Cyfoeth Naturiol Cymru
Natural Resources Wales

Wales Coastal Flooding Review: Delivery Plan for Phase 2 Recommendations

Closure Report
December 2017

Prepared by Natural Resources Wales
for Lesley Griffiths AM, Cabinet Secretary for Environment and Rural Affairs

Cyfoeth Naturiol Cymru
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Acknowledgement

This report is the final publication to be made under the Wales Coastal Flooding Review. This initiative commenced in January 2014 at the request of the Minister for Natural Resources in response to the December 2013 and January 2014 coastal storms in Wales. Its primary output has been the generation and implementation of 47 Recommendations to create a more resilient future coastal flood and erosion risk management service in Wales. This Closure Report captures progress made in the Review up to the end of August 2017.

Considerable resource, time and effort has been invested in delivering this Review over the past three years. We wish to recognise and acknowledge the contributions made by our Risk Management Authority colleagues, the Welsh Local Government Association, Welsh Government and other partners including infrastructure providers, utility operators and Local Resilience Fora, in informing our delivery of the Review. This voluntary input has been given alongside the demands of continuous flood and coastal erosion risk management activities to support communities in Wales.

Executive Summary

Following the flooding to the North Wales Coast on 5th December 2013 and the more widespread coastal storms of early January 2014, Natural Resources Wales, working with partners around Wales, completed a two stage Review as instructed by the Minister for Natural Resources. Phase 1 identified the impacts incurred during the storms and Phase 2 concluded with the identification of 47 individual Recommendations ('the Phase 2 Recommendations'). Natural Resources Wales then published a Delivery Plan in January 2015 that outlined how each of the Recommendations could be taken forward.

At the time of the Wales Coastal Flooding Review: Delivery Plan publication in January 2015, some notable progress had already been made on the Phase 2 Recommendations of April 2014, whereby:

- 5 were already complete.
- 35 were ongoing.
- 7 were yet to be commenced.

Consistent progress was achieved in implementing the Delivery Plan throughout 2015/16. By the end of August 2016 and out of the 47 Phase 2 Recommendations:

- 40 were complete.
- 7 were ongoing (with significant progress made since the 2013/14 winter).

As demonstrated within this Closure Report capturing progress to the end of August 2017 out of the 47 Phase 2 Recommendations:

- 42 are complete.
- 5 are ongoing (with significant progress made since the 2013/14 winter).

The following pages within this report provide a progress update on work undertaken between August 2016 and August 2017, demonstrating completion of a further 2 Recommendations and progress on the residual 5 Recommendations.

Out of the 42 completed Recommendations, tangible improvements are already benefitting the coastal flood and erosion risk management sector in Wales. Some of these have been listed within this report under the 'Progress made through the Wales Coastal Flooding Review' section. Realisation of the full benefits from all completed Recommendations will require further commitment and resources from all parties, including Welsh Government. There needs to be a sustained effort and continuous improvement to ensure that the intended outcomes are fully delivered.

At the end of August 2017, only the following five Recommendations remain as ongoing:

- Recommendation 5 (review guidance design of coastal standards and joint probability), is to be taken forward internally by Natural Resources Wales through integration of the outputs from the relevant England and Wales Flood and Coastal Erosion Risk Management (FCERM) Research and Development programme project alongside business as usual activities.
- Recommendation 19 (continue to develop potential 'impact scenario' assessments, maps and/or statements) will be delivered in the medium to long term through the continuous development of the Flood Incident Management service in Natural Resources Wales.
- Recommendation 31 (a national dataset for all flood risk assets, across all key organisations) will require continued collaboration between Welsh Government and all Risk Management Authorities in Wales to share and securely store asset data. This work is progressing well with the National Asset Database, but will require sustained effort to satisfy completion of this Recommendation.
- Recommendation 33 (developments in the national coastal modelling and mapping programme) will require ongoing efforts to ensure Natural Resources Wales prioritises its mapping and modelling work on a risk basis, using the Communities at Risk Register. It is important that a national approach is also responsive to local priorities, where appropriate. This area is subject to continuous developments.
- Recommendation 41 (development of local adaptation 'toolkit', to assist communities predicted to experience coastal change) will require further liaison with the Wales Coastal Group Forum and the Coastal Groups in Wales to support creation of a toolkit for local coastal adaptation.

Each of the above Recommendations have progressed considerably since their creation in April 2014. Together, Risk Management Authorities in Wales and relevant partners will continue to action these ongoing Recommendations through business as usual activities where best possible.

To conclude, the delivery and completion of 42 of the 47 Recommendations in three years has been a significant collective effort on the part of all Risk Management Authorities and partners in Wales. It is important that all partners continue to draw upon the learning experience of the Wales Coastal Flooding Review and its various benefits to support the practical delivery of a more resilient coastal flood and erosion risk management sector in Wales.

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Origin and Purpose

This Closure Report supplements the following five publications of the Wales Coastal Flooding Review initiative, produced at the request of the Minister for Natural Resources in response to the coastal flooding events in Wales of December 2013 and January 2014:

- *Wales Coastal Flooding Review, Phase 1 Report – Assessment of Impacts* ('the Phase 1 Report'), was submitted to Welsh Government on 31st January 2014 and published on 14th February 2014.
- *Wales Coastal Flooding Review, Phase 2 Report* ('the Phase 2 Report') submitted to Welsh Government on 28th April 2014 and published on 30th April 2014.
- *Wales Coastal Flooding Review, Delivery Plan for Phase 2 Recommendations (*'Delivery Plan' main report) was submitted to Welsh Government on 2nd December 2014 and published on 5th January 2015.
- *Wales Coastal Flooding Review, Delivery Plan for Phase 2 Recommendations, Supporting Documents (*'Delivery Plan Supporting Documents') was submitted to Welsh Government on 2nd December 2014 and published on 5th January 2015.
- *Wales Coastal Flooding Review, Delivery Plan for Phase 2 Recommendations, Progress Report August 2016* was submitted to Welsh Government on 29th September 2016 and published on 27th October 2016. This publication includes 10 additional Project Reports.

The above reports have been published on our website and can be found at: http://naturalresourceswales.gov.uk/evidence-and-data/research-and-reports/reports-evidence-and-data-on-flooding/?lang=en.

The Phase 2 Report of April 2014 generated 47 Recommendation across six priority themes identified below. The primary aim has been to progress implementation of the Recommendations over a three-year period to deliver a more resilient future coastal flood risk and erosion management service for Wales. By August 2016, 40 of the 47 Recommendations were complete.

Sustained investment in coastal flood and erosion risk management.

Improved information on coastal flood defence and erosion management systems.

Greater clarity of roles and responsibilities.

An assessment of skills and capacity of Risk Management Authorities.

More support to communities to help them become more self-sufficient and resilient.

Locally developed and delivered plans for coastal communities and infrastructure operators

This Closure Report follows on from the Progress Report of August 2016 (published in October 2016) by capturing progress made in implementing the remaining 7 ongoing Recommendations between August 2016 and the end of August 2017.

These 7 Recommendations are:

- Recommendation 5 – *Review and update if required, the guidance used for the assessment and design of coastal standard of service against flooding. The review should consider whether more clarification is needed, in particular on the issues of the treatment of joint probabilities, in combination effects and appropriate national consistency.*
- Recommendation 6 – *Continue to identify and implement risk based opportunities to deliver further improvements to longer range forecasts.*
- Recommendation 8 – *Continue to progress risk based opportunities to deliver improvements to the accuracy of the coastal forecasting service. Develop and deliver a programme of improvement works.*
- Recommendation 19 – *Continue to develop potential 'impact scenario' assessments, maps and/or statements. This work must be developed in close discussion with professional partners to ensure it meets all parties' requirements*.
- Recommendation 31 – *Produce a complete national dataset of coastal protection and defence assets including details of areas benefitting. It is essential that this dataset becomes a 'live management tool' and not merely a representative picture of a snapshot in time. This dataset must therefore be associated with a process for ensuring the information is maintained.*
- Recommendation 33 – *Continue to develop a nationally prioritised programme of coastal modelling and mapping improvements. This must be nationally risk based and consistent.*
- Recommendation 41 - *Welsh Government should endorse the strategic framework established by the Shoreline Management Plans (SMP2). This should be accompanied by more national and local support to communities and community involvement in the development of local adaptation options and plans.*
  Develop a 'local adaptation toolkit' to better support communities. This may include technical guidance, templates, and engagement and communication tools and policy positions.
  Local discussions in all coastal communities need to begin now, involving professional partners and the community. These discussions should consider communities on a risk basis. These discussions need to explore and develop local plans to adapt and increase resilience over time.
  Support and draw upon the experience of the Fairbourne multi-agency group to help inform adaptation and community resilience discussions at other locations.

Progress made through the Wales Coastal Flooding Review

The scale of work delivered in the three years of the Wales Coastal Flooding Review has been considerable, especially when considering it has been undertaken in addition to ongoing pressures of additional storms (e.g. December 2015) and financial constraints within the public sector.

Since the December 2013 and January 2014 coastal storms, the following tangible successes have been achieved as either a direct result of, or by association to, the 47 Recommendations from the Wales Coastal Flooding Review:

- Four Shoreline Management Plans were reviewed by Welsh Government and the Welsh Minister confirmed that they were satisfied with the plans (North Wales and North West England, South Wales, West of Wales and Severn Estuary) by early December 2014.
- Rebranding of the flood warning service in Wales, so the provider is clearly identified as Natural Resources Wales.
- A permanent offshore waverider buoy has been deployed off the West Pembrokeshire coast to help improve flood forecasting.
- Improvements to Flood Forecasting, with 5 day forecast information now available to local Natural Resources Wales officers.
- Completion and publication of the assessment of environmental change experienced during the December 2013 and January 2014 storms (Duigan C, Rimington N & Howe M (Eds) 2014. *Welsh Coastal Storms, December 2013 & January 2014 – an assessment of environmental change*, NRW Evidence Report, Recommendation 36).
- National Sciencewise Research & Development programme research carried out into the way Natural Resources Wales communicates flood messages to the public.
- A review of the extreme sea level dataset was undertaken by the National Oceanography Centre for Natural Resources Wales, using the UK Coastal Monitoring & Forecasting partnership, and concluded that the inclusion of the more recent peak sea level data does not make a statistically significant difference to the design sea level estimates around Wales.
- On-going engagement with the joint Wales and England Flood and Coastal Erosion Risk Management (FCERM) Research and Development programme working with UK partners to consider joint probability analysis.
- Improvements made through supplying more local, longer-range information within flood forecasts to professional partners as and when required.
- 40 of the flood warning thresholds and flood warning areas have been revised following the December 2013 and January 2014 coastal storms.

- Continued work on the Flood Awareness Wales Programme has increased registrations of at-risk members of the public to Flood Warnings Direct, with 1139 full registrations between January 2015 and January 2017.
- Continued work developing community flood plans through Flood Awareness Wales has resulted in 1002 plans across Wales, (all kinds of plans including Communities, Businesses, Schools etc.) supported locally by 302 flood volunteers.
- Completion of an Independent review of the Flood Awareness Wales community engagement programme which provides insights into delivery improvements.
- Publishing of a Research and Development project which explores the value of engaging young people in flood risk management to achieve sustainable community resilience.
- NRW Flood Incident Management teams have delivered a training programme to improve staff confidence in their role in the decision-making process for issuing a Severe Flood Warning.
- 'Exercise Megacyma Cymru', being the national coastal evacuation exercise, was held in March 2015 to test capabilities and resources in dealing with a large-scale flooding event in Wales.
- In Rhyl stop logs at stairwell openings have been replaced by pre-cast concrete walls and steel flood gates, and a topographic survey of Rhyl Golf Course has been completed. A Project Appraisal Report for a future East Rhyl Coast Protection Scheme has been produced for determination by Welsh Government.
- Development of arrangements and identification of potential coastal risk management schemes for a £150 million capital value investment ('the Coastal Risk Management Programme') co-funded by Welsh Government and Local Authorities through a Local Government borrowing initiative with project development and construction funding between now and 2022.
- Additional funding for 2016/17 was secured for coastal local authorities to undertake business case development in preparation for the Coastal Risk Management Programme.
- Natural Resources Wales has updated the North Wales tidal defence survey which now offers valuable data to inform a future national dataset of coastal protection and defence assets.
- Completion of a national skills and capacity audit for all Risk Management Authorities to assess and quantify the scale of the issue plus to assess the size of the skills and capacity gap.

- A programme of coastal risk management training courses was delivered to 90 members of staff from across RMAs, the Welsh Local Government Association and Welsh Government.
- Progress has continued within the Fairbourne: Moving Forward project, with publication of the project's first two Annual Reports in 2015 and 2016. Welsh Government has appointed a researcher to work alongside the project through to 2018, with first interim lessons learnt published in 2016.
- The National Trust published their '*Shifting Shores – playing our part at the coast*' in November 2015 that captures progress made in the ten years since their original 'Shifting Shores' publication and identified the opportunities and challenges facing delivery of coastal adaptation.
- In December 2015, the joint Wales and England Flood and Coastal Erosion Risk Management (FCERM) Research and Development programme published a report entitled '*Adapting to Coastal Erosion: Evaluation of rollback and leaseback schemes in Coastal Change Pathfinder projects*'.
- A four-year capital budget is now in place for the FCERM programme and Welsh Government are developing a long term (5 year) pipeline of schemes which will be prioritised on a national basis.
- Development of a national investment programme using Communities at Risk Register as a tool to help prioritise areas of investment in Wales.
- Initial development of a National Asset Database using AMX software has been undertaken. The database currently contains asset information from NRW and most Local Authorities. It is currently viewable by a limited internal NRW audience, prior to completion and use as a 'live tool' by all Risk Management Authorities.
- The amalgamation of the Development Advice Map (DAM) for planning with Natural Resources Wales' Flood Risk Map to provide a consistent source of information for public and planners which is updated simultaneously on a three-month cycle.

Recommendations: Completion status and progress

At the time of the Wales Coastal Flooding Review: Delivery Plan publication in January 2015, some notable progress had already been made on the Phase 2 Recommendations of April 2014, whereby:

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The following pages provide a progress update on work undertaken between August 2016 and August 2017. This demonstrates completion of a further 2 Recommendations and progress on the residual 5 Recommendations.

Recommendation 5 – Storm Severity

Rec 5: Review and update if required, the guidance used for the assessment and design of coastal standard of service against flooding. The review should consider whether more clarification is needed, in particular on the issues of the treatment of joint probabilities, in combination effects and appropriate national consistency.	
Recommendation Lead:	Natural Resources Wales
Project Reference:	Project 1
Completion Date:	Ongoing

Summary of Recommendation Implementation

There is a close dependency with Recommendation 3 which states:

“Further work is required to assess the joint probability of wind, waves and tides for these recent winter storms. This may take the form of an initial assessment coupled with consideration of more thorough analysis. The scope of this work will require further technical discussion.”

Following the initial assessment of the joint probability of wind, waves and tides for the 2013/2014 storms and the subsequent analysis of joint probability carried out for the Rhyl flood risk management scheme, Recommendation 3 concluded that further specialist work is required to review and update standard methods of joint probability analysis and best practice guidance.

As stated in the summary report for Recommendation 3, we believe this is best achieved by working at a UK level, because of the need to establish best practice which RMAs and their consultants can use across England and Wales, in a similar vein to the approach taken for fluvial flood frequency (where the Flood Estimation Handbook has become established as the UK wide industry standard).

We also share coastal waters with England (Liverpool Bay and Severn Estuary) so consistency becomes an issue for assessment of storm severity and joint probability in these locations.

To begin to take this forward, NRW have engaged through the Defra-Welsh Government Flood and Coastal Erosion Risk Management Joint Research Development (R&D) Programme with two projects which are developing new techniques related to joint probability assessment:

- Planning scenarios for FCRM and the National Risk Assessment (H21 widespread inland flooding) Capturing the true spatial nature and joint probability of flood risk across all sources.
- Defra National Risk Assessment H19 extreme coastal flooding.

NRW understand that both these projects are due to publish their final reports in late autumn 2017. The exact timetable is still to be confirmed by Defra and the Environment Agency (who between them have led both projects).

Recommendation 5 – Storm Severity

The reports will include a science summary, methods chapter, a new Multi-Event Modeller (MEM) tool and a supporting guidance document. The tool will incorporate new techniques related to joint probability assessment which have been developed as part of these projects and so will be of potential use for coastal practitioners carrying out scheme design and modelling project in Wales.

We also understand that the publication of the R&D reports will be supported by practitioner workshops for those specialists who might use the new tool. NRW has been invited to send delegates from Wales to attend these workshops, although the scope and therefore attendance is still to be confirmed.

Once these R&D projects are complete with the reports published and the practitioner workshops delivered, we will review what, if any, further work is required to take forward the R&D outputs in order to deliver the Recommendation.

Recommendation 6 – Flood Forecasting

Rec 6: Continue to identify and implement risk based opportunities to deliver further improvements to longer range forecasts.

Recommendation Lead:	Natural Resources Wales
Project Reference:	Project 1
Completion Date:	January 2017

Summary of Recommendation Implementation

Natural Resources Wales continually aim to improve longer range forecasts to enable earlier discussions around the scale, impacts and location of coastal flood events. Early, shared understanding of coastal flood risk increases the quality and coordination of risk management responses. Improvements of this nature usually require collaborative working with the Met Office and the utilisation of emerging science. To facilitate this, Natural Resources Wales continue to be an active partner in the United Kingdom Coastal Flood Forecasting (UKCFF) partnership. This partnership provides the strategic overview of the current and future needs of those who provide coastal warnings. Natural Resources Wales contribute to, propose, and lead UKCFF work.

During the period covered by this Review, Natural Resources Wales' long range coastal forecasting capability has been improved by:

- Ongoing collaborative working with the Met Office and Environment Agency to better align data feeds and improve discussion of forecasts;
- Reviewing the potential benefit of wave ensemble forecasts in providing improved long range forecasting ability;
- Extending wind wave data usage and site specific forecasting from 48 to 120 hours;
- Implementing surge ensemble forecasts to give greater understanding of uncertainty in the current forecast and the potential for events in the 48 to 120-hour lead time period.

Natural Resources Wales will continue to utilise emerging technological advances, with the following improvements planned for 2017 / 2018:

- Adopting a replacement for the operational surge model. The Met Office and the National Oceanography Centre (NOC) have developed a replacement model that they believe to be comparable to the current model for UK flood forecasting purposes. The current model has limited users beyond UKCFF and no active research community. The methodology underpinning the proposed replacement is used far more widely and benefits from active ongoing research and enhancements. Because of this, migration is seen as an important first step in ensuring we can continue to utilise emerging science and best practice to enable

future improvements to the accuracy and resolution of our operational surge forecasts.

- Natural Resources Wales have instigated a project to rigorously evaluate the performance of the updated operational surge model for Welsh forecast locations in the Bristol Channel; an area in which the current operational surge model struggles to consistently forecast the surge accurately.

Natural Resources Wales intends to use the increased processing capability of its recently implemented forecasting system to improve its utilisation of Met Office ensemble data. Surge and wave ensemble inputs will be used to produce full ensemble, site specific forecasts. These will provide greater understanding of the range of conditions possible at approximately 80 locations around Wales. The impact of the uncertainties that differentiate the ensemble outputs is greatest at longer timescales. Because of this, these developments will allow forecasts to better inform discussions of the possible scales, of potential events in the 48 to 120-hour lead time period.

Recommendation 8 – Flood Forecasting

Rec 8: Continue to progress risk based opportunities to deliver improvements to the accuracy of the coastal forecasting service. Develop and deliver a programme of improvement works.	
Recommendation Lead:	Natural Resources Wales
Project Reference:	Project 1
Completion Date:	January 2017

Summary of Recommendation Implementation

Natural Resources Wales continually aim to improve the accuracy of the coastal forecasting service. Improvements to the accuracy of the coastal forecasting service directly influence the coastal flood warning service, leading to more effective action in the lead up to coastal flood events.

During the period covered by this review, Natural Resources Wales' coastal forecasting accuracy has been improved by:

- Utilising improvements in meteorological forecast data available to Natural Resources Wales upon which site specific forecasts are based.
- Continuing to improve Natural Resources Wales' site specific coastal flood forecasting modelling capabilities by:
  - Migrating coastal forecast locations to an improved coastal model. Approximately 40 locations have been configured, utilising wave transformation and wave overtopping science, and making use of the latest meteorological forecasting models;
  - Recalibrating the forecast model at locations where observation data suggests performance could be improved.
- Improving the understanding of strengths and limitations of current coastal forecasting techniques. Whilst Natural Resources Wales utilises the latest coastal flood forecasting modelling methods, this is still an emerging science. By delivering in-house training to duty officers on the nuances and assumptions of coastal flood modelling, the forecasting service benefits from detailed interpretation of the model outputs.

Future developments are likely to include:

- Adopting the replacement operational surge model developed by the Met. Office and the National Oceanography Centre. In time, future developments of this model will likely result in increased resolution and accuracy. The accuracy of the site-specific forecasting service is dependent in part upon the accuracy of the operational surge model.
- Taking advantage of the increased processing capability of the recently implemented forecasting system to enable site specific ensemble forecasts.

These will show the range of possible conditions that may result from uncertainties in meteorological conditions in addition to the current deterministic forecast.

- Continuing, where possible, to capture site observations and use them to; verify the model output, better understand model performance, and, where necessary recalibrate the forecast model.
- Continuing to incorporate advancements in the science of coastal forecasting into the service. For example, the EuroTop neural network upon which site specific wave overtopping forecasts are based is currently being updated. Once the revised network is available it will be reviewed and incorporated into the forecasting model if appropriate.

Recommendation 19 – Operational Response

Rec 19: Continue to develop potential 'impact scenario' assessments, maps and/or statements. This work must be developed in close discussion with professional partners to ensure it meets all parties' requirements.	
Recommendation Lead:	Natural Resources Wales
Project Reference:	Project 4
Completion Date:	Ongoing

Summary of Recommendation Implementation

Further to the August 2016 Progress Report, this Recommendation remains a challenge to progress through to completion due to other more pressing business priorities. These have included establishing new underpinning flood risk IT systems and products for our new organisation and a wider corporate change programme to ensure NRW can meet the demands of a new funding regime and target operating model in 2020.

Against these priorities, this Recommendation has not been a priority for delivery as we do have existing flood mapping products and locally tailored information to support impact assessment during an incident. However, we recognise there is a need to establish a common specification across Wales for flood impact scenarios and maps for use during a flood incident at national and local levels, including by Local Resilience Fora. This is part of our continuous improvement to our services.

The scope of the work to meet this Recommendation needs to be considered within NRW's future mapping and modelling programme, once we have developed a specification for the impact scenarios and maps which meets the needs of NRW and all Local Resilience Fora across Wales. The potential merits of impact scenario maps and supporting statements will need to be evaluated, so we can determine what the options are based on our modelling capabilities and available resource to deliver it. We will then engage and consult externally with Welsh Government, the Wales Flood Group and Local Resilience Fora, the latter being the main end users of these products.

This Recommendation is currently planned to be completed in the medium to long term.

Recommendation 31 – Coastal Defences

Rec 31: Produce a complete national dataset of coastal protection and defence assets including details of areas benefitting. **It is essential that this dataset becomes a 'live management tool' and not merely a representative picture of a snapshot in time. This dataset must therefore be associated with a process for ensuring the information is maintained.**	
Recommendation Lead:	Natural Resources Wales
Project Reference:	Project 6
Completion Date:	Ongoing

Summary of Recommendation Implementation

The August 2016 Progress Report noted that in July 2016 a letter was issued by the Cabinet Secretary for Environment and Rural Affairs, Lesley Griffiths AM, to all Risk Management Authorities laying out the reasons and plans for creating a National Asset Database of flood risk assets in Wales.

A range of possible options were identified through the Wales Coastal Flooding Review's Delivery Plan, with each having their respective benefits and drawbacks. It was felt on balance that storing the information centrally on the Natural Resources Wales (NRW) asset management system (AMX) offered the best way forward in achieving the objective of creating a consistent asset database for Wales.

Good progress has been made since the issue of the ministerial letter in July 2016 up to August 2017:

- Consultation and agreement between NRW, the Welsh Local Government Association and Welsh Government on the asset data requirements and what is achievable.
- Between January and mid-March 2017, all Local Authorities (LA) were asked to populate the template created specifically for capturing the information on their key flood risk assets.
- AMX system enhancements have been delivered to allow for importation of data.
- 20 of 22 LA templates have been received, with 19 having now being imported into AMX.
- Data received by NRW has since been quality assured. This has flagged that some mandatory fields are missing key information and needs further work.

Future plans and timescales

One of the key requirements of the National Asset Database is that the information needs to be kept up-to-date as a "*live management tool*".

To keep the asset information as accurate as possible, a method and timeline will need to be developed. This will need to set out a risk based approach to balance out the need to

update the information without overburdening RMAs with frequent requests for new information.

The next phase of the project will seek to address two main elements:

- Populate the remaining mandatory fields with the focus being on those with relatively low completion rates. The plan is to get feedback from RMAs as to the reasons for not completing the fields and to put in place tools and resources to help you complete these elements.
- To update the current asset information where required including adding or removing assets and inputting the latest inspections records.

Future phases of AMX are looking to improve and increase the availability of the AMX system. This will mean that the system will be made available via the web rather than through desktop machines as is the case at present. We hope in the longer term that updates will be able to be made directly by all RMAs. While this phase of AMX development takes place, it is likely that the same, or similar, data capture template will be used as in the first exercise. A proposed timetable for the next phase is below:

Task	Timeline
Planning (*feedback from initial exercise, development of tools to assist data population)*	Sep 2017 – Dec 2017
Data collection by RMAs	Jan 2018 - Mar 2018
Checking and import of submissions to AMX	April 2018 – Jun 2018

Welsh Government are inviting Local Authorities to apply for additional funding to support asset data collection and inspection work where needed.

This Recommendation is still classed as ongoing due to not currently meeting all of the Recommendation's definition. Currently the national database contains asset information from NRW and 19 of the 22 Local Authorities and is visible to only a limited internal audience at NRW for development purposes. To complete the Recommendation the future phases outlined above need to be actioned.

Recommendation 33 – Coastal Defences

Rec 33: Continue to develop a nationally prioritised programme of coastal modelling and mapping improvements. This must be nationally risk based and consistent.	
Recommendation Lead:	Natural Resources Wales
Project Reference:	Outside of Projects
Completion Date:	Ongoing

Summary of Recommendation Implementation

Natural Resources Wales prioritises its mapping and modelling work on a risk basis, using the Communities at Risk Register. This is a risk-based and prioritised approach. It is important that a national approach is also responsive to local priorities, where appropriate. This area is subject to continuous development.

Natural Resources Wales will continue to use the Communities at Risk Register to help to prioritise work packages. The below plan has been developed to model the areas at greatest coastal risk as follows:

- 2016: Caldicot and Wentlooge – completed
- 2016/17: Point of Ayr to Rhyl – completed
- 2017/18: Kinmel Bay to Abergele
- 2018/19: Rhos on Sea to Llandudno, and Conwy
- 2019/20: Fairbourne and Barmouth

These detailed models will provide improved information on impacts across a range of storm severities and future climate change scenarios.

In addition, the coastal fluvial and surface water, components of the national model are being revised as part of the National Flood Risk Assessment during 2017/18. This will help to guide future versions of the Communities at Risk Register and considers risk from all sources.

Recommendation 41 – Coastal Defences

Rec 41: Welsh Government should endorse the strategic framework established by the Shoreline Management Plans (SMP2). This should be accompanied by more national and local support to communities and community involvement in the development of local adaptation options and plans.

Develop a 'local adaptation toolkit' to better support communities. This may include technical guidance, templates, and engagement and communication tools and policy positions.

Local discussions in all coastal communities need to begin now, involving professional partners and the community. These discussions should consider communities on a risk basis. These discussions need to explore and develop local plans to adapt and increase resilience over time.

Support and draw upon the experience of the Fairbourne multi-agency group to help inform adaptation and community resilience discussions at other locations.

Recommendation Lead:	Welsh Government (sign off SMPs), Risk Management Authorities (for guidance)
Project Reference:	Project 9
Completion Date:	Ongoing

Summary of Recommendation Implementation

Delivery and communication of SMP2s needs to be done at a local level, understanding local issues and needs and involving local communities. Current examples of where work is underway include that of Bridgend County Borough Council at Newton, Pembrokeshire County Council at Newgale and Gwynedd Council at Fairbourne. Some of these projects are being taken forward via the Coastal Risk Management Programme, the supporting studies for which include insight from public consultation and therefore within the next year may provide useful lessons to inform a local adaptation toolkit.

Regarding Fairbourne, the 'Fairbourne Moving Forward' project published their Annual Report for 2015/16 (year 2) in late 2016. The project is researching a Master Plan to be completed by March 2018 to implement the SMP2 policy. A new Technical Group has been created beneath the Project Board to focus on improving understanding of the present and future risks facing the community. Over time, outputs from this Technical Group will directly inform design of the Master Plan for considering local community adaptation.

The Welsh Government appointed JBA Consulting Ltd to undertake work on lessons learnt at Fairbourne. This project will feed into further research into coastal adaptation in Wales. This research project will focus on learning from and about community and stakeholder engagement approaches. There are two key strands to the work; reviewing and drawing out lessons from activities to date and more formative action-focussed learning as agencies and the community continue the process of working together to address the issues raised by the SMP2.

Initial research findings of November 2016 are found at: http://gov.wales/topics/environmentcountryside/epq/flooding/studies/fairbourne-research/?lang=en.

The outcome of this research will help inform production of a 'local adaptation toolkit' to better support communities and the practical delivery of coastal adaptation on the ground. This should be prepared and led by the Coastal Groups, with support from Natural Resources Wales, the Welsh Local Government Association and Welsh Government. For this reason, Recommendation 41 remains ongoing.

Closure of the Wales Coastal Flooding Review

There is value in quoting from the Wales Coastal Flooding Review: Delivery Plan as a reminder of the aspirations behind the Review:

'The current flood risk management service in Wales is multi-faceted and in parts complex. Although collectively the Risk Management Authorities (RMAs) performed well during the winter storms of 2013/14, there are challenges and opportunities across all aspects of the service and a collective response, sustained over time, is required to enable Wales to become more resilient to coastal flooding. There is no simple or quick fix solution. These challenges and opportunities are reflected by the scope and scale of the 47 Phase 2 Recommendations.

The Recommendations are a positive reflection of the ambition and aspiration of Welsh Government and the coastal risk management partners in Wales. They set out a shared framework of practical activities, which over time will deliver increased resilience to communities at risk from coastal flooding and/or coastal erosion in Wales.'

The Wales Coastal Flooding Review initiative has achieved considerable success in promoting collaborative working between RMAs in Wales and in generating numerous publications as listed earlier on page 8. Through completion of 42 of the Review's 47 Recommendations, Risk Management Authorities in Wales, together with partners, have all taken a step forward in enhancing their capability to deliver a more resilient coastal flood and erosion risk management service to the communities of Wales.

In accordance with Recommendation 2 of the Wales Coastal Flooding Review, where appropriate in the delivery of a Recommendation we have extended its focus from the coast to consider other sources of flooding. This has brought about a broader range of benefits to the sector. Collectively we cannot be complacent however, as we need to be as ready as we can be to support communities at risk on the coast or inland in Wales whenever the next storm event occurs.

Whilst the majority of Recommendations stand complete, we recognise that several were to 'review and investigate' by nature and therefore the need for continuous improvement within the coastal flood and erosion risk management sector remains. Progress on the ongoing 5 Recommendations will need continued effort, and in some cases (e.g. Recommendation 19 – impact maps) it is dependent on decisions on business priorities.

In closing this report, it is valuable to refer back to the six priority themes around which the 47 Recommendations were created. These themes, shown below, have been consistent throughout the past three years of delivering the Wales Coastal Flooding Review. The themes remain pertinent today and it is argued that they could be a useful framework for Welsh Government when undertaking their first review of their National Flood and Coastal Erosion Risk Management Strategy during 2017/18. They are also a valuable framework for all Risk Management Authorities.

Sustained investment in coastal flood and erosion risk management.

Improved information on coastal flood defence and erosion management systems.

Greater clarity of roles and responsibilities.

An assessment of skills and capacity of Risk Management Authorities.

More support to communities to help them become more self-sufficient and resilient.

Locally developed and delivered plans for coastal communities and infrastructure operators

Finally, it is clear that the delivery of the Recommendations in the Wales Coastal Flooding Review has been a significant collective effort on the part of all Risk Management Authorities and partners. It is important that all partners continue to draw upon the learning experience of the Wales Coastal Flooding Review and its various benefits to support the practical delivery of a more resilient coastal flood and erosion risk management sector in Wales. Indeed, such learning can be applied to benefit future activities across the whole of the flood risk management sector in Wales. This is on ongoing task, and one that will never be truly complete – there is always room for improvement.

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