

Minutes of Progress Meeting 7: Expert Panel on Natural Hazards – Meteorological and Coastal Flood Hazards Sub-Panel
14 March 2022, Windsor House, 50 Victoria Street, London SW1H 0TL

Attendees: *joined remotely

[REDACTED] – ONR External Hazards Inspector (Chair)
 [REDACTED] – ONR Professional Lead for Civil Engineering and External Hazards
 [REDACTED] – ONR External Hazards Inspector
 [REDACTED] – ONR External Hazards Inspector
 [REDACTED] – ONR External Hazards Principal Inspector
 [REDACTED] – ONR External Hazards Inspector
 [REDACTED] – ONR External Hazards Inspector
 [REDACTED] – Expert Panel member
 [REDACTED] – Expert Panel member
 [REDACTED] – Expert Panel member
 [REDACTED] & Andy Mayall (AM) - Environment Agency
 [REDACTED] - Environment Agency
 [REDACTED] – Met Office
 [REDACTED] – The Engineering Design Institute (TEDI), liaison to Department for Levelling Up, Housing & Communities
 [REDACTED] – Lancaster University
 [REDACTED] – Expert Panel on Natural Hazards (Technical Secretary)
Apologies: [REDACTED] – Met Office

Serial	Timing	Item Description	Introduced
Monday 14th March			
1	09:00 – 09:45 09:00 – 09:45	Welcome, Introductions and Update Welcome and update on activities from ONR	[REDACTED]
2	09:45 – 11:00 09:45 – 10:15	Meteorological & Coastal Flood Hazards IPCC AR6 WG2 and UK rapid response catchments programme reports - update	[REDACTED]
	10:15 – 10:45	CCRA3 Research Briefing - Highlights	[REDACTED]
	10:45 – 11:00	Discussion	[REDACTED]
	11:00 – 11:15	<i>Break</i>	
3	11:15 – 13:00 11:15 – 11:20	Meteorological & Coastal Flood Hazards ONR/EA Joint Guidance – Update from ONR	[REDACTED]
	11:20 – 11:30	National Policy Statement – Update from EA	[REDACTED]
	11:30 – 11:40	Climate Change Allowances for flood risk assessments	[REDACTED]
	11:40 – 11:50	National Coastal Erosion Risk Map	[REDACTED]
	11:50 – 12:20	Overview of Hadley Centre Climate Programme and UKCP Services	[REDACTED]
	12:20 – 12:50	Update on Eurocode developments - An Overview	[REDACTED]
	12:50 – 13:00	Discussion	[REDACTED]
	13:00 – 14:00	<i>Lunch</i>	
4	14:00 – 15:55 14:00 – 14:15	Meteorological & Coastal Flood Hazards Multivariate Hazard Curves - Update	[REDACTED]
	14:15 – 14:45	Tipping Points in the Climate System	[REDACTED]
	14:45 – 15:15	Accounting for temporal sequences of storm events on infrastructure performance; review	[REDACTED]
	15:15 – 15:45	Climate Model Uncertainty	[REDACTED]
	15:45 – 15:55	Discussion	[REDACTED]
5	15:55 – 16:00	Closing Remarks	[REDACTED]
	16:00	<i>Close</i>	

1 ONR Update

ONR opened the meeting and provided an update on regulatory matters relevant to the Meteorological and Coastal Flood Hazards Sub-Panel. The actions from the previous meetings were discussed, and all closed. ONR provided a link to research project [ONR-RRR-055 on Extreme weather events in the UK](#).

ONR published the Expert Panel papers for [NS-TAST-GD-013](#) Annexes 2 and 3 for external comment in September 2021. A total of 23 comments were received from five stakeholders. The comments have been sentenced and updated Expert Panel papers formally published as part of the External Hazards Technical Assessment Guide. The remaining NS-TAST-GD-013 documents will be updated by October 2023, or sooner.

ONR's Research Briefings provide transparency of the research that ONR considers in development of [NS-TAST-GD-013](#). The briefings include international and national research in meteorological and flooding hazards, and climate change. The [first briefing](#) was published in October 2021. A second research briefing is being developed, focussing on chapter 1 of the ["Independent Assessment of UK Climate Risk \(CCRA3\)" report](#).

The Environment Agency shared the recently published [high level annual summary from its Chief Scientist's Group](#). The Environment Agency has been working with the British Standards Institute (BSI) in relation to [ISO14090](#), relating to organisational preparation for climate change.

The current Expert Panel contracts end 31st March 2022. New contracts will be competitively tendered during spring and early summer. The Expert Panel is expected to reconvene in summer 2022.

2 IPCC 6th Assessment Report WGII and ONR Research Briefing

The Expert Panel presented on the recently published [Working Group II contribution to the IPCC Sixth Assessment Report](#). This report assesses the impacts of climate change, reviews vulnerabilities, and the capacities and limits of the natural world and human societies to adapt. The report highlights that adaptation can generate multiple benefits; however, there is increasing evidence of maladaptation across many sectors and regions. Adaptation is given more significance and urgency than in IPCC [Assessment Report 5 \(AR5\)](#). The report also highlights adaptive pathways as a useful tool for identifying and managing uncertainties.

The Environment Agency highlighted that the UK Government will publish a report on the UK resilience strategy. This report evaluates all risks, including climate change. The [storyline approach](#) for climate change was discussed. Future updates of the Expert Panel papers will include this approach.

The Expert Panel presented work on rapid response catchments. Flash flood events in Britain are described in [Archer et al.\(2019\)](#) (a database initiated as part of the UKRC funded ["SINATRA" project](#)).

The Expert Panel presented on the three key topics from CCRA3 (chapter 1): high temperatures, storms/storminess, and summer precipitation. These topics will be included in the next research briefing.

3 Updates from Partner Agencies

ONR and the Environment Agency are updating the joint regulatory guidance '[Principles for Flood and Coastal Erosion Risk Management](#)' to include UK Climate Projections 2018 (UKCP18). The '[Use of UKCP18 Position Statement](#)' is also being updated with the environment agencies (Environment Agency, Natural Resources Wales and the Scottish Environment Protection Agency). UKCP18 is considered relevant good practice (RGP) for determining climate change allowances for relevant natural hazards..

The Environment Agency provided an update on the National Policy Statements (NPS) for Energy. EN-1 was consulted on in autumn 2021 and is now with the Department for Business, Energy and Industrial Strategy (BEIS). Review of [EN-6 \(nuclear\) NPS](#) concluded that it remains relevant for current projects. A new NPS for nuclear is expected post 2025. The [NPS for Geological disposal Infrastructure](#) was published in 2019.

The Environment Agency provided an update on climate change allowances in both flood risk assessments, and flood and coastal risk projects, schemes and strategies. An update to [peak river flows](#) was published in July 2021, based on UKCP18 climate projections and research by the UK Centre for Ecology & Hydrology (UKCEH). An update to [peak rainfall](#) is due to be published in May 2022 using the [Local UKCP 2.2km projections](#), together with an ensemble of climate change rainfall estimates from the research project [FUTURE DRAINAGE](#). The Expert Panel challenged that palaeoclimate data was not used in the models. **The Environment Agency and Expert Panel will engage in relation to reconciling the use of palaeoclimate data in models (1/7).**

The Environment Agency introduced the National Coastal Erosion Risk Mapping 2 (NCERM2) project, which follows [NCERM](#). The NCERM2 project aims to:

- provide reliable and accessible information;
- improve governance and maintenance;
- actively involve partners in development; and
- increase understanding of coastal erosion risk.

Phase 1 of the project is nearing completion. Phase 2 will start in summer 2022. NCERM2 data is to be published by December 2023. **The Environment Agency will provide an update on NCERM2 at a future meeting (2/7).**

UK Met Office presented the [Hadley Centre Climate Programme \(HCCP\)](#). This programme delivers research on climate risks. It informs the UK Government and global policy makers to prepare for, and adapt to climate change. ONR and the Environment Agency are HCCP User Group members. The UK Met Office's Climate Hub provides the latest outputs, news and updates from HCCP. The Environment Agency requested the UK Met Office deliver a similar presentation to their programme (on behalf of the Nuclear Industry Liaison Group) to enhance collaboration and share learning.

TEDI provided an overview of Eurocode updates. The second generation of Eurocodes is committed to establishing a consistent framework. Climate change will be accounted for via national values for environmental actions. **ONR requested a meeting to discuss hazard maps, in particular, for wind hazards (3/7).**

4 ONR Research Projects

Lancaster University presented progress on ONR research project ONR-RRR-079 an investigation into the application of multivariate hazard curves for external hazard contributions. This project will enable assessment of joint impact, rather than considering hazards in isolation. The approach enables development of bivariate hazard curves and inclusion of non-stationarity effects. The Expert Panel suggested the approach could be used to check climate model projections and uncertainties.

ONR research project ONR-RRR-115 will produce three technical reports on tipping points, compound flooding events, and model uncertainty.

- In relation to tipping points, four characteristics were highlighted: multiple stable states, abruptness, feedbacks and irreversibility. Tipping points exist in complex, dynamic systems. Rapid climate change has occurred in the past and could potentially occur in the future as a result of tipping points.
- Compound flooding events can occur as either a cluster (a single event with multiple peaks) or sequence (a series of discrete events occurring over a short period). Consideration of compound events is becoming increasingly important. Compound events may not occur at the same location but can still impact the same infrastructure (e.g. transmission network), such as through the cascade of failures. Sensitivity analysis of compound events should be considered, in addition to a single design basis event.
- With respect to model uncertainty it was highlighted that different climate models will produce a different climate response even when forced by an identical emissions scenario. Uncertainties are greatest at regional scales rather than at the global scale, especially for precipitation and extremes.

The Expert Panel expect draft research reports to be completed by end of April 2022 for ONR review. The reports will be published. Relevant information will be included in future updates of NS-TAST-GD-013.

ONR will consider organising a meeting between the Seismic Hazards and Meteorological and Coastal Flood hazards sub-panels to share learning on uncertainties in hazard analysis (4/7).

5 Closing Remarks

ONR thanked the participants and closed the meeting. Future meeting topics include:

No.	Topics for future meetings	Responsible
1 / 7	The Environment Agency and Expert Panel will engage in relation to reconciling the use of palaeoclimate data in models.	ONR/EP
2 / 7	The Environment Agency will provide an update on NCERM2 at a future meeting.	ONR
3 / 7	ONR requested a meeting to discuss hazard maps, in particular, for wind hazards	ONR
4 / 7	ONR will consider organising a meeting between the Seismic Hazards and Meteorological and Coastal Flood hazards sub-panels to share learning on uncertainties in hazard analysis	ONR