequence of two correlated events, with the first Magnitude ~7 event rupturing the Hayward fault, followed by a second Magnitude ~7 event in the Rodgers Creek fault, triggered by Coulomb stress transfer from the first event. At today's values, the two earthquakes are estimated to cause a total insured losses in the order of US\$70-80 billion according to the model vendor providers.

The Hayward fault has the potential to trigger severe earthquake event impacting the Greater San Francisco area, especially when time-dependency effects are considered given that the Hayward fault is late in its cycle. The last major event on the Hayward fault occurred in 1868 which struck the San Francisco Bay area (magnitude 6.8).

The inclusion of a second correlated event in a plausible multi-event scenario follows the lessons learned regarding stress transfer mechanisms across different faults (eg New Zealand 2010 and 2011 events). Firms are to assume that the events are sufficiently separated in time to be considered as two separate events for the purposes of reinsurance recoveries. For the avoidance of doubt, the starting point for the scenario is the 2022 base case projection and the scenario is in addition to this.

2.2 Assumptions

In estimating the gross loss, firms are asked to allow for PLA (demand surge) using their natural catastrophe modelling capabilities. Adjustments for PLA should also reflect possible supply chain challenges, increased price of raw materials, energy and labour costs. Firms should assume that the time between events maximises the potential for PLA.

Firms should estimate both the aggregate losses and the breakdown across the two earthquake events, taking into consideration any relevant primary or secondary loss drivers including – but not limited to – ground-shaking, liquefaction, landslide, escape of water and fire-following. Breakdown between physical damage, business interruption and contingent business interruption is also requested. Loss estimates are to be assessed across all relevant lines of business including – but not limited to – property and liability losses triggered by earthquake events. For instance, liability losses examples could include litigation for

structural failure or hazardous biochemical release. Where firms are using external vendor models, firms should adjust the model output to address any relevant model limitations to reflect firm's own views reflecting the scenario assumptions.

Firms should assume events fall under the same reinsurance treaty year, that any changes made to the reinsurance programme do not incept before the first event occurred, and should include the impact of both inwards and outwards reinstatement premiums. Where additional reinstatements or back-up covers are purchased, firms should quantify the likely rate increases and should not factor in reduced attachment points without adequate justification.

In modelling the scenario on gross and net basis, firms should include the impact of both inwards and outwards reinstatement premiums and the impact of any profit commission clawback.

Firms are permitted to assume management actions during the course of the scenario, following an event. Firms should include these in the net aggregate loss reported in the template in 'A2 specific data' tab (see also Section "Management actions").

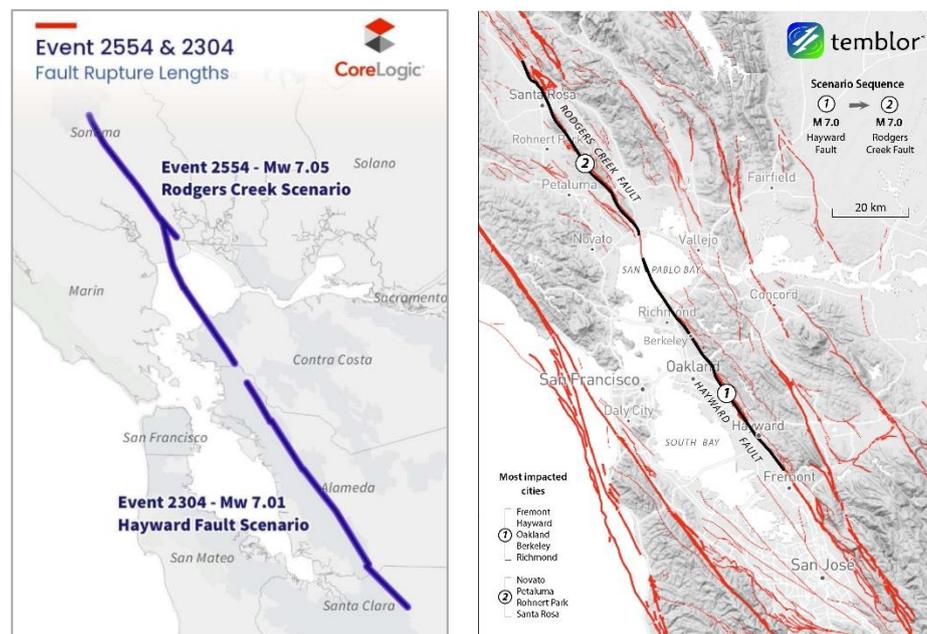
2.3 Earthquake sources

The map below illustrates the extent of the rupture for both events. The first event ruptures on the Hayward fault (note that RMS first event connects with the Calaveras fault), predominantly impacting San Francisco, San Jose, Oakland, Fremont and Hayward. The second event ruptures on the Rodgers Creek fault, predominantly impacting San Francisco, Oakland, Santa Rosa, Berkeley and Richmond. For firms not using any vendor model, the fault rupture characteristics for both events can be found in the table below. The epicentre of the first earthquake should be located reasonably close to 37.77 latitude and -122.14 longitude. The epicentre of the second earthquake should be located reasonably close to 38.27 latitude and -122.58 longitude.

Indicatively, the resulting industry loss for the first event is assumed to be US\$35-60 billion, and the second event to be US\$20-35 billion based on vendor model providers. The closest matching event IDs and estimated industry losses are provided in table below.⁴ Loss estimates include standard demand surge/post-loss amplification captured in the models. Firms are expected to make further allowances for demand surge/post-loss amplification (see Section 2.2). The PRA is aware that event footprints, associated parameters and industry losses differ across vendor models.

⁴ The PRA may provide inputs from additional model vendors for the final version of the document.

Figure 2.1: California earthquake faults map



Source: CoreLogic (left) and Temblor (right). Refer to Annex 3 for figures from other model providers.

Table 2.1: First earthquake (Hayward Fault) – further details

	CoreLogic	Impact Forecasting	RMS	Temblor	Verisk
Event ID	2304	277856	15008439	13761	110015162
Gross Market Loss (US\$ billion)	53.0	41.0	39.6	54.2	56.6
Earthquake magnitude (Mw)	7.01	6.73	7.22	7.0	6.88
Depth (km)	7.72	6.5	Top: 2.7, bottom: 11 to 13.5	8.0	6.80
Rupture length (km)	65.0	42.0	127.0	67.0	55.3
Epicentre latitude (°)	37.62	37.73	37.31	37.75	37.77
Epicentre longitude (°)	-122.01	-122.06	-121.78	-122.15	-122.14

Table 2.2: Second earthquake (Rodgers Creek Fault) – further details

	CoreLogic	Impact Forecasting	RMS	Temblor	Verisk
Event ID	2554	277896	15012329	18432	110035580
Gross Market Loss (US\$ billion)	22.7	32.0	34.3	16.4	21.0
Earthquake magnitude (Mw)	7.05	6.97	7.33	7.0	7.10

Depth (km)	6.4	7.5	Top: 1.6, bottom:12.0	8.0	6.1
Rupture length (km)	70.0	60.0	135.0	52.0	78.5
Epicentre latitude (°)	38.18	38.62	38.27	38.32	38.17
Epicentre longitude (°)	-122.47	-122.82	-122.58	-122.60	-122.43

2.4 Model uncertainty assessment

For a rare event that results in a severity that has not been recorded historically, such as the first earthquake event, catastrophe models are relying mostly on theoretical equations to drive loss estimates. The theoretical equations carry a significant uncertainty and the reliance on theoretical equations can result in model failures (eg Tohoku 2011).⁵ In this scenario, we explore the model uncertainty in particular with regard to the potential underestimation of the ground motion estimation often used in catastrophe models.

After obtaining the losses using model providers' event IDs, firms are asked to assess the potential sensitivity of their modelled loss estimate should a fundamental assumption in hazard estimation be changed. We understand the ground motion prediction equations used by catastrophe models provide a distribution of possible ground motion intensity levels for a particular event and location. Firms are asked to re-assess and report losses only for the first earthquake event (ie the Hayward fault event), by assuming that the ground motion is one standard deviation above the ground motion originally estimated for that event by the catastrophe model. Firms are asked to provide the updated loss estimate in the reporting template, and describe the methodology used in modifying the ground motion estimation and reflect on the sensitivity of the loss to such an assumption in the RBP report. Firms that leverage vendor models' view of ground motion equation uncertainty, are asked to reflect on the key assumptions adopted by the vendor model they have sourced to assess this scenario in the RBP report.

2.5 Reporting

This section sets out details of the quantitative requirements that support completion of the tab "A2 specific data". In addition, firms need to refer to the guidance in the RBP report, which sets out the required qualitative information to be submitted and that forms an integral part in completing this exercise.

⁵ The national seismic hazard body, the Headquarters for Earthquake Research Promotion (HERP), did not contain events as large in magnitude as Tohoku in the region where it occurred. The main catastrophe models, which were based on HERP, similarly did not contain such a large magnitude event in that area.

Standard reporting for this scenario

Firms are asked to provide the breakdown of the gross loss estimate for each event by:

- lines of business and coverage (eg residential, commercial, business interruption, contingent business interruption, motor, marine and energy, liability);
- types of loss driver (eg liquefaction, fire-following);
- post event loss amplification;
- the estimate of secondary uncertainty (if any) included in their loss estimates.

Firms should report losses from lines of business and coverage according to the 'Additional description' set out in the Scenario specific tab in the qualitative template. The PRA understands that catastrophe models do not produce losses for all lines of business and coverages. Where the firms deem that the modelling capabilities they have access to are incomplete to assess the full spectrum of losses, they are asked to estimate the non-modelled components (eg liability or contingent business interruption) using an alternative approach of their choice. The approach should be clearly described, along with key assumptions and expert judgements made to estimate relevant non-modelled components, in the RBP report.

Firms should report PLA, including what is captured by the catastrophe models used, and what they believe is over and above what is captured by the catastrophe models. We expect firms to include adjustments to the PLA reflecting possible supply chain challenges, increased price of raw materials, energy and labour costs. Firm should set out in the RBP report how they have assessed the appropriateness of the PLA within the catastrophe models used, how they have established any loading, and what are the most material PLA components.

Firms should provide details of their overall exposures and those that have been impacted (number of risks impacted) as part of the quantitative template. Firms may make reasonable assumptions to derive their estimates and should exclude immaterial claims if using vendor models.

Data assumptions and adjustments made to the vendor model estimates to reflect firms' own view of risk should be disclosed (see the RBP report), including for example:

- the allowance made for uncaptured exposures or data limitations (eg locations not geocoded); and

- the allowance made for non-modelled secondary perils (eg liquefaction, escape of water), non-modelled coverages (eg contingent business interruption) and non-modelled lines of business (eg energy, motor).

Firms should calculate the net losses for each event individually and, subsequently, in aggregate across scenario events, taking into consideration reinsurance recoveries as described in Section 2.2.

Additional reporting for this scenario

For the model uncertainty test, firms are asked to provide the updated loss estimate for the first earthquake event in the quantitative template tab 'A2 specific data', and set out the methodology and assumptions used to allow for this higher than average ground motion estimation as part of the RBP report.

Scenario A3: UK windstorm and UK flood

This scenario includes two UK windstorm events and one UK inland flood event, generating circa £20 billion of gross insured loss. The first event is a 1987J-like windstorm event causing significant wind losses in the South of England. The second event is a UK windstorm causing significant storm surge losses along the West coast of England, assessing firms' modelling capabilities beyond the east coast of the UK. The third event results in extensive inland flooding, with widespread geographic footprint – similar to 2007 – impacting an area from Devon to North Yorkshire.

3.1 Event definition

This scenario comprises of a set of three large UK events generating c. £20 billion of insured losses in aggregate in the United Kingdom. Firms may ignore losses generated by this event in other countries, yet should consider losses generated across the United Kingdom.

Firms are to assume that the events are sufficiently separated in time to be considered three separate events for the purposes of reinsurance recoveries. For the avoidance of doubt, the starting point for the scenario is the 2022 base case projection and the scenario events are in addition to this. The three events are not explicitly correlated but conceptually are occurring within the same windstorm season, something that recent research has highlighted as being plausible.⁶

The return period for aggregate wind, surge and flood losses of this size to the UK is estimated to be approximately 200 to 280 years according to the model providers. Firms are asked to comment whether they assume the correlated – or uncorrelated – nature of those events when reporting the return period for this scenario's losses.

3.2 Assumptions

Firms are asked to estimate the size of the loss per event and in aggregate using their natural catastrophe modelling capabilities. In estimating the gross loss, firms should provide their own view and allow explicitly for all material non-modelled risks and for PLA (demand surge as well as adjustments reflecting possible supply chain challenges, increased price of raw materials, energy and labour costs). Firms should assume that the time between events maximises the potential for PLA.

Where firms are using external vendor models, firms should adjust the model output to address any relevant model limitations to reflect firm's own views.

⁶ [It's windy when it's wet: why UK insurers may need to reassess their modelling assumptions – Bank Underground.](#)

In modelling the scenario on net and gross basis, firms should include the impact of both inwards and outwards reinstatement premiums and the impact of any profit commission clawback.

Firms should assume events fall under the same reinsurance treaty year, that any changes made to the reinsurance programme do not incept before the first event occurred, and should include the impact of both inwards and outwards reinstatement premiums. Where additional reinstatements or back-up covers are purchased, firms should quantify the likely rate increases and should not factor in reduced attachment points without adequate justification.

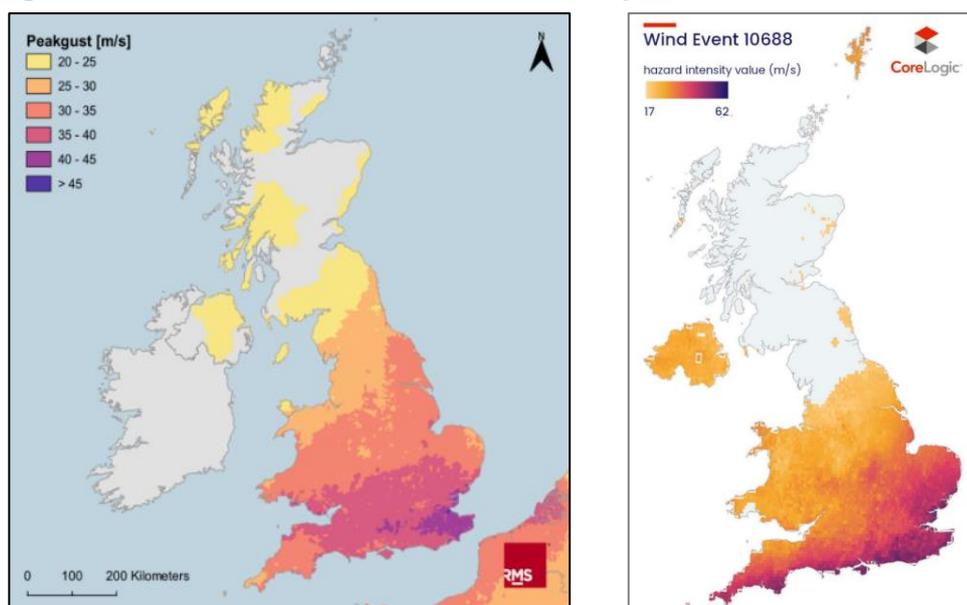
Firms are permitted to assume management actions during the course of the scenario, following an event. Firms should include these in the net aggregate loss reported in the template in 'A3 specific data' tab (see also Section "Management actions").

First UK windstorm event

A severe extra tropical cyclone with "sting-jet" characteristics crosses the south of England, causing strong winds in South and East of England predominantly. The strongest winds occur slightly south of the Greater London area, similar to the Great Storm of 1987. This event causes an industry gross loss around £8.5 billion in the UK based on some vendor model estimates. For the purpose of this stress test, losses outside the UK are assumed to generate negligible losses.

The maps below illustrate footprints for the closest matching RMS and CoreLogic events. Please refer to **Annex 3** for figures from other model provider(s).

Figure 3.1: First UK windstorm event footprint



Source: RMS (left) and CoreLogic (right). Refer to Annex 3 for figures from other model provider(s).

The closest matching vendor model event IDs and estimated industry losses are provided in the table below. Loss estimates include standard demand surge/post-loss amplification captured in the models. Firms are should make further demand surge/post-loss amplification allowances (see Section 3.3). The PRA is aware that event footprints, associated parameters and industry loss estimates vary across vendor models.

Table 3.1: First UK windstorm event – further details

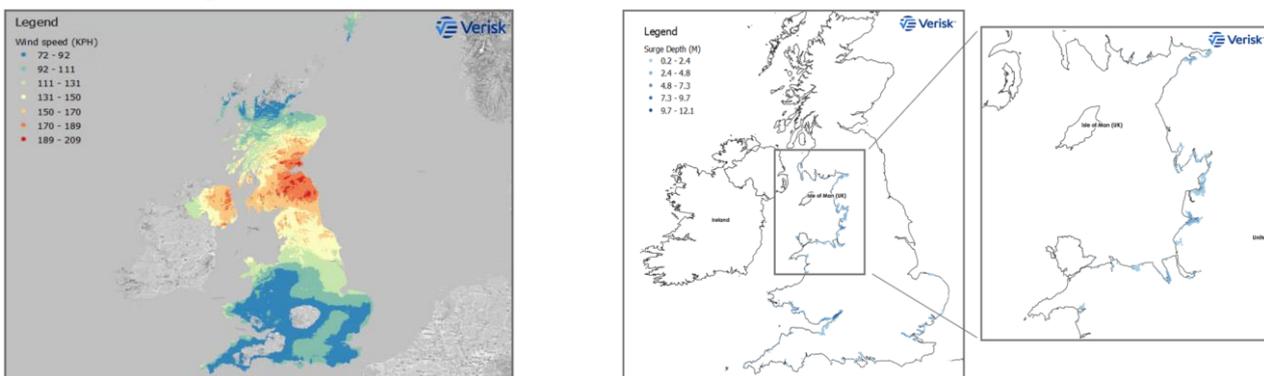
	CoreLogic	RMS	Verisk
Event ID	10688	3189151	410030903
Gross Market Loss (£ billion)	8.6	8.5	8.7

Second UK windstorm event

An extra tropical cyclone that results in significant storm surge along the west coast in addition to widespread strong winds across the UK. The major loss driver of this event is the significant storm surge to the UK west coast with material severity in areas including the Bristol Channel. This event causes an industry gross loss in excess of £5.8 billion across the UK, with more than half resulting from the storm surge.

The maps below illustrate footprints for the closest matching Verisk events. Please refer to **Annex 3** for figures from other model provider(s).

Figure 3.2: Second UK windstorm event area impacted by wind (left) and storm surge (middle and right)



Source: Verisk. Refer to Annex 3 for figures from other model provider(s).

The closest matching vendor model event IDs are provided in the table below. The PRA is aware that not all model providers cover the modelling of storm surge for the UK west coast and in those cases firms need to undertake additional loss estimates to complement model coverage. Please note that the RMS event ID (3172563) covers wind only, and Fathom event ID (93875) and JBA Risk Management event ID (E60467/62501) cover storm surge only. The PRA is aware that the event footprint, associated parameters and industry loss across vendor models will differ. Firms are encouraged to assess the adequacy of the vendor event ID to

cover this event in its entirety, recognising that variations may occur between models. Loss estimates in the table below include standard demand surge/post-loss amplification captured in the models. Firms are expected to make further demand surge/post-loss amplification (see Section 3.3).

When assessing the losses from this event, firms are asked to reflect on the limitations of the methodology adopted in the RBP report, including reflections on adequacy of hazard resolution to capture this localised perils, flood defence assumptions and coverage of the model used to reflect the assumptions laid out in this scenario.

Table 3.2: Second UK windstorm event – further details

	CoreLogic	Fathom	JBA Risk Management	RMS	Verisk
Event ID	11849	93875 ^(a)	E60467/ 62501 ^(a)	3172563 ^(b)	410056187
Gross Market Loss (£ billion)	7.1	n/a	2.9	1.6	5.8

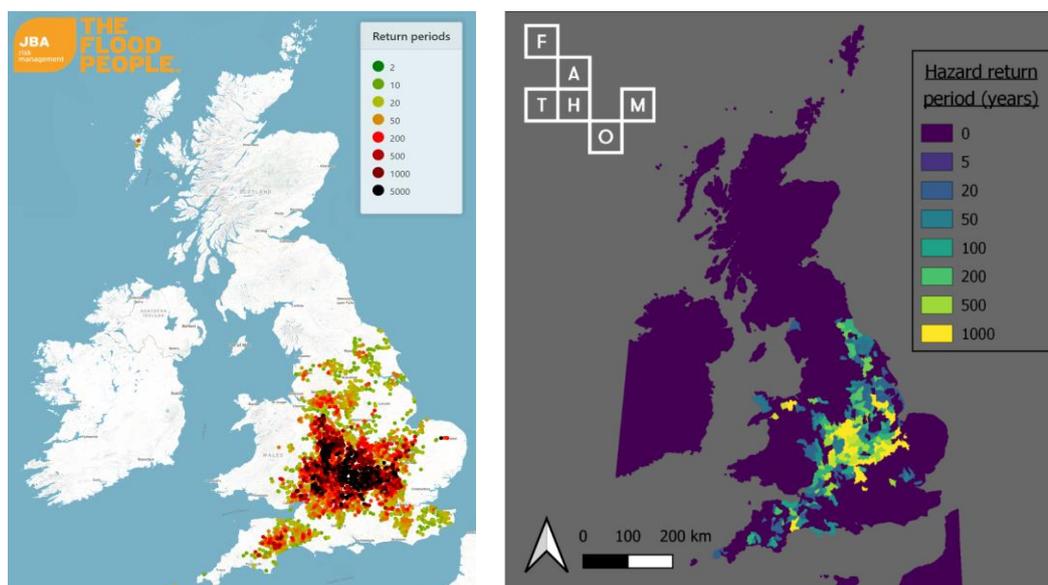
(a) Fathom and JBA Risk Management event IDs cover storm surge only.

(b) RMS event ID covers wind only.

Third UK inland flood event

The third event is similar to the equivalent one included in GIST 2019, which permits the PRA to compare the evolution of firms' resilience, and assumptions on PLA for a widespread flood event. The event is similar to the 2007 flood in terms of the extensive footprint, resulting in widespread inundation from Devon to North Yorkshire with the worst impacts in Oxfordshire, Worcestershire, Herefordshire, Buckinghamshire, and Hertfordshire. The duration of inundation for this event is a minimum of 4 weeks. The event causes an industry loss in the order of £5-6 billion. The map below illustrates the area impacted by flooding from JBA Risk Management and Fathom. Please refer to **Annex 3** for figures from other model provider(s).

The closest matching vendor model event IDs and estimated industry losses are provided in the table below. Loss estimates include standard demand surge/post-loss amplification captured in the models. Firms are expected to make further allowances for demand surge/post-loss amplification (see Section 3.3). The PRA is aware that event footprints, associated parameters and industry loss estimates vary across vendor models.

Figure 3.3: UK inland flood event (area impacted by flooding)

Source: JBA Risk Management (left) and Fathom (right). Refer to Annex 3 for figures from other model provider(s).

Table 3.3: UK inland flood – further details

	Fathom	JBA Risk Management	RMS	Verisk
Event ID	37938	E37777 / 37289	3620656 (HD) / 1945607 (RiskLink)	920020742
Gross Market Loss (£ billion)	n/a	5.7	6.0	5.7

3.3 Reporting

This section sets out details of the quantitative requirements that support completion of template tabs “A3 specific data” and “A3 Event 2 Loss Reporting”. In addition, firms need to refer to the guidance in the RBP, which sets out the required qualitative information that needs to be submitted and that forms an integral part in completing this exercise.

Standard reporting for this scenario

Firms are asked to provide the breakdown of the gross loss estimate by:

- lines of business and coverage (eg residential, commercial business interruption, contingent business interruption, motor, marine and energy, liability);
- types of peril (eg wind, storm-surge, inland flood);
- post loss amplification;

- the estimate of secondary uncertainty (if any) included in their loss estimates.

Firms should exclude losses outside of the UK. Firms should report losses from lines of business and coverage according to the 'Additional description' set out in the Scenario specific tab in the quantitative template. The PRA understands that catastrophe models do not produce losses for all lines of business and coverages. Where the firms deem that the modelling capabilities they have access to are incomplete to assess the full spectrum of losses, they are expected to estimate the non-modelled components (eg liability or contingent business interruption) using an alternative approach of their choice. The approach should be clearly described, along with key assumptions and expert judgements made to estimate relevant non-modelled components, in the RBP report.

Firms should report PLA, including what is captured by the catastrophe models used, and what they believe is over and above what is captured by the catastrophe models. We expect firms to include adjustments to the PLA reflecting possible supply chain challenges, increased price of raw materials, energy and labour costs. Firm should set out in the RBP report how they have assessed the appropriateness of the PLA within the catastrophe models used, how they have established any loading, and what are the most material PLA components.

Firms should provide details of their overall exposures and those that have been impacted (number of risks impacted) in the quantitative template. Firms may make reasonable assumptions to derive their estimates and should exclude immaterial claims if using vendor models.

Data assumptions and adjustments made to the vendor model estimates to reflect firms' own view of risk should be disclosed, including for example:

- the allowance made for uncaptured exposures or data limitations (eg locations not geocoded); and
- the allowance made for non-modelled secondary perils (eg storm-surge), non-modelled coverages (eg contingent business interruption) and non-modelled lines of business (eg energy).

Firms should calculate the net losses for each event individually and, subsequently in aggregate across all events in the scenario, taking into consideration reinsurance recoveries as described in Section 3.2.

Additional reporting for this scenario

For the second UK wind-storm event, for firms who license a model that does not cover the modelling of storm surge for the UK west coast, the PRA provides the hazard data (surge

depth) for all affected postcodes so that the firms can develop their own bespoke damage ratios to calculate losses from storm surge. Damage ratios should include rebuild costs taking into consideration historic and/or modelled claims data. For instance, firms may decide to use a blended approach, applying a vendor model event ID for modelling wind losses and a damage ratio approach for modelling storm surge losses. The hazard data can be found in the quantitative template tab 'A3 Event 2 Hazard Information'.

Additional reporting requirements for this event are:

- firms should report total sum-insured for a number of categories in tab 'A3 Event 2 Loss Reporting' in the quantitative template. Only firms with gross total sum insured for storm surge higher than 5% of overall total sum-insured affected by this event are required to report gross insured losses for storm surge;
- firms should report the gross insured losses for wind and storm surge in the tab 'A3 Event 2 Loss Reporting' in the quantitative template. Those firms which assess their surge exposure as immaterial are asked to report only their wind losses.

Note: Firms that have not used catastrophe models to estimate storm surge losses to the UK west coast, should specify the approach and assumptions used to estimate losses for the impacted regions in the qualitative questions in the RBP report.

Section B – Cyber underwriting scenarios

Note: in this section insurers are only required to consider the impact of losses arising from policyholders (ie excluding impact of cyber events on their own operations).

Cyber Exposures

We ask the firms to complete information on their cyber underwriting exposures in the data template tab “Cyber Exposures”. This will help the PRA to better understand differences in firm results.

In-force exposures as at 01.01.2022

Firms are asked to provide details of the in-force number of policies, gross average line size and gross written premium (GWP) as at 1 January 2022, as well as a forecast for 2022. Gross average line size and gross written premiums should be before treaty reinsurance but facultative purchases should be netted off, if possible.

Firms should capture the exposure for stand-alone cyber and for other lines of business that could be exposed to affirmative or non-affirmative cyber losses. For those lines of business other than stand-alone cyber, exposures should be for the whole class recognising that not all policies reported will have affirmative cyber exposures.

Stand-alone cyber (Direct only): Sectoral breakdown – In-force exposures as at 01.01.2022

Firms are asked to provide a high level sectoral breakdown of the in-force stand-alone cyber exposures separately for small, medium and large enterprises.

For the purpose of IST 2022 firms are asked to define small, medium and large enterprises as follows:

- large firms: revenues exceeding US\$1 billion,
- medium sized firms: revenues between US\$50 million and US\$1 billion,
- small firms: revenues between US\$10 million and US\$50 million

Note, firms with revenue of less than US\$10 million should be excluded from this exercise.

Stand-alone cyber (Direct only): Availability of data for reliance on Cloud Service Providers for Business Critical Functions

To assess cross-firm comparability and to understand potential market concentrations, firms are requested to provide details of the main cloud service providers, covering business critical functions, of those policyholders that are covered by stand-alone cyber insurance.

Scenario B1: Cloud down scenario

This scenario assesses the extent of underwriting losses from a cloud outage of a week for a major Cloud Service Provider. Insureds' activities might be disrupted for a longer period as they need to check their data and systems once the cloud is back in operation.

4.1 Event definition

The largest Cloud Service Provider (CSP) suffers a catastrophic outage for a week (7 days) from a cyber attack facilitated by an insider. Its customers lose access to the cloud worldwide, with ensuing business interruption. Firms are asked to select the CSP that they believe has the largest representation for their portfolio.

Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) are all impacted.

When access to the cloud is re-established, policyholders will need to check their data and systems to ensure these have not been corrupted. Some policyholders have poor back-up systems that lengthens this verification.

Furthermore, this scenario results in business interruption to the global supply chain, as many insured businesses supply key components on a just in time basis.

4.2 Assumptions

Firms are asked to assume that:

- the CSP suffering the outage is the one with the largest concentration in their own portfolio. Where firms do not have sufficient information, they should assume the largest CSP has a 35% market share.
- once the CSP is up and running, 40% of policyholders restore their access to the cloud immediately, but 30% of firms take 9 days to restore access and the remaining 30% take 12 days to restore access [to be clear, this means assume 40% of policyholders have the outage for 7 days, 30% have an outage for 9 days and 30% have an outage for 12 days];
- where insurers do not have sufficient information to assess the reliance of policyholders' business critical functions on CSPs, they may use the assumptions provided in **Annex 4** for the percentage of revenue that is dependent on CSPs and the proportion of that revenue that is lost;

- 20% of large US insured firms that take longer than a week to restore their cloud access face D&O claims, of which 15% are successful. 10% of large non-US insured firms that took longer than a week to restore access, face D&O claims of which 10% are successful; and
- while it is feared that the threat actor may benefit from the tacit support of a nation state, this cannot be proved and so insurers should assume that war exclusions cannot be applied.

Firms should allow for the costs of restoring access where covered and for business interruption losses subject to the deductibles and limits in place.

Firms should assess where contingent business interruption coverage provided is expected to respond.

For D&O losses, firms should estimate both defence costs and claim costs.

Given the scale of the access to the cloud being compromised, firms should consider the potential for some loss in their Professional Indemnity book; this could be in terms of where policyholders are not able to discharge their professional responsibilities or where they are not able to meet contractual commitments. Losses could also arise from cover given to technology providers.

Firms should allow for losses on any other classes they believe would be impacted.

4.3 Reporting

This section sets out details of the quantitative requirements that support completion of template tab “Scenario B1”. In addition, firms need to refer to the guidance in the RBP report, which sets out the required qualitative information to be submitted and that forms an integral part of completing this exercise.

Firms should estimate the instantaneous impact on Basic Own Funds (BOF) and Solvency Capital Requirements (SCR) assuming the stress occurred at the beginning of the year 2022.

A breakdown of gross losses by type of loss is required to help the PRA better understand the impact of each scenario. Gross losses for stand-alone cyber coverages should be broken down by forensics and remediation, ransomware payments, notification costs, fines, liability for data loss, business interruption, contingent business interruption, and other losses.

Losses should be estimated not only for stand-alone cyber coverages but also for affirmative cyber coverages and for non-affirmative cyber coverages in other product lines.

A sectoral breakdown of losses is required for the stand-alone cyber exposures and losses.

Where firms are estimating defence costs and claim costs for D&O losses, we ask that any assumptions made in doing this are reported in the RBP report. In addition, an explanation on how the potential for losses in their Professional Indemnity book has been considered should also be reported.

Scenario B2: Data exfiltration scenario

This scenario assesses the extent of underwriting losses triggered by a large data loss across multiple sectors.

5.1 Event definition

An easily made misconfiguration to a major cloud service provider is made by a large number of policyholders. Misconfiguration is made by insured firms and not by the CSP. This leads to a threat actor exploiting the misconfiguration to gain access to large volumes of customer data. Customer data is exfiltrated across some major insured firms in the three key sectors of healthcare, retail and professional services (including legal). The attackers publish the data on the dark web. The motivation of the hackers is both ideological and financial but there is no link to any nation state.

5.2 Assumptions

Firms are asked to assume that:

- their largest 5% of policyholders by exposure in each of the following sectors are impacted: healthcare, retail and professional services (including legal);
- all impacted policyholders incur notification costs of the data breach to their customers and face class action suits for the privacy breach;
- 20% impacted policyholders (i.e. 1% of policyholders in the impacted sectors), are fined for the data loss at 1% of revenue for contributory negligence;
- no ransom demands are made to customer companies of the CSP;
- the CSP had published configuration guidelines that might have averted the data loss but the guidelines were unclear and misunderstood. The CSP refuses to indemnify the impacted firms; and
- war exclusions cannot be applied.

Firms should allow for the breach management costs, loss notification costs, business interruption and contingent business interruption losses. Firms should also allow for both defence costs and claim costs for the class action suits for privacy breach.

Where firms also have D&O exposures, they should estimate both defence costs and claim costs.

Firms should allow for some loss in their Professional Indemnity book where they believe they may have exposures as well as losses on any other classes they believe would be impacted.

5.3 Reporting

This section sets out details of the quantitative requirements that support completion of template tab “Scenario B2”. In addition, firms need to refer to the guidance in the RBP report, which sets out the required qualitative information to be submitted and that forms an integral part of completing this exercise.

Firms should estimate the instantaneous impact on Basic Own Funds (BOF) and Solvency Capital Requirements (SCR) assuming the stress occurred at the beginning of the year 2022.

A breakdown of gross losses by type of loss is required to help the PRA better understand the impact of each scenario. Gross losses for stand-alone cyber coverages should be broken down by forensics and remediation, ransomware payments, notification costs, fines, liability for data loss, business interruption, contingent business interruption, and other losses

Losses should be estimated not only for stand-alone cyber coverages but also for affirmative cyber coverages and for non-affirmative cyber coverages in other product lines.

A sectoral breakdown of exposures and losses is required for the stand-alone cyber exposures and losses.

Where firms are estimating defence costs and claim costs for D&O losses, we ask that any assumptions made in doing this are reported in the RBP report. In addition, firms should also report the assumptions made in estimating the losses in their Professional Indemnity book or on other classes that firms believe are impacted.

Scenario B3: Systemic ransomware

This scenario assumes ransomware claims increase significantly as a result of a large systemic ransomware event. It tests for the impact of underwriting losses from a large systemic ransomware event, differentiating impact based on the size of the policyholder.

6.1 Event definition

A ransomware group (threat actor) exploits a vulnerability in the update mechanism of a commonly used software to deliver its malicious software payload, using trusted applications as cover.

The impacted policyholder firms' files are encrypted with a ransom demanded for the decryption. The threat actor exfiltrates some firm data to back-up their claims of access to the data and ability to decrypt it.

A number of policyholders refuse to pay any ransom and rebuild their systems with varying levels of downtime. Most of the policyholders need to check their data and systems to ensure these have not been corrupted. Some policyholders have poor back-up systems that lengthens this verification.

The vulnerability is patched 3 days later. However, those policyholders already impacted still suffer from the encryption. Some policyholders take longer than 3 days to implement the patch and others never patch, remaining vulnerable to the attack.

6.2 Assumptions

Firms are asked to assume that:

- of policyholders that have purchased cyber insurance, 7.5% of large firms, 10% of medium sized firms, and 5% of small firms suffer the ransomware attack;
- to decrypt a firm's encrypted data, the threat actor or associated threat actors, demand US\$5 million for large firms, US\$500 thousand for medium sized firms, and US\$50 thousand for small firms;
- 40% of policyholders pay the ransom but the remaining 60% decide to rebuild their systems. However, despite paying the ransom, the threat actor ultimately refuses to provide the decryption keys;
- for large firms, 50% are able to rebuild their systems from backups within 3 days, 30% take 1 week and 20% take 2 weeks. For medium sized firms, 30% take 3 days to rebuild their systems, 40% take 1 week and 30% take 2 weeks. For small firms, 20%

only are able to rebuild their systems from backups within 3 days, 30% take 1 week and 50% take 2 weeks;

- 20% of large US firms that took more than a week to rebuild their systems, face D&O claims of which 15% are successful. 10% of large non-US firms (that took more than a week to rebuild their systems, face D&O claims of which 10% are successful); and
- while it is feared that the threat actor may benefit from the tacit support of a nation state, this cannot be proved and war exclusions cannot be applied.

Firms should allow for the costs of the incident management process by policyholders.

For D&O losses, firms should estimate both defence costs and claim costs.

Firms should consider the potential for some loss in their Professional Indemnity book. Losses could arise from cover given to technology providers; and where policyholders are not able to discharge their professional responsibilities or where they are not able to meet contractual commitments.

Firms should allow for losses on any other classes they believe would be impacted.

6.3 Reporting

This section sets out details of the quantitative requirements that support completion of template “Scenario B3”. In addition, firms need to refer to the guidance in the RBP report, which sets out the required qualitative information to be submitted and that forms an integral part in completing this exercise.

Firms should estimate the impact on Basic Own Funds (BOF) and Solvency Capital Requirements (SCR) assuming the stress occurred at the beginning of the year 2022.

A breakdown of gross losses by type of loss is required to help the PRA better understand the impact of each scenario. Gross losses for stand-alone cyber coverages should be broken down by forensics and remediation, ransomware payments, notification costs, fines, liability for data loss, business interruption, contingent business interruption, and other losses.

Losses should be estimated not only for stand-alone cyber coverages but also for affirmative cyber coverages and for non-affirmative cyber coverages in other product lines.

Where firms are estimating defence costs and claim costs for D&O losses, we ask that any assumptions made in doing this is reported in the RBP report. In addition, an explanation on how the potential for losses in their Professional Indemnity book and on any other classes has been considered, should also be reported.

A sectoral breakdown of exposures and losses are required for the stand-alone cyber exposures and losses.

For the ransomware scenario only, firms should estimate the gross losses assuming key exclusions do not perform as expected. This should include consideration of exclusions on classes of business other than stand-alone cyber and war exclusions.

Section C – Data submissions process

7.1 Introduction

This section sets out the data submissions process.

Participating firms are required to submit the Insurance Stress Test Excel template (s) (referred to as “structured data”) as well as the RBP report and any supporting documentation (referred to as “unstructured data”) by **5pm on Wednesday 28 September 2022** via the BEEDS portal.

Firms should ensure that IST 2022 quantitative and qualitative information provided is clear and sufficient. Where this is not the case, the PRA will ask for a resubmission to enable it to make an adequate assessment. Firms will need to provide a resubmission within 5-10 business days of a request (per communication from the PRA at the time of the resubmission request).

7.2 Data submission process

Submission procedure, standard and conventions

Please follow the instructions in this section exactly and completely

Participants are asked to submit IST stress testing files via the BEEDS portal. More detailed information – including the required set-up processes and example error handling – is also available via the [BEEDS User Guide](#) published on the Bank of England website. If participants have any specific technical issues preventing submission, they should contact the PRA as soon as possible to discuss suitable alternatives (see next section for detailed information on the available support structures).

There may be occasions where BEEDS is unavailable due to maintenance, in which case a firm attempting to submit data at weekends may be unable to access the portal until the following Monday. Scheduled maintenance will not take place around key stress test submission dates and participants will also receive relevant communications as to when such maintenance will occur.

To complement this guidance, submission details will also be scheduled within the BEEDS system.

Summary of Stress Testing key support structures

With regards to the BEEDS portal, there are two key support mechanisms for Stress Testing data submissions.

Firstly, for technical questions specifically regarding the BEEDS portal, please contact BEEDSQueries@bankofengland.co.uk or 020 3461 5360. Standard support hours for these questions are 9am-5pm, Mon-Fri with further details in the [BEEDS User Guide](#).

Also, as part of the creation of firm profiles within the BEEDS portal, named individuals in each firm are either BEEDS 'principal users' or 'additional users'. The creation of these users forms part of the BEEDS security profile with the differences between these roles related mainly to different available functionality. Once a submission is made by any of these users via BEEDS, all users will then receive relevant progress notifications.

Secondly, all other communication between the PRA and the participants involved in this exercise is via the Question & Answer (Q&A) process via the IST.2022@bankofengland.co.uk mailbox.

For example, if any part of a firm's submission is likely to be delayed, the firm should contact the PRA as soon as possible to discuss alternative arrangements. In such a case, the firm may be asked to submit a partially completed template and then resubmit the template including the missing data as relevant (NB: the Submission ID should then be increased).

File conventions and identifiers

For the .zip files submitted, a filename consists of a number of identifiers de-limited by an underscore '_' and should **not** contain any of the following invalid characters: # % & * : < > ? / { \ " |. **If this guidance is not followed, the firm could be asked to correct and re-submit its files.**

The following outlines how each .zip file name should be structured (in order of appearance in the filename):

- **Firm Codes:** For Insurers, participants should use their FRN codes.
- **Submission Frequency:** This should be "A" in all cases. Participants are reminded to use the BEEDS UAT environment (and will be informed when it is open) for testing purposes.
- **Structure:** Data is either Structured (S) or Unstructured (U).
- **Risk/Category Code:** To be referenced as either "LIFE" or "NONLIFE".
- **Reporting Date:** The date for which the data are applicable, which is the firm's reporting year end (31 December 2021 for most firms). For unstructured data files, this is the reporting date of the associated structured data. This information will also be available to the firms as part of their BEEDS schedule.

- **Analysis Period:** This should be 'ANNUAL' in all cases.
- **Submission ID:** This should be '1' for the first submission of a file. For example, for a first re-submission, this should be increased to '2' and so on.
- **Submission Part (optional):** This is for use with large unstructured data submissions where it is necessary to send more than one email each containing one .zip file. The first part of the submission is suffixed by 'A', the second part by 'B' and so on. Participants are reminded that this part of the filename should **not** be used to identify different versions of submissions.



Number of files in a submission

Participants should send their IST data within .zip files. Participants are reminded that:

- For unstructured data (responses to RBP report), BEEDS will currently accept zipped submissions up to a maximum zipped file size of 30MB per upload option and BEEDS offers up to 10 of these upload options/buttons per unstructured submission.
- For structured data (quantitative templates), if participants wish to upload particularly large files, they are encouraged to consider any timing-out risks and / or possible system performance risks within their own IT environments before attempting submissions. Participants are also encouraged to contact the PRA for further guidance ahead of attempting submissions above 60MB in size.
- Structured and unstructured data must be submitted in separate .zip files.
- All structured or unstructured data within each individual .zip file must relate to one specific content/category code and must be the same one as noted within the .zip file name.
- All .zip file names must include a content/category code equating to the one scheduled to each firm via BEEDS or that the firm creates themselves (for other unstructured submission purposes).

- f. No folder structures should be embedded within .zip files – data submissions should be at the root of the .zip file.
- g. Participants are reminded not to put zipped files within other .zip files.

Note that participants may be able to submit earlier than the deadline if they wish – BEEDS will have scheduled a deadline for each submission but will be available to accept early if needed.

Structured data

Structured data files relating to the IST Excel template **must not be split (the PRA expects the total file size to be less than 30MB)**. The relevant template should be submitted as a separate file within its own zip file – i.e. participants should submit one file per zip file for structured data. The structured file within a zip file **must follow the same naming convention as the zip file** and should enable the file to be distinguished from any other submission or re-submission.

All data should be provided in base units (unless otherwise stated). Data in any particular unit currency should be rounded to the nearest unit, without the need to include any decimal points. Ratios and all percentages should be expressed in decimals (maximum of 4 decimal places).

The sign convention to follow is Solvency II reporting convention (unless otherwise stated).

Unstructured data

Unstructured data refers to either the information that participants are requested to provide in response to the questions in the RBP report, or any other unstructured documents (ie participants can choose the format, structure and number of these documents themselves) that participants proactively choose to submit to aid understanding of their structured submissions.

For the RBP report submissions, participants will receive schedules for the relevant returns within BEEDS.

For other unstructured IST documents that participants may choose to submit, participants should follow relevant steps in the [BEEDS User Guide](#) on how to create their own 'unscheduled' unstructured returns within BEEDS. For these 'unscheduled' unstructured returns created by participants, participants must add an 'effective date' of 31 December 2021 in BEEDS when creating them.

Firms are reminded that, if they wish to submit more than one unstructured submission with the same category code and the same effective date, then there are ten upload options within each unstructured submission. Additionally, if they then wish to submit additional files at a later point for the same code and same effective date as before, they should do this via requesting a resubmission in BEEDS (see Section **Resubmissions** below for more details).

If a firm wishes to submit more than one unstructured return, with different category codes but with the same effective date, it may receive an error message stating there is already a return with the same effective date. If this occurs, please see “Section 8 Manager Users” in the [BEEDS User Guide](#) on how this can be resolved.

Acceptable formats **specifically for unstructured data files** are .XLSX, .DOCX, .PDF, .PPTX, .CSV and .TXT. If a firm needs to report in other formats, they should contact the PRA to discuss next steps.

The files within the .zip should **all relate to the same content code** and - whilst they do not need to follow specific naming conventions - they should have an understandable, distinguishable and descriptive name.

Until then, BEEDS will reject these submissions if they are submitted as structured returns.

Data encryption

The BEEDS portal is a secure interface through which participants will submit templates in a number of other exercises. Participants should refer to the information available via the [BEEDS User Guide](#) (and associated links) for further guidance on this connection and associated processes (for example, usage of security questions).

Resubmissions

Participants must log on to BEEDS to request a resubmission of any information via the relevant functionality. As per the Submission ID noted above, the revision number in BEEDS should increase for every resubmission completed. Please see the [BEEDS User Guide](#) for further details on resubmissions.

When sending these resubmissions via BEEDS, the following guidance for participants remains:

- ensure that all templates still reconcile as expected after any changes made;
- submit only one final version of the template incorporating **all** changes; and

- ensure re-submitted data templates are accompanied by a supporting [unstructured] document to provide detail of the changes made since the previous document; specify the reason for resubmission and data quality issues addressed.

The PRA will only process changes to data that it has requested – participants should therefore limit changes to those that have been requested by the PRA and clearly highlight them.

Firms are also reminded that, if they wish to submit more than one unstructured submission with the same category code and the same effective date, then there are ten upload options within each unstructured submission. Additionally, if they then wish to submit additional files at a later point for the same code and same effective date as before, they should do this by requesting a resubmission in BEEDS.

Key Submission Header and other template guidance

All firms must include both the legal **Firm name** and relevant **Firm Registered Number (FRN)** in the appropriately labelled cells in all submission headers. The **Firm name** should be exactly the same as the entry in the Firm Profile on BEEDS for the corresponding FRN.

Firms are asked:

- To **complete all tabs, as appropriate**, in the IST structured template(s). Systems tabs shall be hidden and will not require any actions from Firms.
- It is **vital** that participants fill in this name and FRN information correctly for **every submission**. For a Lloyds Syndicate, please enter FRN as “SYXXXX”, where XXXX is refers to the participating Syndicate number. Also, if participants amend their FRNs for any reason, they should inform their PRA Supervision contacts through the standard Q&A process.
- For the **Submission ID**, for the first submission please report 1, each subsequent resubmission should increase the Submission ID by 1 so that the Submission ID for the second submission would be 2 and so on.
- The **Reporting date** in the template will be the firm’s reporting year end (31/12/2021 for most firms). This information will also be provided to the firms as part of their BEEDS schedule.
- The PRA **analysis period** in each template will be “Annual”.
- Please ensure that the **Risk Type** in the submission header remains as per the template when it was published. Participants should not change this information.

- The **Submission content type, Submission period type, Version** or any of the **tab headers** should **not** be amended from what was provided in the templates when they were published.
- In relation to **Worksheet names, Column names** and **Enumerations**, please do not replace or delete any of the Worksheet names from what was published. For example, please do not replace underscores “_” in worksheet names with dashes “-” and do not amend the case of any letters in the Worksheet names (e.g. Submission_header not Submission_Header). Also, please do not change the spelling or order of any column names from the templates provided and do not add any columns or change the order of columns in the templates provided.

Annex 1 Responses to firm feedback from the first and second request for technical input (general insurance)

Questions / issue raised		The PRA response
Natural Catastrophe scenarios		
1.	We are concerned about the number of sub-elements in the Natural Catastrophe scenarios.	GIST 2022 includes three natural catastrophe scenarios with eight sub elements, while the 2019 exercise included four natural catastrophe scenarios with eight sub elements. Given that not all firms have material exposure to all of those sub-elements, we believe that the effort required to complete GIST 2022 is broadly comparable to GIST 2019 for most firms. Based on the feedback from the second request for technical input, we have now also simplified the reporting requirements in the quantitative template.
2.	What is the climate change - related science that is informing the PRA's calibration of the natural catastrophe stresses?	GIST 2022 does not aim to assess financial impact from climate change. The scenarios represent severe but plausible realisations of current climate conditions chosen to reflect firms' exposures and business models.
3.	For <i>Set of US Hurricanes scenario</i> , the third event (inland penetration), appears too severe, given no history of similar events in the Great Lakes.	This hurricane track is leveraging validated catastrophe models that simulate plausible hurricane events. Recent events (eg Hurricane Ida) have demonstrated the loss propensity of hurricane inland tracks.
4.	For the second <i>Hurricane event – Cyclone precipitation-induced flood</i> – clarify if there is a requirement to seek divisibility in the property versus marine losses incurred.	Yes, a break-down by line of business is required in the data reporting template (see Section 1.3)
5.	What is the reason for inclusion of the <i>Earthquake Scenario</i> given a tenuous link between climate change and seismic activity?	GIST is not focused on climate change-related scenarios as opposed to IST. The scenarios represent severe but plausible stresses chosen to reflect industry exposures.

6.	For the <i>UK Wind and Flood scenario</i> , sub-element UK West Coast Storm Surge, recommendation for the PRA to provide damage ratios.	The PRA has provided hazard information, aiding firms' loss estimation. The PRA will not be prescriptive on how to use the hazard information for loss estimation. Firms are expected to undertake the analysis using an approach they deem appropriate, whether by developing in-house solutions, or working with third party model providers or brokers. Firms are expected to provide the methodology and assumptions used in the RBP report.
7.	For the UK Wind and Flood scenario, sub-element UK West Coast Storm Surge, can you confirm that expanding the postcode data to a more granular property level is an acceptable approach for this exercise?	Yes, firms may expand the postcode data to a more granular property level using their modelling solutions.
8.	For the US Hurricane scenario, should losses in Caribbean and Mexico be included or not? For the UK Wind and Flood scenario, should losses in continental Europe be included or not?	For the US Hurricane scenario, losses in Caribbean and Mexico should be included. For the UK Wind and Flood scenario, losses in continental Europe should be excluded.
9.	When assessing the balance sheet impact of the natural catastrophe scenarios how should firms approach the existing catastrophe loads in their financial plans?	The natural catastrophe scenarios are assumed to occur towards the end of 2022, such that firms do not need to consider mid-year adjustments to their existing plan when assessing their projected own funds at 31 December 2022. The starting point for these scenarios is therefore the 2022 base case projection and scenarios are in addition to this.
10.	Does the PRA expect firms to report Post Loss Amplification (PLA) over and above what is captured by the cat models and the challenges to report the PLA breakdown (ie loss adjustment expenses, increased material costs, other causes)?	Firms are expected to report PLA, including what is captured by the catastrophe models used, and what they believe is over and above what is captured by the catastrophe models. We expect firms to include adjustments to the post loss amplification reflecting possible supply chain challenges, increased price of raw materials, energy and labour costs. Firms

		<p>should set out in the RBP report how they have assessed the appropriateness of the PLA within the catastrophe models used, how they have established any loading.</p> <p>We have simplified reporting of the PLA in the quantitative template. PLA breakdown has been removed from the template. However, firms are expected to specify in the RBP report what the most material PLA components are.</p>
11.	<p>Please clarify the request to assess model assumptions within the cat models, specifically on 1) changing the ground motion assumptions in the California earthquake scenario, and 2) use of 25% Florida Roof Rule in the US hurricane scenario. Would the PRA provide guidance on how to adjust these assumptions?</p>	<p>The PRA will not be prescriptive on how these model assumptions could be adjusted. Firms are expected to undertake the assessment using the approach they deem appropriate, whether by developing in-house solutions, or working with third party model providers or brokers. Firms are expected to provide the methodology and assumptions used to assess these model assumptions in the RBP report.</p>
12.	<p>Please provide further clarification on reporting losses in the quantitative template, specifically:</p> <ul style="list-style-type: none"> • Estimate of losses resulting from secondary uncertainty • Business interruption (BI) losses as BI loss is requested to report alongside lines of business which may also have BI coverage (e.g. marine and energy) • Liability loss in all scenarios 	<p>Secondary uncertainty is uncertainty associated with the damage and loss estimation should a given event occur.</p> <p>When reporting losses from lines of business and coverage, firms should refer to the 'Additional description' in the Scenario specific tab in the quantitative template. The PRA understands that catastrophe models do not produce losses for all lines of business and coverages. Where the firms deem that the modelling capabilities they have access to are incomplete to assess the full spectrum of losses, they are expected to estimate the non-modelled components (eg liability or contingent business interruption) using an alternative approach of their choice. The approach should be clearly described, along with key assumptions and expert judgements made to estimate relevant non-modelled components, in the RBP report.</p>

Cyber underwriting scenarios		
13.	We are concerned about increase in number of cyber scenarios from 1 in GIST 2019 to 4 in GIST 2022.	<p>Given the increase in cyber exposures over the last few years, and the evolving nature of the underlying cyber risk and ensuing coverage changes, the PRA believes it is important to explore a range of scenarios.</p> <p>However, based on the industry feedback, in the final specification we have reduced the number of the PRA scenarios from 4 to 3. Firms will no longer be asked to consider a cyber attack on shipping navigation systems scenario.</p> <p>We have also removed the need to provide the insurer's own largest cyber scenario if one or more of the other 4 defined scenarios are at least as material as the internal scenarios.</p> <p>We have further simplified the cyber scenarios reporting template by asking for the Solvency Ratio impact on the starting balance sheet for the year rather than asking for a projection to year end 2022.</p>
14.	All cyber scenarios are based on intentional/malicious cyber-attacks. We believe broadening causes beyond non-malicious factors would enhance the scope of the exercise overall.	We are asking firms to consider how the loss potential might be different if the scenario was non-malicious and to comment within the RBP report.
15.	Do the cyber scenarios assume any impact on financial markets?	Unlike IST 2017 and 2019, in 2022 the general insurance component of the Insurance Stress Test does not include an asset shock. The exercise is focussed on underwriting shocks across all scenarios.
16.	Which covers are included in the cyber scenarios – eg does the cloud scenario cover only business interruption or also includes physical damage?	The cyber scenarios are primarily exploring affirmative cyber and non-affirmative cyber losses. While we are expecting business interruption losses in the scenarios, the scenarios have not been designed to explore physical losses.

		Firms do not need to model physical damage where it has not been explicitly described in the scenario. However where firms believe it would be appropriate or prudent to include an element of physical damage, they can do so.
17.	Non-affirmative cyber events will be idiosyncratic to each firm's exposure – further details would be needed to ensure consistent responses between firms.	We have provided additional assumptions and guidance to reduce the level of inconsistency.
18.	Confirm whether you would like participants to assess the silent cyber exposures and any assumptions we should make around successful challenges to exclusions or wordings.	<p>Yes, we would like firms to consider silent cyber exposures. This has been made clear in the specifications; the reporting template also captures stand-alone, affirmative and non-affirmative losses.</p> <p>In addition, for the Systemic Ransomware scenario only the reporting template also captures firms' view of gross losses if exclusions do not work as expected.</p> <p>Firms are also asked to comment on the exclusions in the RBP report.</p>
19.	Does the materiality threshold of Gross Loss (before Reinsurance) of 5% of GWP relate to the GWP of the main UK regulated entity?	The GWP measure is at reporting entity level.
20.	Are there assumptions around credit security of reinsurers given the severity impact of the scenarios?	The cyber stress does not specify reinsurer downgrades or defaults but does capture reinsurer details for the largest cessions.
21.	Are coverages in scope only those for a sub-set of classes (e.g. D&O, PI and CBI) or for a broader range of insurance classes?	We expect the firms to consider all lines of business in respect of both affirmative and non-affirmative covers and this is reflected in the updated Instructions.
22.	What are the NAICS codes associated with each economic sector?	Classification is at a high level and we leave it up to the firm to map its own classifications to our high level classifications.

23.	Is there the expectation that the firms need to use the PRA stated assumptions or also develop and apply their own assumptions?	<p>To ensure comparability across responses, firms are requested to use assumptions provided by the PRA.</p> <p>Where the PRA has not specified assumptions, firms are free to develop their own assumptions reflecting the specifics of their portfolio and their own views.</p> <p>We believe this strikes the right balance for the PRA to be able to aggregate the results to get a sector view of loss from the scenarios while leaving flexibility to reflect firms' portfolio specifics.</p> <p>In the RBP report, firms should comment on how their own view of risk compares to the scenario results.</p> <p>If the application of any assumption is unclear, firms should not hesitate to get clarification from the PRA.</p>
24.	Are all cells of the 'specific data' tabs expected to be completed, for example non-affirmative and affirmative columns for stand-alone cyber and the 'stand-alone' column for other lobs?	Cells can be left blank where they are not relevant. The table has been set-up to facilitate PRA analysis. For the avoidance of doubt, for the stand-alone cyber class, firms are not expected to complete the cells for the affirmative and non-affirmative columns.
25.	Can the PRA provide an indication of the return period for each scenario as this will help with comparable reporting?	We would like to understand the range of firms' views and do not want to introduce anchoring in those views.
26.	Should firms provide descriptions of model vendors and model versions for cyber scenarios?	We are not expecting firms to provide this information for the cyber scenarios.
27.	We believe the motivation for the type of attack in the data exfiltration scenario is limited, as personally identifiable information data is not that valuable at present, so we think the financial motive is limited.	While that may be true, the motivation of the threat actors may not be purely financial. For example, they could also have geopolitical, ideological or social motivations.

28.	In the Cloud down scenario - for the proportion of companies that require more than 7-days to restore services, the proportions seem high compared to the Ransomware scenario where 80%-50% (dependent on size) companies have a complete restoration of their systems seven days after the event.	The PRA engaged widely with insurers, reinsurers, brokers, and vendor models in designing the scenarios. It has been suggested that many firms are likely to need more time because they have to check their systems and data to ensure they are not corrupted. Smaller firms might take even longer.
Other		
29.	What will be the format of the RBP report?	Please see the RBP report attachment. We have now clarified the suggested word count for questions in the report.
30.	Will a firm have the chance to run its RBP report past the PRA towards the end of the submission window to check whether it meets the PRA's expectations?	No. The PRA will not review RBP reports before submission. However, dialogue channels will remain open during the period before and during the submission window in order to discuss any queries.

Annex 2 Institutions invited to take part

Large UK general insurers

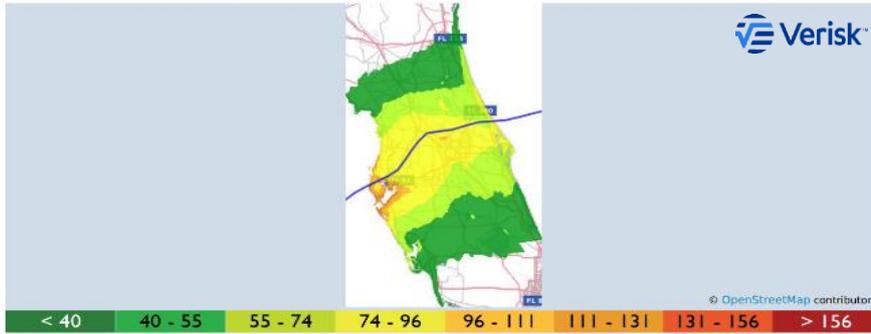
- Admiral (Group)
- Ageas Insurance Limited
- Allianz Insurance plc
- American International Group UK Limited
- Aspen Insurance UK Limited
- Aviva Insurance Limited
- AXA Insurance UK plc
- Convex Insurance UK Limited
- UK Insurance Limited
- Flood Re Limited
- Hiscox Insurance Company Limited
- Lloyds Bank General Insurance Limited
- The National Farmers Union Mutual Insurance Society
- QBE Limited
- Royal & Sun Alliance Insurance Limited
- XL Catlin Insurance Company UK Limited
- TransRe London Limited

Society of Lloyd's (21 selected Managing Agents)

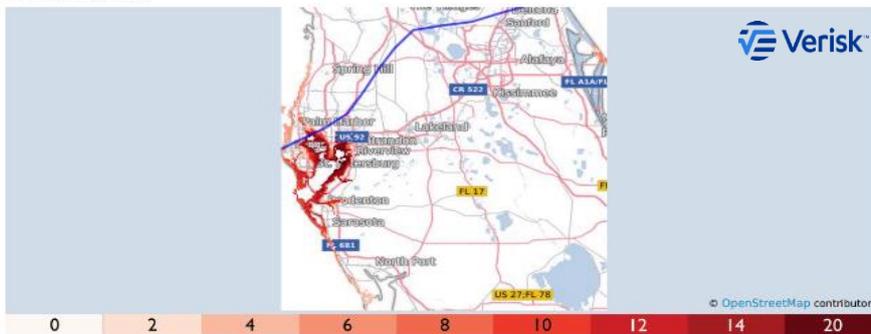
Annex 3 Natural catastrophe scenarios – additional information

US Hurricane set of events

Windspeed Intensity (mph)

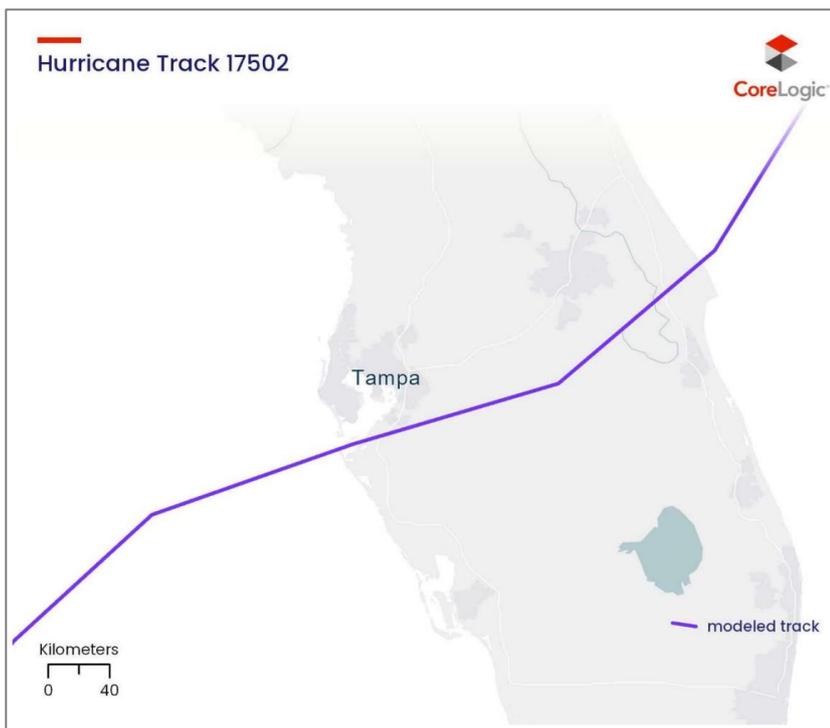


Storm Surge (ft)



First hurricane event

First hurricane track as modelled by Verisk.

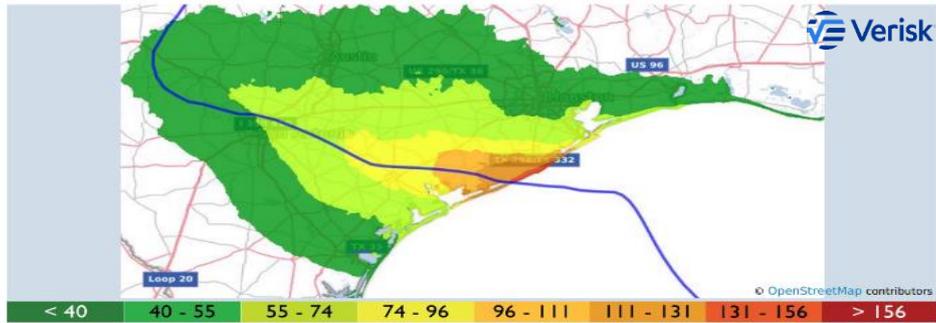


First hurricane track as modelled by CoreLogic.

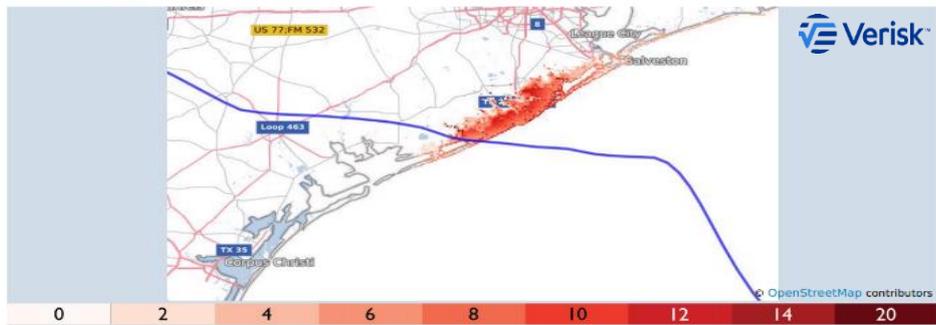
Second hurricane event

Landfall Intensity Footprints

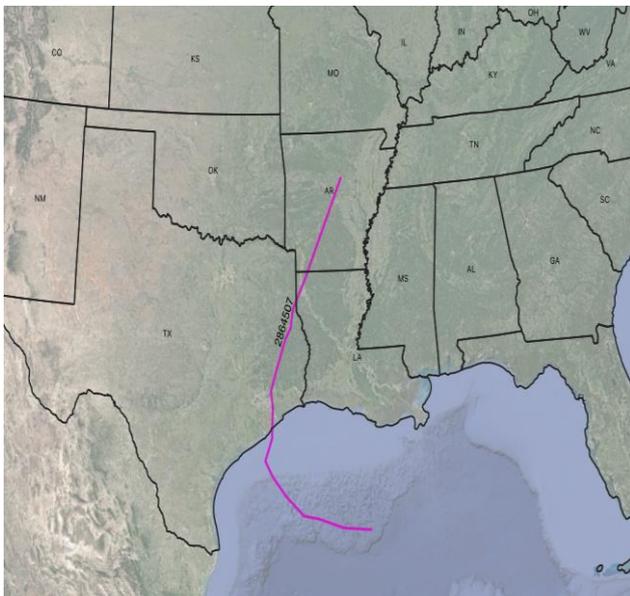
Windspeed Intensity (mph)



Storm Surge (ft)

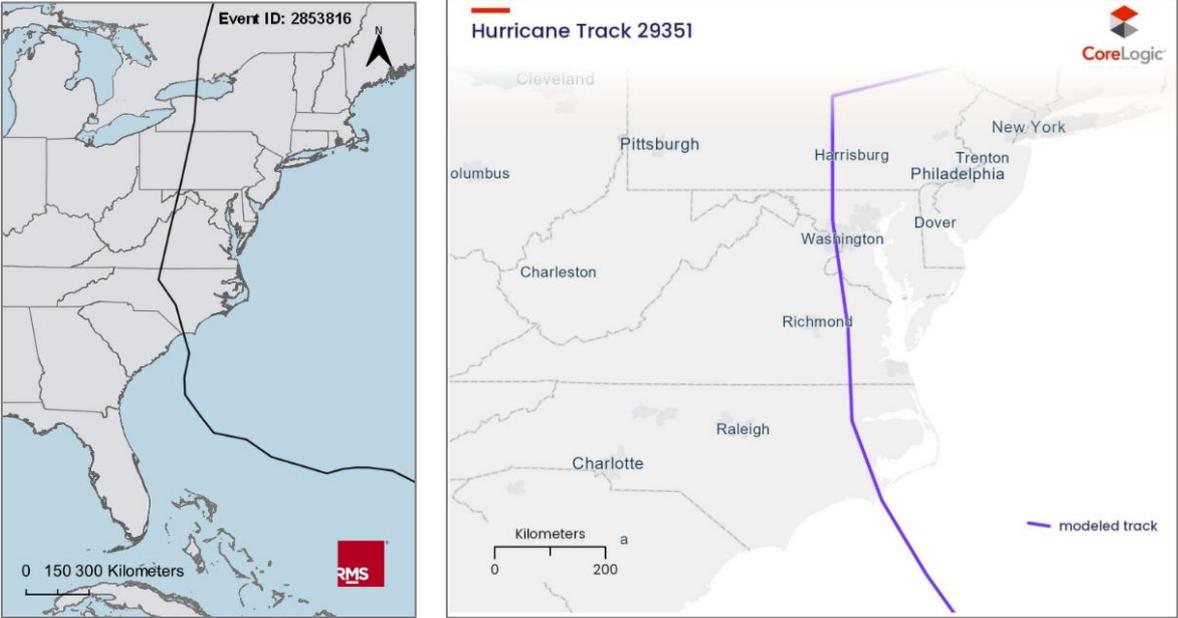


Second hurricane track as modelled by Verisk



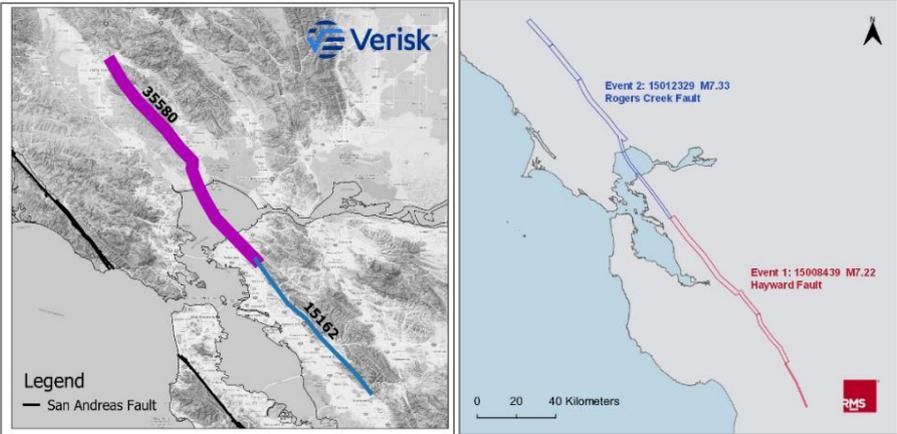
Second hurricane track as modelled by RMS (updated 09062022)

Third hurricane event



Third hurricane track as modelled by RMS (left) and CoreLogic (right).

California earthquake



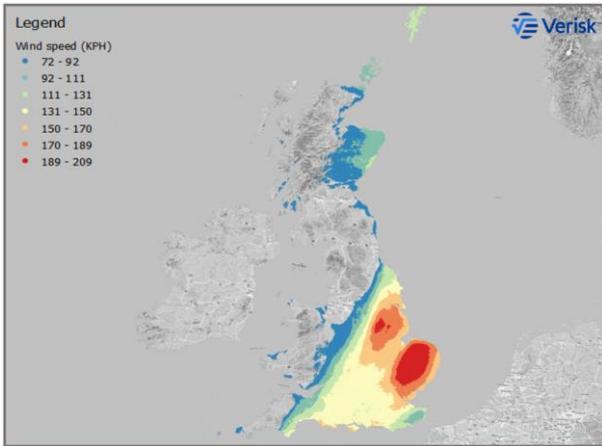
California earthquake faults as modelled by Verisk (left) and RMS (right)



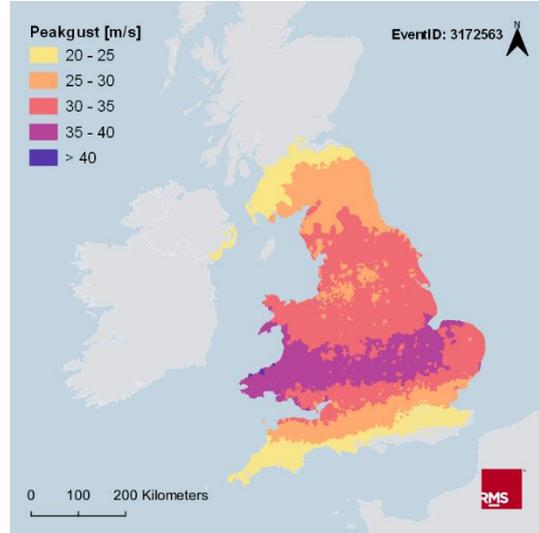
California earthquake faults as modelled by Impact Forecasting

UK windstorm and inland flood

First UK windstorm



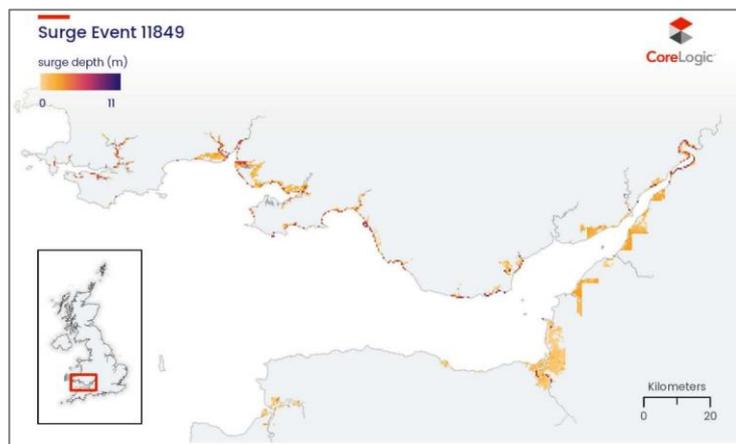
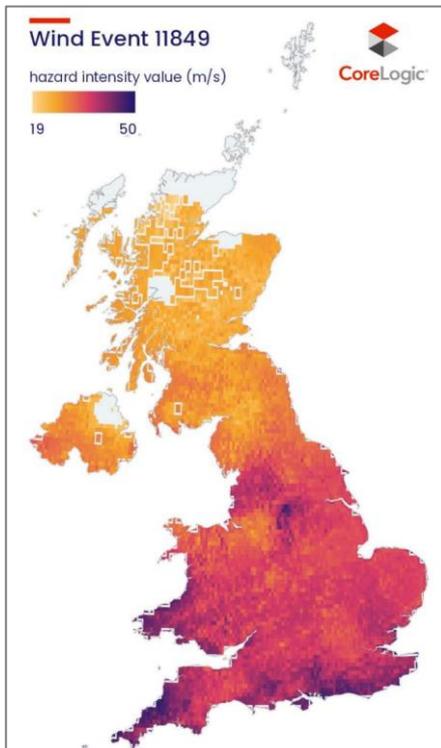
Second UK windstorm



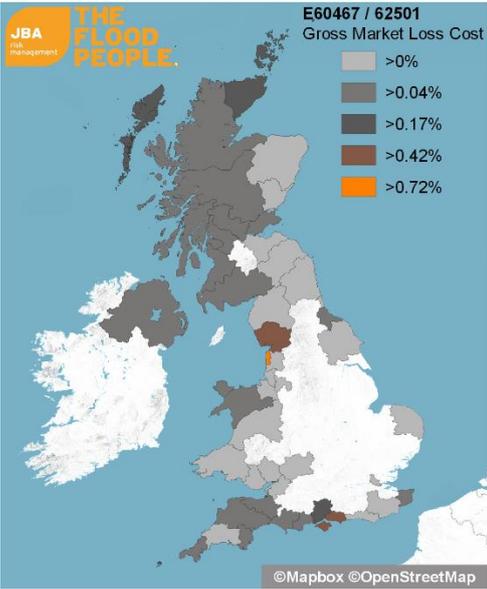
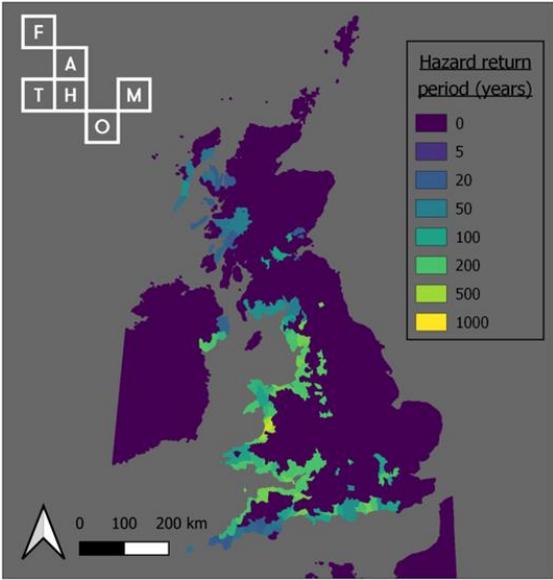
First UK windstorm as modelled by Verisk.

Second UK windstorm as modelled by RMS.

Second UK windstorm

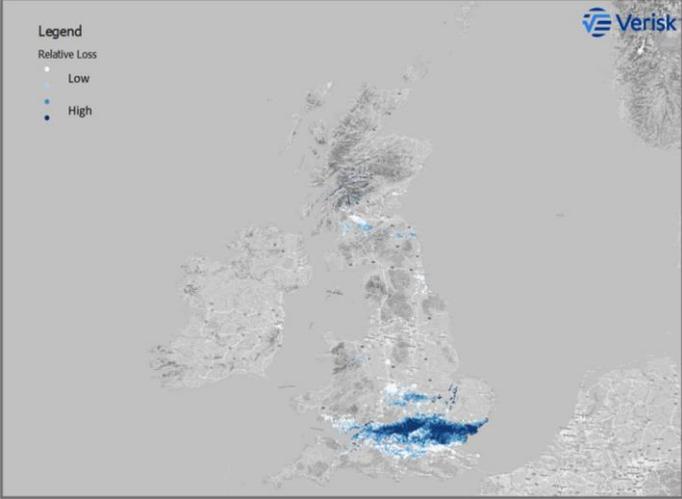
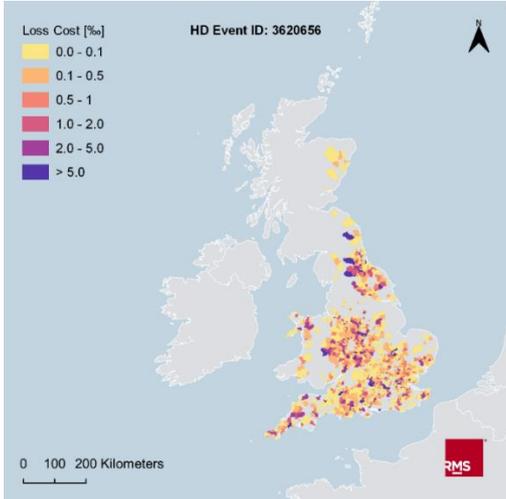


Second UK windstorm (left) and corresponding storm surge (right) as modelled by CoreLogic.



Storm surge associated with the second UK windstorm as modelled by Fathom (left) and JBA Risk Management (right).

UK inland flood



UK inland flood as modelled by RMS (left) and Verisk (right)

Annex 4 Cyber underwriting scenarios – additional information

Unless firms or syndicates have an in-house view of the dependence of their policyholders on cloud services and the consequential business interruption losses, they should use the following assumptions.

Table IV: Reliance on cloud service providers and consequential BI losses

Economic Sector	% of revenue reliant on Cloud Service Providers	% of the cloud dependent revenue lost
Agriculture & Mining	10%	50%
Manufacturing	20%	50%
Pharmaceuticals	20%	50%
Energy and Utilities	10%	50%
Construction and Real Estate	10%	50%
Consumer Retail	50%	50%
Wholesale Trade	25%	50%
Marine	10%	50%
Aviation	25%	50%
Other transportation	25%	50%
Hospitality	80%	50%
Technology	75%	50%
Financial and Insurance	80%	50%
Professional Services	80%	50%
Other services	25%	50%
Public Administration	10%	50%
Education	50%	50%
Healthcare	70%	50%
Other	25%	50%

Annex 5 Abbreviations

BOF	Basic Own Funds
IST	Climate Biennial Exploratory Scenario
CSP	Cloud Service Provider
ECA	Economic Capital Assessment
D&O	Directors & Officers
FRN	Firm Reference Number
GIST	General Insurance Stress Test
GWP	Gross written Premium
GBP, £	British Pound Sterling
IM	Internal Model
IST	Insurance Stress Test
LEI	Legal Entity Identifier
IM	Internal Model
IST	Insurance Stress Test
LEI	Legal Entity Identifier
LORS	Lloyd's Outward Reinsurance Scheme
Nat Cat	Natural Catastrophe
PLA	Post event loss amplification
PRA	Prudential Regulatory Authority
QRT	Quantitative Reporting Templates
RBP	Results and Basis of Preparation report
SCR	Solvency Capital Requirement
SII	Solvency II
TEU	Twenty-foot Equivalent Unit
US\$	United States Dollar

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IUA

JBA Risk Management

Maximum Information

Kovrr

LMA

Munich Re

Oliver Wyman

Plymouth University

RMS

Temblor

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