

# Wales Coastal Flooding Review: Project 2 Report – Recommendations 11 &12

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## Context

Following the coastal flooding of late December 2013 and early January 2014, the Minister for Natural Resources, asked Natural Resources Wales (NRW) to undertake a two stage Review into the coastal flooding events. The Minister requested that the Review be undertaken in collaboration with all Risk Management Authorities in Wales. Phase 2 of this Review identified 47 Recommendations for future progression and in January 2015 NRW published a Delivery Plan outlining a proposed way forward to address each Recommendation. The Minister directed NRW to collaboratively implement the Delivery Plan in 2015/16 with supporting funding made available.

Thirty of the Recommendations have been packaged into ten Projects to reflect common themes. The remaining seventeen Recommendations stand independently outside of these projects with individual leads for progression.

The 10 Projects and their broad technical themes are listed below:

Project 1 – Flood Forecasting and Coastal Design

**Project 2 – Flood Warning and Forecasting**

Project 3 – Community Resilience

Project 4 – Operational Response

Project 5 – Coastal Defences

Project 6 – National Coastal Defence Dataset and Inspection

Project 7 – Skills and Capacity Audit and Roles and Responsibilities

Project 8 – Review of Coastal Groups

Project 9 – Coastal Adaptation

Project 10 – Infrastructure Resilience

Recommendations 11 and 12 are inherently linked to the improvement of the Flood Warning Service, in particular the setting of Flood Warning Areas and flood warning thresholds, validation information from real storm events is required.

Recommendation 11 and 12 together form Project 2 – **Flood Warning and Forecasting**. This report summarises the work undertaken to complete Recommendations 11 and 12.

## Introducing the Recommendations

### **Recommendation 11**

*Develop and implement a prioritised programme of improvement works to Flood Warning Areas and thresholds, using the experience and data gathered from these storms. This should include engagement with Professional Partners and communities as appropriate.*

Recommendation 11 relates to the continual improvement of NRW's Flood Warning Service based on experience and evidence gathered from real storm events. NRW continually learn and, where appropriate, improve its Flood Warning Service following all flood events. This report will identify and describe the work NRW has carried out to improve its Flood Warning Service following the winter storms of 2013/14 and also work underway or planned to improve the service into the future.

### **Recommendation 12**

*Review and consider additional sources of validation information for future incidents. This has potential to improve confidence in both forecasting and warning. This may involve seeking feedback from Professional Partners and others.*

Recommendation 12 relates to gathering as much information as possible from a variety of sources to enable NRW to validate and ultimately improve the Flood Warning Service. This report will identify the validation data currently used and identify additional sources of validation data that could be collated during or after future storm events to further improve confidence in forecasting and warning.

## Methodology

To progress these Recommendations an internal NRW working group was created comprising a technical specialist from each of the three local Flood Incident Management teams (South West, South East and North Wales), representatives from the National Flood Forecasting team and NRW's Wales Coastal Flooding Review project team. The views of Professional Partners were sought through a questionnaire for both Recommendations and their views are summarised in the consultation section (page 6).

## Current Position

### Recommendation 11

This Recommendation relates to the continuous improvement of the Flood Warning Service. NRW uses its operational experience both from real events and from non-incidents use of the Flood Warning Service (e.g. from routine daily checks and model development work) to continually improve its Service.

Improvement works have been identified under Recommendation 11 under 2 categories: those that can be carried out immediately and those that will require further work and development. NRW has completed the improvements considered to be short term. There are some improvements, particularly in the South East Wales area, that require further modelling work and these Flood Warning Areas requiring further investigation are also detailed in Appendix 1. These are mainly within the Caldicot and Wentlooge Levels where NRW has reviewed the Flood Warning Areas and recognise that improvements are needed.

### Recommendation 12

The validation of the actual impacts against the forecast (predicted) impacts for any event is critical in assessing forecast performance and for identifying areas for improvement of our Flood Warning Service. The list below identifies the methods of validation that NRW currently use:

- Site observations during events.
- Site observations after events (e.g. wrack marks).
- Video recording.
- CCTV.
- All sources of media.
- Reports from Professional Partners.
- Reports from members of the public.
- Community engagement workshops (e.g. liaising with the public).
- Flood modelling.

In the production of this report the working group have also evaluated some of the validation methods the three local Flood Incident Management teams use and where applicable these methods will be used in future events to create a consistent Wales approach to validation process in NRW.

## Consultation with Professional Partners

### Recommendation 11

For Recommendation 11 the following questions were asked of our Professional Partners:

Question 1 – Do you have any concerns over the issue and receipt of Flood Warnings in your Coastal area, particularly whether they are being called under the appropriate conditions?

Question 2 - Are there any specific Coastal locations in your area which you think require further assessment in terms of deciding when a condition is exceeded for a warning to be issued?

Question 3 – What is the best way to communicate any changes made to the Coastal flood warning system, such as changing the criteria which trigger a flood warning?

The responses are summarised below:

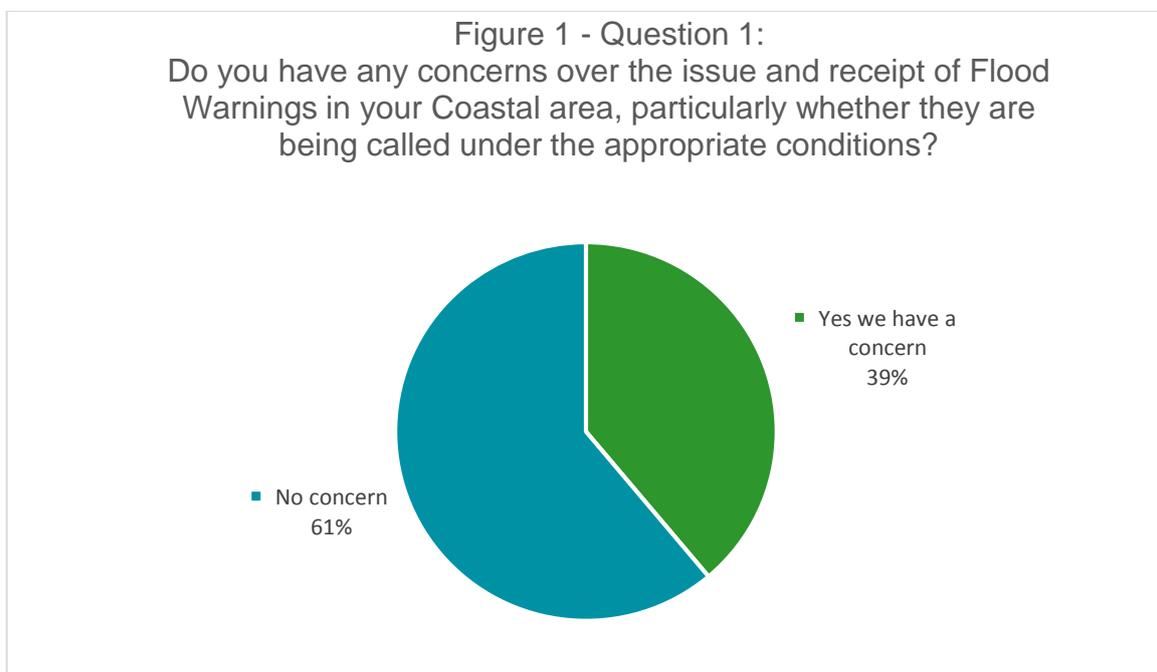


Figure 1 – Pie chart summarising Professional Partners responses to Question 1

As can be seen from Figure 1, 61% of the people questioned do not have concerns in relation to the issue and receipt of flood warnings, 39% of the people questioned stated that they did have concerns. This was from 18 responses.

Some of the concerns raised have already been resolved or are in the process of being resolved by NRW as they related to the size of the Flood Warning Areas (3 responses comments). The rest of concerns were around the tone and wording of the messages, as some of the responses thought the messages were a bit severe, especially when issued to defended areas (4 responses comments).

Around half of all the responses received stated that the warnings were issued in good time but questioned whether NRW should consider the timings of when the warnings are issued. Responses indicated that issuing Flood warnings in daytime hours gives greater benefits,

particularly in industrial areas where there may not be anyone around to respond outside of the standard working day.

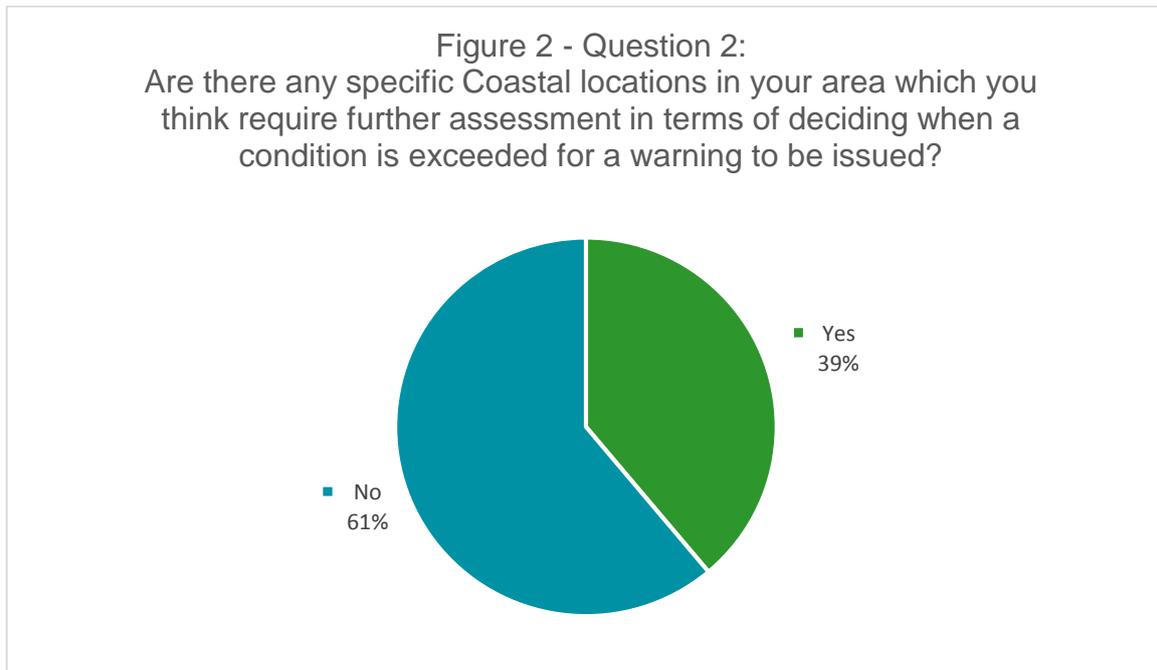


Figure 2 – Pie chart summarising Professional Partner responses to Question 2

Figure 2 shows that 39% of the responses to question 2 felt that there are specific locations within their areas that require further assessment. These are the same respondents that indicated they have a concern from question 1. NRW is now aware of these since the 2013/14 flooding and has either addressed them already or put plans in place to address them in the near future. 61% of the 18 responses stated that they have no specific locations that merit further assessment.

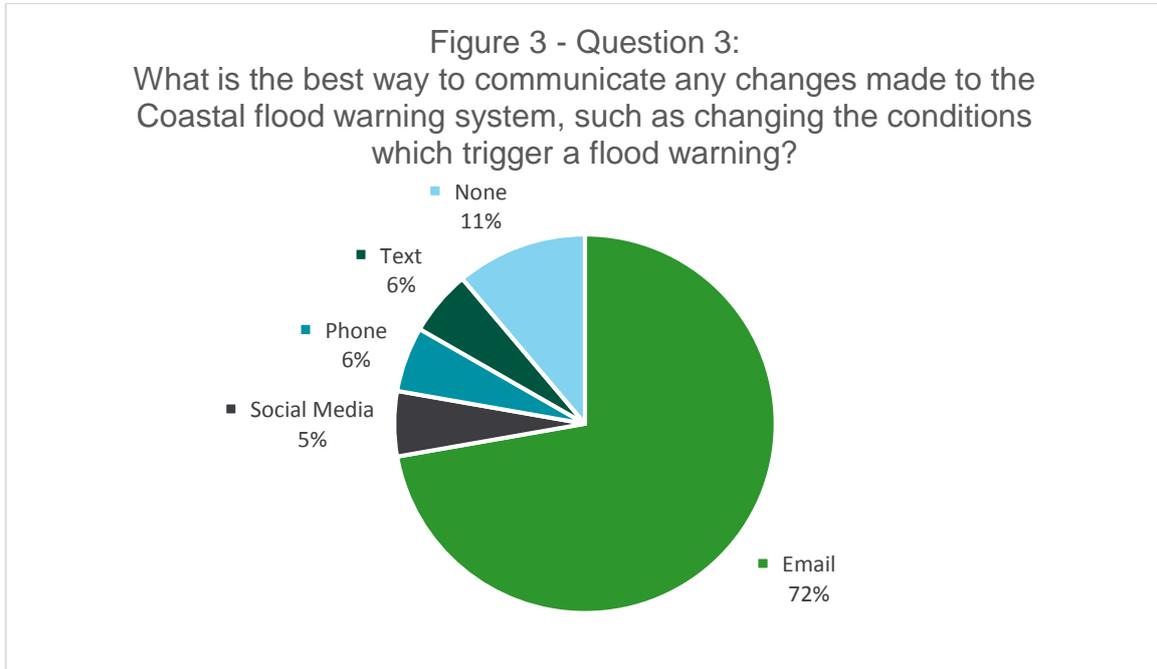


Figure 3 – Pie chart summarising Professional Partners responses to Question 3

Question 3 was asked due to the request from all parties that NRW communicates changes made to the flood warning system effectively and in good time. Figure 3 shows that of the 18 responses received, it was stated that any changes should be communicated via email using the same contacts as used for incident management. Other options put forward were social media, phone and texting. This confirms the need to inform our Professional Partners of changes to the flood warning system and do this by email in good time.

#### Summary of responses

All the responses received for Recommendation 11 identified some issues regarding the size of Flood Warning Areas, the wording, timing and tone used when issuing flood warnings, and the sharing of relevant changes to triggers and thresholds. Collectively the consultation responses reflect that the majority of Professional Partners would like to be made aware of any changes made by NRW via email in good time.

## Recommendation 12

For Recommendation 12, five questions were asked to our Professional Partners:

Question 1 – Does your Local Authority have any validation process in place and if so what do you do (please describe)?

Question 2 – Do you have any suggestions on extra sources of validation and ways to manage these?

Question 3 – Do you have any concerns / gaps in your area in regards to validation?

Question 4 – What triggers do you have in place to initiate your validation process?

Question 5 – What system do you have in place to manage the data plus who do you share this data with?

Responses received are summarised below:

For Question 1, 77% of the responses stated that there was no formal validation process in place for flood events, whilst 23 % of responses indicated that they do carry out site inspections following events and communicate to NRW on an *ad-hoc* basis.

For Question 2, from the responses received the only additional source of validation being used compared to the validation methods in operation by NRW, is the use of police drones for capturing event data.

For Question 3, half of the organisations undertaking validation have concerns in their areas regarding validation due to concerns in a) sharing of the data, and b) the resource demand in being able to validate events.

In response to Question 4, of the 23% of responders who undertake validation of data, the trigger for data collation is the receipt of flood warnings or reports of property flooding.

Question 5, responses indicate that there are a variety of systems in place across those who undertake validation efforts rather than one definitive, consistent system. Data is shared internally within each organisation but only a small amount of responses indicated that they have a process to share their data with NRW.

### Summary of responses

The consultation process for Recommendation 12 identified that there are no formal validation processes or mechanisms for the majority of Professional Partners. This appears to be driven by lack of resources and it not being perceived as a priority. This has identified gaps in knowledge of how to undertake validation with limited understanding of the benefits of validation. A pan-Wales approach to give a consistent approach to the process for validation is required to maximise the benefits from validation. This should be taken forward, however to make this a priority and find the resources with Professional Partners will be a challenge against other higher priorities.

## Conclusions

### Recommendation 11: improvement works to Flood Warning Areas and thresholds

NRW continually learns from flood events and uses lessons learnt to improve the Flood Warning Service. Such improvements include the development of new Flood Warning Areas, the refinement of existing Flood Warning Areas and improvements to flood warning thresholds and trigger levels. These improvements are undertaken in consultation with Professional Partners.

There are also some Flood Warning Areas that are under review following the tidal events of 2013/14 for which NRW are still awaiting modelling work to be finalised. These reviews will be carried out as soon as the information becomes available. Once these changes have been identified, we will consult with our Professional Partners to seek their support prior to progressing. NRW will then work with Professional Partners and RMAs to effectively communicate changes once implemented to relevant communities.

Appendix 1 lists the 40 flood warning areas that have been reviewed and changed following the 2013/14 winter.

Further improvements will be made – it is an area that will require continuous improvement (as resources and priorities allow).

### Recommendation 12: additional sources of validation information for future incidents.

Based on a review of the current data collation processes in place within NRW and the consultation responses from Professional Partners. It is concluded that NRW currently collate and utilise readily available sources of validation information. However, as technological advancements are made and new data collation techniques become available, further sources of data may become available. NRW need to be able to capture this new data to further improve its Flood Warning Service. Recent examples of new data methods include the use of drones to collect photographic data to evidence flood extents during and after a storm event.

As part of NRW's continued development we welcome all sources of evidence in regards to events. To help us improve our Flood Warning Service and our understanding of flood risk, during future flooding events we would encourage anyone to send any evidence of flooding to the following email addresses so that we have all the available information to support any decisions taken.

South East Wales – [flinese@cyfoethnaturiolcymru.gov.uk](mailto:flinese@cyfoethnaturiolcymru.gov.uk)  
South West Wales – [flinesw@cyfoethnaturiolcymru.gov.uk](mailto:flinesw@cyfoethnaturiolcymru.gov.uk)  
North - [flinen@cyfoethnaturiolcymru.gov.uk](mailto:flinen@cyfoethnaturiolcymru.gov.uk)

Receipt of additional information via the above avenues will supplement NRW's efforts and help progress towards a pan-Wales, consistent way of collecting validation data. This should be taken forward, however to make this a priority and find the resources with Professional Partners will be a challenge against other higher priorities. This will be down to Welsh Government to determine the priority and value of getting a pan Wales approach to validation to events



**Cyfoeth  
Naturiol  
Cymru  
Natural  
Resources  
Wales**

## **Appendix 1- Improvements carried out to the Flood Warning Service**

This Appendix 1 contains a list of all the reviews and changes that have been made to the Flood Warning Service by NRW following the Winter Storms of 2013/14. A total of 40 areas have been reviewed within Wales following these events and – not all the reviews concluded that changes were required.

### **North Wales**

#### **Northern Embankment**

**Flood Warning Threshold increased actioned 27 October 2014**

#### **Hawarden Embankment**

**Flood Warning Threshold increased actioned 27 October 2014**

#### **Greenfield to Bagillt**

**Flood Alert Threshold increased actioned 27 October 2014**

#### **Point of Ayr Area A**

**Flood Warning and Severe Flood Warning Thresholds increased**

#### **Point of Ayr Area B**

**Flood Alert and Flood Warning Thresholds increased**

#### **Prestatyn Area A**

**Flood Warning area extended to include a further 129 properties and renamed Prestatyn Beach Road**

#### **Prestatyn Area B**

**Flood Warning area reduced to remove 129 properties and renamed Prestatyn and East Rhyl**

#### **Rhyl Splash Point**

**A new Flood Warning area created following the December 2013 event.**

#### **Rhyl Area A**

**Flood Warning threshold increased.**

#### **Kimnel Bay Area A**

**Flood Warning area extended to include a further 195 properties**

**Kimnel Bay Area B**

Flood Warning area reduced as a result of Kimnel Bay Area A increasing.

**Llandulas**

Flood Warning threshold increased.

**Bangor**

Flood Warning threshold increased.

**Treaddur Bay**

Flood Warning threshold reduced.

**Dwyran**

Flood Warning threshold reduced.

**Y Felinheli**

Flood Warning threshold reduced.

**Gimblet Rock**

New Flood Warning Area introduced.

**Pwllhelli**

Flood Warning area split now two areas Pwllhelli and Gimblet Rock

**Barmouth**

Flood Warning area split, new names are “Barmouth Harbour and Hendre Mynach” and “Barmouth Hoel y Llan”.

**Fairbourne Area A**

Flood Warning area reduced in size.

**Fairbourne Area B**

Flood Warning area increased to include those excluded from Fairbourne Area A

## South West Wales

### Borth

New Flood Warning Triggers introduced based on Wales Coastal Model

### Baglan and Aberavon

New Flood Warning area introduced

### Llangennech

Triggers transferred to Wales Coastal Model

### Penclawdd

Flood Warning triggers increased.

### Llanelli

Flood Warning triggers increased.

### Pembrey

Flood Warning triggers increased.

### Ferryside

New Flood Warning triggers introduced.

### Carmarthen Bay Holiday Park

Flood Warning triggers amended.

### Carmarthen Bay Holiday Park

Flood Warning triggers amended.

## South East Wales

### Usk Estuary at Newport and Caerleon

Flood Warning area has now been split into eight smaller Flood Warning Areas, Usk Estuary at Maindee, North Liswerry and Spytty Pill, Usk Estuary at Uskmouth and Old Town Docks, Usk Estuary at Crindau and Malpas Road Area, Usk Estuary at Caerleon, Usk Estuary at St Julians, Usk Estuary at Pill, Usk Estuary at Riverside, Usk Estuary at South Liswerry

### Wye Estuary at Tintern

Reviewed, no changes required

### Wye Estuary at Chepstow

Reviewed, no changes required

### Coast at Aberthaw

Reviewed, no changes required

### Coast at Swanbridge and Barry

Reviewed, no changes required

### Coast at Penarth

Reviewed, no changes required

### Coast at Wentlooge Levels in the Newport Area

Flood warning thresholds need amending and area needs splitting up, awaiting a mapping study currently being undertaken to identify the new thresholds.

### Coast at Wentlooge Levels in the Cardiff Area

Flood warning thresholds need amending and area needs splitting up, awaiting a mapping study currently being undertaken to identify the new thresholds.

### Coast at the Caldicot Areas

Flood warning thresholds need amending and area needs splitting up, awaiting a mapping study currently being undertaken to identify the new thresholds.

### Tidal Rhymney at Industrial Area near Rumney Bridge inc Roath

New flood warning area introduced



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