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First Flood Risk Management Plans - Member State: Germany

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REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the implementation of the Water Framework Directive (200/60/EC) and the Floods Directive (2007/60/EC)
Second River Basin Management Plans
First Flood Risk Management Plans

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Acronyms

APSFR	Areas of Potential Significant Flood Risk
CBA	Cost-Benefit Analysis
EEA	European Environment Agency
FD	Floods Directive
FHRM	Flood Hazard and Risk Map
FRMP	Flood Risk Management Plan
NGO	Non-Governmental Organisation
NWRM	Natural Water Retention Measures
PFRA	Preliminary Flood Risk Assessments
PoM	Programme of Measures
RBD	River Basin District
RBMP	River Basin Management Plan
SEA	Strategic Environmental Assessment
UoM	Unit of Management
WFD	Water Framework Directive
WISE	Water Information System for Europe

Introduction

The Floods Directive (FD) (2007/60/EC) requires each Member State to assess its territory for significant risk from flooding, to map the flood extent, identify the potential adverse consequences of future floods for human health, the environment, cultural heritage and economic activity in these areas, and to take adequate and coordinated measures to reduce this flood risk. By the end of 2011, Member States were to prepare Preliminary Flood Risk Assessments (PFRAs) to identify the river basins and coastal areas at risk of flooding (Areas of Potential Significant Flood Risk – APSFRs). By the end of 2013, Flood Hazard & Risk Maps (FHRMs) were to be drawn up for such areas. On this basis, Member States were to prepare Flood Risk Management Plans (FRMPs) by the end of 2015.

This report assesses the FRMPs for Germany (DE)[1]. Its structure follows a common assessment template used for all Member States. The report draws on two main sources:

- Member State reporting to the European Commission on the FRMPs[2] as per Articles 7 and 15 of the FD: this reporting provides an overview of the plans and details on their measures.
- Selected FRMPs: due to the high number of FRMPs, 51, prepared in Germany, the assessment has focused on five plans, chosen to cover a broad range of methodological approaches, different Units of Management (UoMs), a good range of flood risk conditions, and plans prepared at both UoM and Federal State level. The following FRMPs were reviewed:
    - FRMPs at the UoM level: Elbe (DE5000), Weser (DE4000), and Schlei Trave (DE9610);
    - FRMPs at the Federal State, i.e. at the "Land" level, as opposed to the "Bund" (Federal) level: Rhine (North Rhine-Westphalia, NRW), DE2000) and Danube (Bavaria, DE1000).

[1] The present Member State reports reflect the situation as reported by each Member State to the Commission in 2016 or 2017 and with reference to FRMPs prepared earlier. The situation in the Member States may have altered since then.

[2] Referred to as "Reporting Sheets" throughout this report. Data must be reported in a clear and consistent way by all Member States. The format for reporting was jointly elaborated by the Member States and the Commission as part of a collaborative process called the "Common Implementation Strategy": http://ec.europa.eu/environment/water/water-framework/objectives/implementation_en.htm
Whereas a key role of the Commission is to check compliance with EU legislation, the Commission also seeks information to allow it to determine whether existing policies are adequate. It also requires certain information to create a European-wide picture to inform the public.

Overview

Figure 1 Map of Units of Management/River Basin Districts



International River Basin Districts (within European Union)
International River Basin Districts (outside European Union)
National River Basin Districts (within European Union)
Countries (outside European Union)
Coastal Waters

Source: WISE, Eurostat (country borders) as presented in the 2012 RBMP assessment reports

Germany has 10 UoMs, which correspond to the River Basin Districts (RBDs) under the Water Framework Directive (WFD). Within these UoMs, in total 841 APSFRs have been assigned as

shown in the next table. The delineation of the APSFRs, originally submitted in 2012, has been updated in 2015 (for details see section 2).

In Germany, there is a mix of situations and FRMPs have been developed at UoM/RBD level or at sublevel. Plans are developed on the UoM/RBD level (called the B-Level in Germany's system) and the Länder or Federal State level (for sub-catchments within UoMs – this is called the C-level). Germany also contributes to the international plans of River Commissions (A-level), and all of these plans on the international level have been reported to WISE by Germany as background documents[3]. (See Annex A1 for an overview of Germany's FRMPs.)

LAWA[4], the National working group on water issues, has prepared several non-binding guidelines for the FRMPs, which should guide the development of plans with the aim to have a minimum common approach in all the various plans.

An overview of the legal status of each FRMP was not found[5].

Given the considerable number of FRMPs prepared by Germany, the following five FRMPs have been assessed: Elbe (DE5000), Weser (DE4000), Rhine (NRW) (DE2000), Schlei Trave (DE9610) and Danube (Bavaria) (DE1000). This choice captures a good spread of flood risk conditions and approaches. Three of these FRMPs are at UoM level – Elbe, Weser and Schlei Trave – and the other two are at Federal State level.

The table below gives an overview of all UoMs in Germany, including the UoM code, the name, and the number of APSFRs reported. It also shows if the UoM reported documents to EEA WISE[6] – the FRMP as a PDF and the reporting sheet as an XML. The assessment, however, identified a total of 51 FRMPs covering the territory of Germany across the different levels, and it appears that only 31 were reported (see section 1 for details).

Table 1 Overview of UoMs in Germany

UoM	Name	Number of APSFRs	XML Reported	PDF Reported
DE1000	Danube	77	Yes	Yes
DE2000	Rhine	345	Yes	Yes*
DE3000	Ems	5	Yes	Yes*
DE4000	Weser	74	Yes	Yes*

[3] See http://www.wasserblick.net/servlet/is/148748/
[4] See: http://www.lawa.de/About-LAWA.html
[5] Germany subsequently remarked that FRMPs are binding for the competent authorities.
[6] http://rod.eionet.europa.eu/obligations/603/deliveries?id=603&tab=deliveries&d-4014547-p=1&d-4014547-o=2&d-40145[4]7-s=3

UoM	Name	Number of APSFRs	XML Reported	PDF Reported
DE5000	Elbe	282	Yes	Yes*
DE6000	Oder	27	Yes	Yes
DE7000	Maas	2	Yes	Yes
DE9500	Eider	10	Yes	Yes
DE9610	Schlei/Trave	13	Yes	Yes
DE9650	Warnow/Peene	6	Yes	Yes
TOTAL		841		

Note: * Not all multi-level FRMPs were reported for these UoMs.

Links to Germany's FRMPs can be found via the following web page:

- http://www.wasserblick.net/servlet/is/148748/.

Overview of the assessment

The table below gives an overview of the evidence found during the assessment of the FRMPs. The following categorisation was used for the column concerning evidence:

- **Evidence to the contrary**: An explicit statement was found stating that the criterion was not met;
- **No evidence**: No information found to indicate that the criterion was met;
- **Some evidence**: Reference to the criterion is brief and vague, without a clear indication of the approach used for the criterion. Depending on the comment in the adjacent column, "some evidence" could also be construed as "weak evidence";
- **Strong evidence**: Clear information provided, describing an approach followed in the FRMP to address the criterion.

Table 2 Overview of the evidence found during the assessment of the FRMPs

Criterion	Evidence	Comments
FRM objectives have been established	Strong evidence	The objectives in all German FRMPs are the same, and on a very strategic level. They are based on the risk management cycle and call for further concretization at the local or federal state level, based on the subsidiarity principle within Germany. Several FRMPs, including, for example, the Bavarian FRMP for the Danube UoM (DE1000) have set further objectives.
FRM objectives relate to...		
...the reduction of	Strong evidence	This aspect is specified in the definition of objectives

Criterion	Evidence	Comments
potential adverse consequences		in the FRMPs.
...to the reduction of the likelihood of flooding	Strong evidence	The objectives of the FRMPs aim to reduce the vulnerability and to mitigate new risks and reduce existing risks; however, without further specification.
...to non-structural initiatives	Some evidence	The objectives of some FRMPs refer to non-structural initiatives: for example, the Bavarian FRMP for the Danube UoM (DE1000) includes objectives relating to non-structural initiatives (e.g. use of planning instruments, information, and event-specific regeneration/recovery after flood events).
FRM objectives consider relevant potential adverse consequences to...		
...human health	Strong evidence	Objectives are formulated in a very generic and strategic way: In terms of adverse consequences, it is only mentioned that with the objectives, a "reduction of the adverse consequences for all protected assets is aimed for".
...economic activity	Strong evidence	See above under ‘human health’.
...environment	Strong evidence	See above under ‘human health’.
...cultural heritage	Strong evidence	See above under ‘human health’.
Measures have been...		
...identified	Strong evidence	The FRMPs include a set of types of measures to be implemented. Some plans also list measures which are currently under implementation. Germany reported in total 17 568 aggregated measures to WISE for all of its UoMs, and no individual measures. Germany has indicated that each aggregate measure reported represents a series of actions and projects.
...prioritised	Some evidence	Germany provided information about the priority of all measures. As set out by LAWA (the National working group on water issues), priorities should be set according to the following overall criteria: effect of the measure for reaching the overall and specific aims; relevance of the measure for other measures; implementability; and effect related to achieving the objectives of the WFD.

Criterion	Evidence	Comments
		Information on specific criteria for prioritisation – including for actions and projects elaborated under the measures – varies among the FRMPs. The actual implementation of measures is subject to the subsidiarity principle (as applied within Germany), involving also several stakeholders. The final prioritisation will only take place in the detailed planning process, which follows the planning hierarchy of prioritisation in combination with feasibility. It might change during concrete planning processes and might in reality lead to adjustments and changed priorities.
Relevant aspects of Article 7 have been taken into account such as...		
...costs & benefits	No evidence	It is stated that economic considerations have a role in the planning processes (as the implementation of measures is done on several levels and responsibility is with different stakeholders) but no cost-benefit analysis (CBA) was carried out in the preparation of the FRMPs[7].
...flood extent	Strong evidence	The flood extent is described for each APSFR and was considered in defining measures.
...flood conveyance	Strong evidence	The flood conveyance was considered in defining measures.
...water retention	Strong evidence	Natural water retention measures (NWRMs) are found in all plans assessed.
...environmental objectives of the WFD	Strong evidence	The FRMPs refer to the necessity of coordination between the FRMPs and River Basin Management Plans (RBMPs), and the obligation to foster the achievement of the WFD objectives. Measure types are categorised according to whether they support, hamper or have no effect on the implementation of the WFD.
...spatial planning/land use	Strong evidence	Measures to address spatial planning/land use are found in all plans assessed.

[7] Germany subsequently clarified that CBA was not considered appropriate at the level of the FRMP, especially for aggregated measures, since the FRMPs are at a very strategic and aggregated level. The measures in the FRMPs are also defined on a strategic level. In Germany CBA is mandatory in the detailed planning process for the measures on federal state or regional level for any technical measure whether ecosystem based or structural.

Criterion	Evidence	Comments
...nature conservation	Some evidence	Nature conservation is mentioned in some plans, but no details are provided.
...navigation/ port infrastructure	No evidence	The issue is not specifically addressed in any of the plans assessed[8].
...likely impact of climate change	Strong evidence	All plans have a detailed chapter/information how climate change was considered in the development of the FRMPs.
Coordination with other countries ensured in the RBD/UoM	Strong evidence	All plans describe their coordination activities within Germany in the same RBMP and on the international level.
Coordination ensured with WFD	Strong evidence	See above under 'environmental objectives of the WFD'.
Active involvement of interested parties	Strong evidence	Active involvement was part of the plan development in all FRMPs assessed. There are detailed descriptions of the methods used, the parties involved and how input by them has been taken up.

Good Practices

The assessment identified the following good practices in the German FRMPs assessed.

Table 3 Good practices in the German FRMPs

Topic area	Good practices identified
Objectives	Detailed qualitative and comprehensive description of the objectives in the FRMP in DE9610 (Schlei/Trave).
Integration of previously reported information in the FRMPs.	Inclusion in the FRMP for the Schlei/Trave UoM (DE9610) of explicit information about changes in the APSFRs/FHRMs.
Planning/implementation of measures and their prioritisation for the	All five FRMPs assessed include the promotion of sustainable land-use practices and NWRMs among their measures.

[8] Germany subsequently remarked that for DE1000, DE 5000 and DE6000 the Directorate-General for Waterways and Shipping (*Generaldirektion Wasserstraßen und Schifffahrt*), responsible for navigation and port infrastructure, has been involved in the coordination process according to §7 Abs. 4 Satz 1 WHG (Federal Water Act). It was further remarked that no specific measures for ports/navigation exist in Germany, but the aspect is covered in several other national level measures.

Topic area	Good practices identified
achievement of objectives.	
Consideration of climate change in the FRMPs assessed.	An example of climate change consideration is found e.g. in the Bavaria and Schlei/Trave FRMPs where safety margins are added to the dyke height in order to cope with climate change. Germany is undertaking serious efforts in linking climate modelling to flood risk management, and several studies have been commissioned. A climate proofing tool for measures was developed by the Federal Environmental Agency that allows a systematic check of measures: this was used in at least two of the FRMPs.
Public participation.	In all UoMs assessed the competent authorities have made significant efforts for public consultation, also reaching for active involvement. Many actions (e.g. meetings with various stakeholders at different levels, conferences, information brochures, media outreach etc.) were set and public involvement has been organised in an early stage of the plan development. A wide range of stakeholders actively contributed during the various stages of the plans' development.
Flood risk governance.	Germany has carried out an intensive coordination of the FRMPs with the RBMPs under the WFD. Aspects that have been coordinated are: joint consultation, coordination between competent authorities, coordination of objectives and measures. The FRMPs also contain assessments of the interactions between measures under the Floods Directive and the objectives of the WFD. Three categories (supportive, conflicting, no interaction) have been established and measures are categorised along these. Coordination with local authorities and authorities from other departments (than those responsible for floods) has been taken place with relevant stakeholders when developing the plan.
International issues in flood risk management.	Germany has established, for the international UoMs, good cooperation with the neighbouring countries either within international commissions and also on the bilateral level. There have been strong attempts to develop common approaches and methodologies on the international level.

Areas for further development

The assessment identified the following areas for further development in the German FRMPs assessed.

Table 4 Areas for further development in the German FRMPs

Topic area	Areas identified for further development
Integration of previously reported information in the FRMPs.	While the FRMPs indicate that the PFRA and the FHRMs were used to prepare the objectives, priorities and planning of measures in the FRMPs, detail on the methods that were followed is not provided. The internet links to the APSFRs did not work anymore in DE2000 (Rhine/NRW). The links provided regarding FHRMs link to a general page in the FRMPs for Rhine/NRW (DE2000) and Schlei/Trave (DE9610), which is not user-friendly. In the Weser FRMP (DE4000) and the Elbe FRMP (DE5000), the maps are presented on a Geo-Portal, as a GIS-App, which seems challenging to operate and without instructions for navigating it at the time of accessing it[9]. In the North Rhine-Westphalia FRMP (part of the Rhine UoM, DE2000), the summary map only depicts the largest APSFRs; while all APSFRs are listed in a table in Annex 5, a link to the detailed maps that is provided does not work anymore.
Setting of objectives for the management of flood risk.	The objectives in Germany are not measurable (no timeframe, no indicators), as they are formulated in a very generic way. There is a lack of clear criteria of what significant adverse impacts of flooding are.
Planning/implementation of measures and their prioritisation for the achievement of objectives.	Detailed information on the implementation of measures[10], i.e. responsible authority[11], timetable and funding source, are not provided. There is a lack of a method to demonstrate how much the measures will contribute to the objectives, including: 1) a baseline established against which progress will be monitored and assessed; and 2) assessment of the geographic coverage of the effect of the measure and on flood likelihood and adverse consequences. The criteria, their application and what these mean to implementation in practice of the prioritisation are not described in detail. Overall budgets per UoM are lacking, broken down in: 1) costs for each of the aspects, 2) costs for each APSFR and 3) costs for individual measures or groups of measures. Responsible authorities for monitoring overall progress in implementation have not been defined[12].

[9] Germany subsequently informed that for the second cycle of the FD a new national map application will be available for all RBDs.

[10] Germany subsequently clarified that every measure has a priority code. This information was lost during the reporting process.

[11] Only in DE1000 (Bavaria) the information on the responsible authorities is provided.

Topic area	Areas identified for further development
	Measures under other Community Acts are not clearly identified.
Consideration of climate change in the FRMPs assessed.	While Germany undertook the climate proofing of some measures, this was not performed in all UoMs. There is no apparent coordination between the national climate change adaptation strategy and the FRMPs.
Use of cost-benefit analysis in the FRMPs assessed.	No information on CBA was found in any of the German FRMPs assessed.
Flood risk governance.	For the international Rhine UoM, no single plan for the German share has been developed. In several basins there are no common values for low and high probabilities across FRMPs within the same UoM, which makes the risks difficult to compare and to understand for the general public.

[12] Germany subsequently clarified that the monitoring process is being defined in more detail for the second cycle under the FD.

Recommendations

Based on the reported information and the FRMP assessed, the following recommendations are made to enhance flood risk management (not listed in any particular order):

- To be able to assess progress, the objectives in Germany should be as measurable as possible (timeframe, indicators).
- Germany should define the measures in more detail in the plans, including how much the measures will contribute to the objectives and how they are funded. Costs per APSFR should be estimated. Measures under other Community Acts should be clearly listed.
- Clear criteria of what significant adverse impacts of flooding are should be defined. The measure prioritisation process should be presented in the FRMPs along with its results.
- Cost-benefit analysis should be used wherever possible for the prioritisation of measures.
- It is important to ensure that FRMPs (but also PFRAs/APSFRs and FHRMs) refer to each other as appropriate and that they are continuously available to all concerned and the public in an accessible format, including digitally.
- Ensure or elaborate on coordination between the FRMPs and the national climate change adaptation strategy.

1. Scope of the assessment and sources of information for the assessment

1.1. Reporting of the FRMPs

Germany has designated 10 UoMs; all but one are part of larger international river basins.

Within Germany, there is a mix of situations, and some plans have been developed at UOM level and some plans at a lower level. Germany designates plans developed on the UoM level as B-Level plans and those for lower levels, which are developed by the Federal States (Länder), as C-Level plans. Germany also contributed to the preparation of plans for international UoMs: these are A-level plans. Most of Germany's UoMs contain plans at two levels and often at all three levels. Annex A1 gives an overview of all German FRMPs.

Germany has reported most but not all of its FRMPs to WISE: based on a review in early 2018, Germany reported 31 FRMPs (plus two international ones) out of 52 in total.

1.2. Assessment of the FRMPs

Five plans were chosen for the assessment. The LAWA (national federal level and Länder level working group on water and floods) prepared non-binding guidelines for the FRMPs, so that, it was expected, there will be generally similar methodologies applied across all of Germany's FRMPs (and this was found in the assessment).

The choice of the plans for the assessment was made on the basis of several criteria. First, the plans assessed should include UoMs covered in previous assessments: the FRMPs provide overlap with the separate assessment of international FRMPs, and one of the plans was addressed in the assessment of draft FRMPs. Moreover, the choice sought to capture a spread of flood risk conditions and approaches. In addition, three of the FRMPs assessed are at UoM level and the other two are at Federal State level, to capture these two different planning levels.

Consequently, this assessment covers the following three FRMPs prepared at the UoM level:

Table 5 UoM-level FRMPs assessed

UoM code	UoM Name
DE5000	Elbe
DE9610	Schlei Trave
DE4000	Weser

The assessment also covers the following two FRMPs prepared at the Federal State level:

Table 6 Federal State-level FRMPs assessed

UoM code	UoM Name and FRMP assessed
DE2000	Rhine UoM: North Rhine Westphalia, NRW, FRMP
DE1000	Danube UoM: Bavaria FRMP

The plans assessed are indicated in bold in the table in Annex A1.

Links to Germany's FRMPs can be found via the following web page:

- http://www.wasserblick.net/servlet/is/148748/.

2. Integration of previously reported information

2.1. Conclusions drawn from the preliminary flood risk assessment

The conclusions of the preliminary flood risk assessment are described in detail in the introductory chapters of all assessed FRMPs, both as text and tables and as summary maps, but with a scale not detailed enough to discern individual APSFR or water bodies. In DE9610 (Schlei/Trave), however, the summary map is included in an Annex to the FRMP (and not in the plan itself). In the North Rhine-Westphalia FRMP (part of the Rhine UoM, DE2000), the summary map only depicts the largest APSFRs[13]; all APSFRs are listed in a long table in Annex 5, where also a link to the detailed maps is provided (which does not work anymore). DE5000 (Elbe) and DE4000 (Weser) are the only UoMs where the summary map also depicts other flood risk areas not identified by a PFRA as required by Article 4, as Hesse, Saxony and Brandenburg are federal states which applied Art. 13.1. Only in DE2000 (Rhine/NRW), APSFRs or other flood risk areas shared with other Member States in international UoMs are depicted[14].

Links to maps of the APSFRs – although not mandatory - have been provided as URLs only in some of the FRMPs assessed. Links to maps showing APSFRs or other flood risk areas are provided in DE1000 (Danube/Bavaria)[15] and DE2000 (Rhine/NRW)[16], but the link in the DE2000 FRMP does not work anymore. In DE4000 (Weser), DE5000 (Elbe) and DE9610 (Schlei/Trave), no links are provided[17, 18].

In the reporting sheets, it is stated that conveyance routes have been taken into account for all FRMPs assessed. The statements, however, all use the same wording, i.e. a standard text; furthermore, conveyance routes are only discussed in further detail with regard to the PFRA

[13] Germany subsequently clarified that for DE 2000 a sample of small APSFRs had been checked and found that all APSFRs are depicted. However, small APSFRs are "sometimes not labelled".

[14] FRMPs of the assessed UoMs: DE1000 (chapter 2), DE2000 (chapter 3), DE4000 (chapter 3), DE9610 (chapter 3 and Annex), DE5000 (chapter 2).

[15] https://www.lfu.bayern.de/wasser/hw_risikomanagement_umsetzung/gewaesserkulisse_2011/index.htm

[16] https://www.flussgebiete.nrw.de/img_auth.php/6/6b/Schlussbericht_vorl%C3%A4ufige_Bewertung_August2011.pdf

[17] FRMPs of the assessed UoMs: DE1000 (chapter 2), DE2000 (chapter 3), DE4000 (chapter 3), DE9610 (chapter 3 and Annex), DE5000 (chapter 2).

[18] Germany subsequently provided the following information: For DE 4000 chapter 10 of the FRMP links to the Länder-websites; for DE 5000 there is no APSFR-map available on the website (therefore no internet link), but maps of all APSFRs are included in Annex 3 of the published plan at sub-unit level. This will be improved with a web map tool in the second cycle of the FD; for DE 9610 the flood map portal Schleswig-Holstein contains a direct search function for the APSFRs (information available includes insurance data, planning units and RBD) www.hochwasserkarten.schleswig-holstein.de

relevant section in the FRMPs in DE9610 (Schlei/Trave) and DE4000 (Weser). Nevertheless, as the FHRMs and planned measures take conveyance routes into account[19].

2.1.1 Coordination with neighbouring Member States on shared RBDs/UoMs

The identification of flood risk areas has been coordinated with neighbouring Member States only for some of the UoMs covered. In DE2000 (Rhine/NRW), the whole PFRA, including the identification of flood risk areas, has been coordinated with the Netherlands, both in the frame of the International Commission for the Protection of the Rhine (ICPR) as well as in bilateral working groups.

In Bavaria (DE1000/Danube) and for DE5000 (Elbe), the question cannot be answered fully, as concrete information is missing: both FRMPs make reference, respectively, to coordination via the International Commission for the Protection of the Danube (ICPDR), especially the Expert Group "Flood Protection", and the International Commission for the Protection of the Elbe (IKSE), but without providing details on the identification of flood risk areas[20]. Though DE9610 (Schlei/Trave) is an international UoM, it is treated as a national UoM for all purposes, as the share of Denmark is very small (the FRMP states that Denmark's role in this FRMP is minor). Hence, there is no information on coordinating the identification of flood risk areas internationally[21]. DE4000 (Weser) is not an international UoM[22].

2.1.2 Information how the PFRA was used in the development of the FHR maps

In all assessed UoMs, the PFRA and the identified APSFRs were used as the basis for developing the flood hazard and flood risk (FHR) maps. No further information is provided in the assessed plans with regard to how the PFRA was used in developing the FHR maps[23].

2.2. Presentation of Flood Hazard and Risk Maps (FHRMs) in the FRMPs

In all FRMPs assessed, except the NRW/Rhine (DE2000), the FHRMs are presented (one single map is presented as an example in each plan). In all assessed FRMPs maps for fluvial floods are included. In DE1000 (Danube/Bavaria) and DE5000 (Elbe), only fluvial maps are

[19] FRMPs of the assessed UoMs: DE1000 (chapter 3), DE2000 (chapter 2), DE4000 (chapter 3 and 5), DE9610 (chapter 3 and Annex), DE5000 (chapter 2).

[20] Germany subsequently clarified that in the Elbe (DE5000) and in Bavaria (DE1000), significant efforts were invested into international coordination for all stages of FRM planning.

[21] Germany subsequently clarified that after coordination between Denmark and Germany there were no international APSFRs identified for DE 9610.

[22] FRMPs of the assessed UoMs: DE1000, DE2000 (chapter 8), DE4000, DE9610, DE5000 (chapter 1).

[23] FRMPs of the assessed UoMs: DE1000 (chapter 4), DE2000 (chapter 3), DE4000 (chapter 4), DE9610 (chapter 4.1), DE5000 (chapter 2.2 and 2.3).

presented. In DE9610 (Schlei/Trave), also the FHRMs for coastal flooding are depicted[24], and in the DE4000 (Weser), there is one example of a map showing the combined effects of more than one source of flooding (fluvial and coastal). Maps for pluvial and groundwater floods, floods from artificial water bearing structures or no specific sources are not provided in any of the FRMPs assessed[25].

In DE2000 (Rhine/NRW), the FHRMs are not depicted in the plan itself, but referred to via hyperlink[26] to a general page, not to the maps directly. In DE1000 (Danube/Bavaria), a direct link is provided. In DE9610 (Schlei/Trave), the link leads to a general page, not to the maps directly. In DE4000 (Weser) and DE5000 (Elbe), the maps are presented on a Geo-Portal, as a GIS-App (printable as PDF[27]).

The links to the FHRMs that have been provided in the FRMPs assessed are:

- Bavaria FRMP in the Danube UoM (DE1000): https://www.lfu.bayern.de/wasser/hw_risikomanagement_umsetzung/index.htm
- NRW FRMP in the Rhine UoM (DE2000): https://www.flussgebiete.nrw.de/
- Weser (DE4000): http://geoportal.bafg.de/mapapps/resources/apps/HWRMRL-DE/index.html?lang=de
- Elbe (DE5000): http://geoportal.bafg.de/mapapps/resources/apps/IKSE_DE/index.html?lang=de
- Schlei/Trave (DE9610): http://zebis.landsh.de/webauswertung/pages/access/login.xhtml;jsessionid=1AD9AA5D05DDFFF17EC3CFCFB8B22B34.nodeTC02

2.2.1 Maps for shared flood risk areas

There is no information regarding the preparation of maps for flood risk areas shared with other Member States in the FRMPs in DE1000 (Danube/Bavaria) and DE5000 (Elbe), except

[24] Germany subsequently informed in relation to DE9610 that a new interface for all internet sites was introduced in the Schleswig-Holstein Ministry for Energy Transition, Agriculture, Environment, Nature and Digitalization (MELUND) www.hochwasserkarten.schleswig-holstein.de and via the link for all information on the implementation of the FD: www.hwrl.schleswig-holstein.de

[25] FRMPs of the assessed UoMs: DE1000 (chapter 4), DE2000 (chapters 3.2, 3.3, 3.4), DE4000 (chapter 4), DE9610 (chapter 4), DE5000 (chapter 2.3).

[26] https://www.flussgebiete.nrw.de/

[27] Germany subsequently clarified that there are two platforms (one for Germany and one for the international Elbe basin) which cover the area of the Elbe UoM and provide links to the websites of the federal states. Both have a printing tool integrated (also for pdf). An improved web-based map is being prepared for release in 2019 (*Bundesanstalt für Gewässerkunde*, BfG, the Federal Institute of Hydrology). On both the interactive map applications of the IKSE/ICPER and of the BfG (via Wasserblick) the user is directed to the federal state map applications by clicking on the flooded areas and can download pdf maps.

for references to the respective international plans. In DE2000 (Rhine/NRW), the "Rhineatlas" is mentioned, which should contain FHRMs for the whole basin, but there is no concrete information on the preparation of maps for flood risk areas shared with other Member States. Furthermore, in the FRMP for the Rhine, it is mentioned that information on methods and data used has been shared with the Netherlands. DE4000 (Weser) is not a transboundary UoM, while DE9610 (Schlei/Trave) is treated as a national UoM as agreed with Denmark. Hence, there is no information on flood risk areas shared with other Member States[28].

2.2.2 Conclusions drawn from the flood hazard and flood risk maps

Generally, the information provided regarding the conclusions drawn from the FHRMs in all five assessed FRMPs is not clear or detailed enough to understand the methodology or the approach how the maps were used to prepare the plans. All FRMPs contain a statement that is similar and states that the conclusions of the FHRMs are the "starting point" for the planning of measures, by allowing to identify areas with a need for action. Furthermore, all assessed FRMPs describe the FHRMs "statistically" in terms of "area impacted" (e.g. "the maps show that 20 km² are potentially impacted"), "people impacted" (e.g. "the maps show that 20 000 people are potentially impacted"), "number of industry locations impacted" (e.g. "the maps show that 200 industry locations are potentially impacted") etc. This information is presented in different formats, either in text (e.g. in DE2000), table (e.g. DE1000, DE5000) or map format (e.g. in DE4000, DE9610). In DE2000, a factsheet was developed for each municipality based on the conclusions from the FHRMs, identifying the need for action. In DE4000 (Weser), it is stated that objectives of flood risk management can be locally adapted according to the maps; again, it is not specified whether this happened or how it should happen. In DE9610, DE5000 and DE4000, it is stated that all involved actors can deduce necessary measures from the maps (without specifying how). It is furthermore mentioned that the publication of the maps is important for creating and strengthening public awareness[29].

2.3. Changes to the APSFRs or other Flood Risk Areas

Any changes in the identification of APSFRs since December 2011 or in the FHRMs since December 2013 should be reflected in the FRMP. There is no information provided on any changes on the identification of APSFRs or FHRMs in the FRMPs of DE2000 (Rhine/NRW) and DE4000 (Weser). From the text provided in the FRMPs, it can be concluded that no changes have been implemented in DE1000 (Danube/Bavaria) either.

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[28] FRMPs of the assessed UoMs: DE1000 (chapter 4), DE2000 (chapters 3, 4 and 8), DE4000, DE9610, DE5000 (chapter 2.3).

[29] FRMPs of the assessed UoMs: DE1000 (chapters 4.4 and 6.2), DE2000 (chapter 3.5), DE4000 (chapter 4.3), DE5000 (chapter 2.3), DE9610 (chapters 4.1 to 4.4).

In DE5000 (Elbe), there is a statement that some federal states slightly changed the identified APSFRs/the PFRA[30]. As reason for these changes, it is stated that no significant flood risk was identified when creating the FHRMs. However, there is no information at the FRMP phase on which federal states in the Elbe UoM actually implemented such changes. There is no hint that changes were implemented to the APSFRs and the PFRA after the preparation of the FHRMs in DE5000.

In DE9610 (Schlei/Trave), no changes in the identification of APSFRs since December 2011 have been implemented in Schleswig-Holstein, but it is mentioned that in the other Federal State situated in DE9610, Mecklenburg-West Pomerania, some APSFRs were changed/deleted in Stepenitz/Maurine. For these (former) APSFRs, no FHRMs have been produced[31].

2.4. Areas for further development in the earlier assessment of the flood hazard and risk maps

The FHRM assessment[32] identified the following areas for further development for Germany:

- In 2012 APSFRs for pluvial floods were reported; it appears these were not included in the FHRMs.
- Some UoMs (e.g. DE1000, DE2000 and DE9610) did not show water depth/level in their flood risk and hazard maps.
- Some UoMs (e.g. DE5000, DE6000 and DE9500) did not show the number of inhabitants potentially affected in their FRHMs.
- It was not clear whether coastal flooding was mapped for medium and/or high probability events. It was not clear for what coastal flooding probabilities the existing flood defences were considered adequate.
- It was not clear in which areas within coastal UoMs Article 6.6 was applied (preparation of flood hazard maps only for extreme event floods). It was also not clear how these areas connect to the maps.
- It was not clear in which areas within UoMs Article 13.1 and 13.2 were applied. It was also not clear how these areas connect to the maps.
- No potential adverse consequences on the environment were shown in the maps.

[30] Germany subsequently reminded that changes in APSFR's were reported in 2013 for the Elbe (DE5000). Such changes, concerning updates to phases prior to the FRMP phase, will be assessed in detail during the relevant assessment of each phase during the next cycle of the FD.

[31] FRMPs of the assessed UoMs: DE1000 (chapter 3.2), DE2000, DE4000, DE5000 (chapter 2.3), DE9610 (chapter 4.4).

[32] These areas for further development were identified based on the 2014 assessment of FHRMs: European Commission, Assessment of Flood Hazard and Flood Risk Maps Member State Report: DE – Germany, December 2014. Available at: http://ec.europa.eu/environment/water/flood_risk/pdf/fhrm_reports/DE%20FHRM%20Report.pdf

None of these areas for further development are explicitly addressed within the FRMPs assessed or in the reporting in the time period between publication of the FHRMs and the assessment of the FRMPs. Nevertheless, references in connection to themes associated to these areas for further development identified in the FHRMs have been found in the FRMPs assessed, or in the reporting sheets[33, 34]:

- With regard to pluvial flooding, it is either stated that these are implicitly included in the flood risk via surface waters, i.e. fluvial flooding (e.g. in DE5000, Elbe), or that they are not significant (e.g. in the North Rhine-Westphalia FRMP in the Rhine UoM, DE2000).
- In the flood hazard maps presented in the FRMP of DE9610 (Schlei/Trave), water depth/levels are included. In DE1000 (Danube/Bavaria), there is a separate type of flood hazard map presented that shows water depth/levels (the other type shows the recurrence period)[35].
- In DE5000 (Elbe), the presented flood risk map (from Hamburg) shows the number of inhabitants affected.
- In the reporting sheet for DE2000 (Rhine), it is stated that in a sub-basin of the Rhine (the Main in Bavaria), Art. 13(1) has been applied. In DE5000, it is stated that Saxony and Brandenburg applied Art. 13(1) In DE4000 (Weser), it is stated that one sub-basin in Hesse (Fulda) applied Art. 13(1).

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[33] Aside from the relevant FHRM developments identified under the present assessment and listed in the main text, Germany subsequently made the following points with reference to the areas for further development in relation to the earlier assessment of the FHRMs:
- For Bavaria (DE1000), North Rhine-Westphalia (DE2000) and Weser (DE4000) no pluvial flood APSFRs were identified.
- DE1000, DE2000 and DE9610 (Schlei/Trave) depict water level/depth in their flood hazard and risk maps (in DE9610, since 2013).
- In DE9500, flood hazard maps show the number of affected inhabitants (since 2013). In DE5000, the FHRMs show the number of inhabitants, not on the interactive map application of the IKSE, but on the federal state maps.
- In DE5000, information on probabilities was part of the electronic reporting to the Commission.
- For DE4000 Article 6.6 was applied.
- In North Rhine-Westphalia (DE2000) and Bavaria (DE1000), Articles 13(1) and 13(2) were not applied, and hence not mentioned in the plans. In DE5000, the information on the application of Art. 13 was part of the APSFR electronic reporting to the European Commission. In the Elbe (DE5000) Articles 13(1) and 13(2) were applied in some federal states; in DE4000, Articles 4 and 13(1) were applied.
- Regarding adverse consequences to the environment, North Rhine-Westphalia (DE2000) reports installations (as in Annex I to Council Directive 96/61/EC) and potentially affected protected areas (as in Annex IV(1)(i), (iii) and (v) to Directive 2000/60/EC). For DE4000 the sources of pollution and the endangered areas were mapped. In Bavaria (DE1000) the adverse consequences on the environment have been listed in a supplement ("Beiblatt") as to not overly complicate the maps themselves, which, according to Bavaria, proved to be a good practice for improving the risk dialogue.

[34] FRMPs of the assessed UoMs: DE1000, DE2000, DE4000, DE5000, DE9610 (chapter 4.1), and the reporting sheets for DE2000, DE4000, DE5000: Summary of the Objectives.

[35] Bavaria subsequently clarified that this practice was regarded as beneficial in terms of involving the regional stakeholders, as the data was more visible.

2.5. Good practices and areas for further development in the FRMPs regarding integration of previously reported information

The following **good practice** was identified:

- Inclusion in the FRMP for the Schlei/Trave UoM (DE9610) of explicit information about changes in the APSFRs/FHRMs.

The following **areas for further development** were identified:

- While the FRMPs do indicate that the PFRA and the FHRMs were used to arrive at the objectives, prioritisation and planning of measures in the FRMPs, detail on the methods that were followed is not provided.
- The internet links to the APSFRs do not work anymore in DE2000 (Rhine/NRW). The links provided regarding FHRMs link to a general page in the FRMPs for Rhine/NRW (DE2000) and Schlei/Trave (DE9610), which is not user-friendly. In the Weser FRMP (DE4000) and the Elbe FRMP (DE5000), the maps are presented on a Geo-Portal, as a GIS-App, which seems challenging to operate and without instructions for navigating it at the time of accessing it[36].
- In the North Rhine-Westphalia FRMP (part of the Rhine UoM, DE2000), the summary map only depicts the largest APSFRs; while all APSFRs are listed in a table in Annex 5, a link to the detailed maps that is provided did not function at the time of accessing it.

[36] Germany subsequently stated that for the second cycle of the FD a new national map application will be available for all RBDs.

3. Setting of Objectives

3.1. Focus of objectives

The objectives in all German FRMPs are the same, and on a very strategic level. They are based on the risk management cycle and refer to further concretization to the local or federal state level, based on the subsidiary principle. From this, four general objectives are formulated[37]:

1. Mitigation of new risks prior to a flood event.
2. Reduction of existing risks prior to a flood event.
3. Reduction of adverse consequences during a flood event.
4. Reduction of adverse consequences after a flood event.

These four objectives include several aspects but only in a very general way (i.e. these aspects are just mentioned and described): the objectives for the reduction of the adverse consequences of floods and those addressing flood risks refer to measures that will be implemented, including non-structural measures.

In DE1000 (Danube/Bavaria), the four strategic objectives are slightly more specified on the lower level. Six "action objectives" are formulated here: a) use of planning instruments; b) effective information and counselling of the affected; c) expert and specific preparation for flood events; d) event-specific regeneration/recovery after a flood event; e) use of water retention; and f) use of technical measures.

In DE5000 (Elbe) and DE9610 (Schlei/Trave), three further objectives are described, which should be used to concretize the strategic objectives. These are: a) compliance with legal requirements; b) implementation of sectoral-strategic objectives; and c) taking into consideration the interests of regionally responsible actors. The FRMP text discussing these objectives moreover refers, among the areas of action, to non-structural initiatives such as flood forecasting.

As an overview, in the FRMPs assessed[38]:

- The objectives aim to reduce the adverse consequences of floods.
- The objectives aim to reduce the likelihood of flooding[39].
- The objectives refer to measures that will be implemented.
- The objectives refer to non-structural measures[40].

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[37] See chapter 5 in the FRMP of the Danube (BY), chapter 3 in the FRMP Elbe, chapter 4 in the FRMP of Rhine (NRW) and in chapter 5 in the FRMP Schlei/Trave.

[38] These categories are included in Art. 7 of the Floods Directive.

[39] The assessment adopts the generally accepted definition of risk as a product of consequence times likelihood, thereby also in alignment with Art. 7(2) of the FD.

3.2. Specific and measurable objectives

The objectives in the German FRMPs assessed are formulated in a very general, strategic way and are neither specific nor measurable.

3.3. Objectives to reduce adverse consequences from floods

In the FRMPs assessed, objectives do not provide further specification of the type of adverse consequences that will be reduced. As mentioned previously, the objectives are formulated in a very general and strategic way. In terms of adverse consequences, it is only mentioned that with the objectives, a "reduction of the adverse consequences for all protected assets is aimed for".

3.4. Objectives to address the reduction of the likelihood of flooding

Objectives No 1 (Mitigation of new risks prior to a flood event) and No 2 (Reduction of existing risks prior to a flood event) of the general objectives of the German FRMPs address the reduction of the likelihood of flooding. These objectives do not specifically mention measures, but in the description of the objectives, general measure types that could serve to reach these objectives are mentioned. They are: non-structural measures (which should be the focus), and technical measures. Only in DE9610 (Schlei/Trave) the four objectives are described in more detail, specifying these by adding general priorities for fluvial and coastal flooding, and for some also with regard to concrete measures. This is the case for coastal flooding, where the creation of a hydrological service is mentioned (without providing details).

3.5. Process for setting the objectives

The strategic objectives to reduce flood risks established in Germany were coordinated at the national level, at the "Working Group on water issues of the Federal States and the Federal Government represented by the Federal Environment Ministry" (LAWA). There is no indication in four of the five assessed FRMPs that climate change has been taken into account when defining the objectives (exception: DE9610, Schlei/Trave), or that the objectives have been discussed with stakeholders[41]. In DE9610, for coastal flooding, it is mentioned that dykes should be planned 1.5m higher, due to possible higher levels of storm floods due to climate

[40] Non-structural measures include measures such as flood forecasting and raising awareness of flooding as well as land use planning, economic instruments and insurance.

[41] Germany subsequently clarified that in the Weser (DE4000), an additional safety margin for dykes ("*Klimazuschlag*") was introduced to address potential climate change impacts in coastal areas. For non-coastal areas there was no evidence that such a special supplement is needed. Further, in the Elbe (DE5000), there are implicit references to climate change (e.g. mention of influence on water balance and influence on water level and flow) and to a process which will be defined in more detail in the second FD implementation cycle.

change. In the FRMP for North Rhine-Westphalia in the Rhine UoM (DE2000), a very general explanation regarding climate change is included in the description of the objectives, stating that the objectives will be valid in case of different flood scenarios, and that climate change is hence considered.

3.6. Good practices and areas for further development regarding setting objectives

The following **good practice** was identified:

- Detailed qualitative and comprehensive description of the objectives in the FRMP in DE9610 (Schlei/Trave).

The following **area for further development** was identified:

- The objectives in Germany are not measurable (no timeframe, no indicators), as they are formulated in a very generic way. This may impede measuring progress towards achieving the objectives.

4. Planned measures for the achievement of objectives

Germany reported in total 17 568 aggregated[42] measures to WISE[43] for all of its UoMs – and no individual measures. Germany's FRMPs did not provide a definition of aggregated measures. However, Germany has indicated that each aggregate measure reported represents a series of actions and projects. The total count of these individual measures was not provided in the reporting.

In Germany's reporting to WISE, some of the national measures are assigned to more than one measure type[44]. To compare the number of measures by type, a total count is used that includes each time a measure is allocated to a measure type[45]: this total is 25 023 measures.

The average number of measures reported per UoM is 2 502, with a range between 54 (in DE7000, Maas) and 13 108 measures (in DE2000, Rhine) per UoM. Among the five UoMs covered in this assessment, the highest number of measures are reported for DE2000 (13 108 measures) followed by DE5000, Elbe (5 589 measures) and DE1000 (3 910 measures).

Across all of Germany's UoMs, the majority of measures fall under prevention (6 795 measures or around 27 % of the total), protection (7 519 measures or around 30 %) and preparedness (7 638 measures or around 31 %), with a significantly lower number under recovery and review (only 2 612 measures or about 10 %). Measures are selected from these four broad categories in all UoMs, except DE9500 where no recovery measures are reported[46].

Please see Tables A1 and A2 in Annex A for details, as well as the subsequent tables and charts on measures in Annex A also for the following topics in this section.

The LAWA group developed a catalogue of measures at the federal level. It corresponds to the four general categories or aspects of measures used at EU level (prevention, protection,

[42] The Reporting Guidance mentions "Measures can be reported as individual measures (recommended for major projects) or aggregated measures,…" and also notes that measures may be comprised of "many individual projects". European Commission, Guidance for Reporting under the FD (2007/60/EC), 2013, pp. 54-58.

[43] The information reported to WISE was the starting point for the assessment in this section. The majority of the statistics presented are based on processing of information reported to WISE. Assuming that the Member States accurately transferred the information contained in their FRMPs to the reporting sheets (these sheets are the same for all Member States and are not customisable) and barring any undetected errors in the transfer of this information to WISE arising from the use of interfacing electronic tools, these statistics should reflect the content of the FRMPs. In the case of Germany, since all measures are aggregated (as opposed to a mix of aggregated and individual measures), the statistics are not only illustrative but also representative. To note that individual measures are likewise usually made up of a number of activities or tasks.

[44] See Annex B for the list of measure aspects and measure types.

[45] This approach implies double-counting.

[46] Reporting sheets.

preparedness, recovery and review), as well as including hundreds of measures in the "other measure" category.

4.1. Cost of measures

Germany has not provided any cost information on the measures.

4.2. Funding of measures

In general, financing is discussed in the FRMPs assessed for groups of measures to be implemented. On the national level there is a specific fund (*Hochwasserschutzprogramm*) that has been agreed between the Länder and the federal level. In addition, the Länder have specific funding programmes. In all plans, the importance of insurance and reserves as part of self-provision on the part of private actors is mentioned. In the FRMP for North Rhine-Westphalia in the Rhine UoM (DE2000), a specific document on how technical flood protection is funded is mentioned, but the link to this document is not working.

Based on the information available in the five FRMPs assessed, the following funding sources are used:

Table 7 Funding of measures

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
Distribution of costs among those groups affected by flooding	✓	✓	✓		✓
Use of public budget (national level)	✓	✓	✓	✓	✓
Use of public budget (regional level)	✓	✓	✓	✓	✓
Use of public budget (local level)	✓	✓	✓	✓	✓
Private investment	✓	✓	✓	✓	✓
EU funds (generic)	✓	✓	✓	✓	✓
EU Structural funds					
EU Solidarity Fund					
EU Cohesion funds					
EU CAP funds					
International funds					

Source: FRMPs

4.3. Measurable and specific (including location) measures

Only some of the FRMPs assessed include a description of the measures with regard to:

- What they are trying to achieve,
- Where they are to be achieved,
- How they are to be achieved, and
- By when they are expected to be achieved.

The measures are only reported in terms of measure types and therefore it is unclear what the measure will include (lack of detailed technical descriptions) and how the measure will be implemented on site. In the FRMPs for the Schlei Trave (DE9610), Bavaria/Danube (DE1000), Weser (DE4000) and Elbe (DE5000), connections are made between measure types and the APSFRs, showing which type of measure will be applied in each APSFR. Priorities of implementation are also given in DE9610 and DE4000.

For the NRW/Rhine FRMP, DE2000, measures are linked to the Länder level. DE2000 indicates when measures will be implemented by making a reference to the three implementation cycles of the FD.

Across four of the five FRMPs assessed, it remains unclear to which extent measures will reduce the flood risk levels, except in DE1000 (Danube/Bavaria) where graphs with percentages of effectiveness of measures in relation to the four categories of adverse consequences listed in the Directive are given. It is unclear how this assessment of risk reduction was made.

The measures indicate one of three levels of location: RBD/UoM, APSFR, or more detailed than a single water body.

Table 8 Location of measures

	DE1000 (Bavaria FRMP)	**DE2000 (NRW FRMP)**	**DE4000 (Weser)**	**DE5000 (Elbe)**	**DE9610 (Schlei Trave)**
International					
National					
RBD/UoM					
Sub-basin					
APSFR or other specific risk area	✓		✓	✓	✓
Water body level					✓
Länder level share of the RBD		✓			

Source: Reporting sheet and FRMPs

In the Schlei Trave (DE9610), Danube/Bavaria (DE1000), Weser (DE4000) and Elbe (DE5000) there is a link between aggregated measures and the APSFR, showing which type of measure will be applied in each APSFR, while in NRW (DE2000) the measures are linked to the Länder level share of the RBD.

4.4. Measures and objectives

Germany has set general not quantified measures for flood protection. The measures in the plans are generic and will be further defined in subsequent years in detailed planning processes and in accordance with agreed budget lines. The link between objectives and measures is clearly established, but due to the non-quantification of objectives and the generic nature of the measures as presented in the FRMPs assessed, it remains unclear how, and by how much, the measures will contribute to the objectives or if the objectives will be achieved with the set of measures included in the FRMPs.

4.5. Geographic coverage/scale of measures

Germany provided information about the location of all its 25 023 measures; however, this was an open question in the reporting sheets, and as such, the level of detail varies, and a large number of different responses were given. It was thus not possible to aggregate the information. It appears, however, that the great majority of measures are located at the APSFR level.

Germany did not provide information about the geographic coverage of the expected effects of any of the measures in the reporting sheets.

4.6. Prioritisation of measures

Germany provided information about the priority of all measures reported to WISE. The prioritisation was mostly carried out based on a LAWA guidance document[47]: measures are classified in three categories: ‘very high’, ‘high’ and ‘moderate’.

According to the information reported by Germany, the majority of the measures across all UoMs, 16 289 (or around 65 % of the total), are classified as very high priority, followed by high priority (7 415 measures or around 30 %) and moderate priority (1 319 measures or about 5 %).

[47] LAWA, 2013 Empfehlungen zur Aufstellung von Hochwasserrisikomanagementplänen.

The number of very high priority measures represents around 67 % of the prevention measures, around 58 % of the protection measures, around 67 % of preparedness measures and 80 % of recovery and review measures (see Table 3 and Figure 3 of Annex A for further information).

The largest share of very high priority measures is found in DE2000 (83 % of all measures in the UoM) while the largest number of high priority measures are in DE5000, Elbe (4004 measures, 72 % of the total of 5 589 measures in the UoM); the largest share of high priority measures is found in DE6000 (396 out of 428 measures, 93 %). Among the five UoMs covered by this assessment, all UoMs except DE5000 have the majority of their measures categorised as high priority (see Table A4 and Figure A4 of Annex A for further information)[48]. As noted above, Germany reported aggregated measures, each of which can include a set of individual projects and actions; the statistics presented here and in the following sub-sections refer to the aggregated measures and should be seen as illustrative.

As set out by LAWA, the priorities are set according to the following criteria:

1. effect of the measure for reaching the overall and specific aims;
2. relevance of the measure for implementing other measures;
3. implementability including time, resources needed, planning process, financing link with other measures and acceptance by the general public; and
4. effect related to achieving the objectives of the WFD.

These criteria are given equivalent weights, but it remains unclear how criteria are applied in the prioritisation process.

Germany did not report any information about the timetable of the measures[49].

4.7. Authorities responsible for implementation of measures

Information about the names of the responsible authorities was not provided, however, the level of responsibility of these authorities is indicated for all measures and includes the following: associations (e.g. water, dyke); municipalities and communities; German federal states; regional authorities (e.g. regional boards, district council); and other authorities. Sometimes more than one level of responsible authority is reported per measure. Nevertheless, the majority of the measures will be implemented by authorities at the federal state, municipal and regional levels[50].

[48] Reporting sheets.
[49] Germany subsequently remarked that a timetable for measures is defined in the concrete planning process for the implementation of measures but cannot be defined on the strategic level of the FRMP.
[50] Reporting sheets.

4.8. Progress of implementation of measures

Germany reported information to WISE about the progress of implementation of all measures. The majority of the measures, 20 298 (or around 81 % of all measures) are reported as 'progress ongoing' followed by 3 597 measures (around 14 % of all measures) that are not started.

'Progress ongoing' measures represent the majority of measures under each aspect i.e. prevention, protection, preparedness, recovery and review.

A relatively small number of measures are reported as 'completed' (779, 3 % of total measures) or 'ongoing construction' (349, 1 % of the total). Most 'complete' measures are preparedness measures (272), while most 'ongoing construction' concerns protection measures (309) (see Table A5 and Figure A5 in Annex A for more details).

In all UoMs, the majority of the measures are classified as 'progress ongoing' with most such measures reported in DE2000 (11 551 measures, 57 % of all measures in this category of progress). The most 'completed' measures are reported in DE5000, Elbe (502, 64 % of all measures in this category), while the most measures 'not started' are in DE2000 (1 384 measures, 38 % of those in this category) (see Table A6 and Figure A6 in Annex A for more information)[51].

4.9. Measures taken under other Community Acts

Member States have been asked to report on other Community Acts under which each measure has been implemented and such information is provided in all five FRMPs assessed. There is some information in the plans assessed providing links to the RBMPs. Germany has defined M1 measures as those which help to implement both the WFD and the Floods Directive (see the section 'Coordination with the WFD' below).

Furthermore, the FRMPs assessed indicate that under the Seveso II Directive, Germany has implemented technical guidelines (TRAS 310) that address rainfall and flooding in relation to Seveso installations.

[51] Reporting sheets.

4.10. Specific groups of measures

With regard to **spatial planning/land use measures**, the following types of measures are included in the five FRMPs assessed: M21[52] and M22[53] prevention measures and M31[54] protection measures[55]. M21 has been applied in all UoMs and is by far the measures with the largest numbers of implementation. M22 is also applied in all FRMPs assessed. M31 has been applied in all UoMs and represents the second largest group of measures after M21.

All of Germany's FRMPs include measures (national codes 301-definition of priority and reserve areas in land use plans, 302- definition and updating of flood plain areas as well of use restriction, 303- changes to the building codes, 304-measures to adjust land use, 305-relocation into less flood prone areas) to control buildings and development in floodplains. However, no conclusion can be drawn how the land use framework has evolved since 2000. Land use planning is within the competences of the Länder and communities and such an assessment would require a detailed study on its own.

Natural water retention measures (NWRMs) have been planned in all of the FRMPs assessed. The following NRWMs (M31) have been identified:

- flood reducing management of land;
- renaturalisation in all basins;
- reduced soil sealing;
- rainwater management;
- reclamation of retention areas in all basins.

The description of these measures is very general but at least EU NRWM codes N01 to N14, U02, U03, U11 can be assumed to be covered by the German measures[56].

Measures that specifically consider nature conservation. In the FRMPs assessed the link to nature conservation is given, mostly as nature conservation was an integrated part of the active involvement of the stakeholders. In the Weser (DE4000) and the Elbe (DE5000) it is stated

[52] Prevention, Avoidance, Measure to prevent the location of new or additional receptors in flood prone areas, such as land use planning policies or regulation.

[53] Prevention, Removal or relocation, Measure to remove receptors from flood prone areas, or to relocate receptors to areas of lower probability of flooding and/or of lower hazard.

[54] Protection Natural flood management / runoff and catchment management, Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and / or storage, enhancement of infiltration, etc. and including in-channel, floodplain works and the reforestation of banks, that restore natural systems to help slow flow and store water.

[55] See Annex B for details about all measure aspects and measure types.

[56] For details about the NWRMs and codes see Annex B.

that flood risk management can support the aims of nature conservation, but no further details are provided.

National measure 307 (protection of buildings and infrastructure) should cover **navigation and port infrastructure**, but this kind of infrastructure is not explicitly mentioned in the FRMPs assessed[57].

All FRMPs except DE4000 assessed include **dredging** measures, though the measure information does not refer to dredging explicitly but the increase of river channel capacity and its ability to convey water for flood alleviation (national measure 320): this measure is found in all UoMs, and it can be assumed that this is in fact dredging.

4.11. Recovery from and resilience to flooding

Insurance schemes for the private and business sectors is listed as a measure in the FRMPs assessed. Such insurance schemes are seen in the plans as part of self-provision on the part of households and businesses. The role of the authorities is to strengthen the development of such schemes as part of the risk precaution (national measure 326/EU measure M53[58]). No further details are provided, except for DE4000 where further information is provided in relation to actions needed and responsibilities.

The FRMPs assessed do not provide any information about types of insurance available for flooding areas, if flood risk insurance for properties is available in high flood risk areas, if environmental liability insurance covers the restoration costs or whether ecosystem services are considered in estimating these costs in cases where potentially polluting sites and installations may be flooded.

4.12. Monitoring progress in implementing the FRMP

The implementation of the measures will be monitored during the development of the second plan. No information is provided how this process will be done in detail.

Nonetheless, the measures listed in the FRMPs serve as a baseline of what should be implemented in the first cycle and against which the actual implementation of the measures will be monitored. However, as the planned measures are of generic nature, it remains unclear how detailed progress can/will be measured.

[57] Germany subsequently informed that this measure is included in DE5000, Elbe.
[58] Recovery and Review, Other, Other recovery and review Lessons learnt from flood events Insurance policies.

4.13. Coordination with the Water Framework Directive

All of the FRMPs assessed provide a chapter with information on how coordination with the WFD has been performed. The table below shows how the development of the FRMPs has been coordinated with the development of the second RBMPs of the WFD.

Table 9 Coordination of the development of the FRMPs with the development of the second River Basin Management Plans of the WFD

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
Integration of FRMP and RBMP into a single plan					
Joint consultation of draft FRMP and RBMP		✓		✓[59]	✓
Coordination between authorities responsible for developing FRMP and RBMP	✓	✓	✓	✓	✓
Coordination with the environmental objectives in Art. 4 of the WFD				✓	✓
The objectives of the Floods Directive were considered in the preparation of the RBMPs[a]	✓	✓	✓	✓	✓
Planning of win-win and no-regret measures in the FRMP	✓	✓	✓	✓	✓
The RBMP PoM includes win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and NWRMs[a]	✓	✓	✓	✓	✓
Permitting or consenting of flood risk activities (e.g. dredging, flood defence maintenance or construction) requires prior consideration of WFD objectives and RBMPs					✓
Natural water retention and green infrastructure measures have been included	✓	✓	✓	✓	✓
Consistent and compliant application of WFD Article 4(7) and designation of heavily modified water bodies with measures taken under the FD e.g. flood defence infrastructure					

[59] This information was provided in the River Basin Management Plan of the Elbe.

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
The design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, have been adapted to take into account WFD Environmental Objectives[a]	✓	✓	✓	✓	✓
The use of sustainable drainage systems, such as the construction of wetland and porous pavements, have been considered to reduce urban flooding and also to contribute to the achievement of WFD Environmental Objectives					

Notes: [a] based on reporting under the WFD

The FRMPs assessed provide information on the link to the RBMPs under the Water Framework Directive, including in the reporting sheets. Germany has defined three categories of flood risk management measures (M1, M2, M3) depending on their link to the WFD: M1 measures which are helping to implement the WFD; M2 measures which might lead to a conflict with the implementation of the WFD; and M3 measures which have no relevance to the WFD. Information on the link between the measures codes in the LAWA Catalogue and M1 measures are provided. Furthermore, in the LAWA guidance national measures, which are relevant for both Directives, have been identified.

In its reporting under the WFD, Germany indicated that the objectives of the Floods Directive were considered in the preparation of the RBMPs and PoMs across all of its UoMs; moreover, PoMs in all UoMs contained win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and the use of NWRM.

4.14. Good practices and areas for further development with regard to measures

The following **good practices** were identified:

- Coordination of measures with the WFD and prioritisation of measures that contribute to the implementation of both Directives.
- All five FRMPs assessed include the promotion of sustainable land-use practices and NWRMs among their measures.

The following **areas for further development** were identified:

- Detailed information on the implementation of measures[60], i.e. timetable and funding source are not provided.
- There appears to be lack of a method to demonstrate by how much the measures will contribute to the objectives, including a baseline against which progress will be monitored and assessed.
- The criteria and their application for the prioritisation of measures are not described in detail.
- Overall costs measures per UoM are lacking; these could be broken down per aspect, per APSFR and individual measure or groups of measures.
- With regard to monitoring, the FRMPs assessed do not all clearly identify the responsible authorities for monitoring the implementation of measures and the overall progress in the implementation.
- Measures under other Community Acts are not clearly identified.

[60] Germany subsequently clarified that every measure has a priority code. This information was lost during the reporting process via WISE.

5. Consideration of climate change

The FRMPs for the Danube/Bavaria (DE1000) and the Weser (DE4000) refer to the work of LAWA, which has performed a climate proofing check of all measure categories defined in Germany. The aim of this check was to proof how adaptable measures are under a changing climate. Therefore, the climate impacts (direct and indirect) on the measures have been assessed with the aim to ascertain if these measures would also perform under changed climatic conditions.

In the FRMPs for the Danube/Bavaria (DE1000) and Schlei Trave (DE9610), a safety margin (0.5m) is added when planning dykes to deal with the possible impacts from climate change[61]. For the Schlei Trave, it is further stated that measures are planned in a way that they are flexible and adjustable to cope better with climate change when the effects would be better known. In the Elbe (DE5000) FRMP, it is stated that according to the Elbe Ministerial Conference of 2013, climate change needs to be considered in measure design and climate change safety margins for measures need to be added. Several measures in the German part of the Elbe are considered by the authorities to have accounted sufficiently for impacts from climate change. No information about measures taken to mitigate the expected effects of climate change is provided for the North Rhine-Westphalia FRMP in the Rhine UoM (DE2000).

None of the FRMPs assessed provide a reference to Germany's national Climate Adaptation Strategy (2008) or its Action Plan on Adaptation (2011)[62].

Climate change scenarios have been considered in all five FRMPs assessed. The timeframes of these scenarios are:

- DE1000 (Danube/ Bavaria): 2021-2050;
- DE2000 (Rhine/ NRW): up to 2050;
- DE4000 (Weser): 2021-2050 and 2070-2099;
- DE9610 (Schlei/Trave) and DE5000 (Elbe): no information provided on the timeframe[63].

[61] Germany subsequently informed that in DE 1000 the so called '*Freibord*' was implemented which is basically a safety margin for wind and waves. Above this '*Freibord*' Bavaria has added an additional 15% margin to the statistical value of HQ100 (introduced in 2004) to meet the effects of climate change. So the expected effects of climate change are considered as being taken into account in the planning of new flood protection measures.

[62] https://www.bmub.bund.de/en/topics/climate-energy/climate/adaptation-to-climate-change/

[63] Germany subsequently informed that for DE9610 (Schlei-Trave) the time frame is 2081-2100 (to conform with IPCC projections).

Some of the FRMPs assessed provide information about shifts in the occurrence of extreme events and changes in numerical recurrence periods. In DE1000 (Danube/Bavaria), the trend modelled indicates that flooding will happen more often; however, no numbers are provided. In DE2000 (Rhine/NRW) the trend modelled indicates that flooding (low probability scenario) will not increase significantly[64]. For the other scenarios no information is given, but it is stated that further investigations will be made and shown in the second plan. In DE4000 (Weser), some results from modelling for certain gauging stations are provided. These results suggest that floods with low probability are expected more often (+13 %) for the timeframe 2050, floods with medium probability are expected to be increasing by 3 % for the time frame 2050. For the coast, increased flooding is expected due to sea level rise (+0.1m). In DE9610 (Schlei/Trave) and DE5000 (Elbe) it is stated that flood occurrence will change in the future, but no concrete trends are listed[65].

No information was found in the reporting sheets or the FRMPs with regard to whether the main sources of flooding are expected to change under the long-term climate change scenarios. However, the impacts of flash floods due to storms (which might occur more often due to climate change) will be investigated further in the second cycle.

5.1. Specific types of measures planned to address climate change

Overall, the FRMPs assessed do not provide information about specific types of measures planned to mitigate the expected effects of climate change. Some measures are mentioned, but they are not related to climate change. All plans state that measures to reduce the impacts from flooding are also considered to address the issue of climate change. Non-structural measures are found in all plans, e.g. changes to spatial planning, while provisions to make structural measures more climate proofed are made in DE1000 (Danube/Bavaria), DE5000 (Elbe) and DE9610 (Schlei Trave), as explained above.

5.2. Good practices and areas for further development concerning climate change

The following **good practices** were identified:

[64] Germany subsequently added for DE 2000 [but the information could be of a more general nature] that the scientific data on the exact effects of global climate change on local climate is not yet conclusive.

[65] For DE9610 (Schlei/Trave) Germany subsequently noted that the IPCC projects sea level rise between 0.3 and 1.0m. Acknowledging this large range, no concrete trends are listed. To cope with sea level rise and the uncertainties in the IPCC projections, a 0.5 m safety margin is, inter alia, included in the design of measures.

- Good examples of climate change consideration are found in DE1000 (Danube/Bavaria) and DE9610 (Schlei Trave, also for coastal areas) where safety margins are added to the dyke height in order to cope with climate change.
- Germany is undertaking efforts in linking climate modelling to flood risk management. Several studies have been commissioned.
- A climate proofing tool for measures was developed by the federal environmental agency that allows a systematic check of measures; this was used in two of the FRMPs assessed.

The following **areas for further development** were identified:

- Coordination between the FRMPs and the national climate change adaptation strategy.

6. Cost-benefit analysis

In all of the FRMPs assessed, it is stated that economic considerations have a role in the planning processes. It is noted that the implementation of measures is carried out on several administrative levels and responsibility is with different bodies. The FRMPs assessed, however, have no information on the use of CBA or any applied methodologies.

The following **area for further development** was identified:

- No information on the use of CBA or any applied methodologies was found in any of the FRMPs assessed.

7. Governance including administrative arrangements, public information and consultation

7.1. Competent authorities

Based on the information reported, there were recent further updates to the Competent Authorities and/or the Units of Management identified for the Floods Directive; compared to Germany's most recent reporting on Competent Authorities, which was uploaded to WISE in 2014.

7.2. Public information and consultation: consultation with stakeholders before the establishment of proposed measures for the FRMP

The DE1000, DE4000, DE9610 and DE5000 FRMPs describe who was involved and how the involvement was carried out and which formats have been used. The DE2000 (Rhine/ NRW) FRMP describes who was involved on a detailed level. Details are provided on how the involvement was carried out and which formats have been used. The information is summarised in the following tables.

The table below shows how the public and interested parties were **informed** in the five UoMs assessed concerning the draft FRMPs. Information how the consultation was actually carried out and which stakeholders participated is presented in the rest of the section:

Table 10 Methods used to inform the public and interested parties of the FRMPs

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
Media (papers, TV, radio)			✓	✓	✓
Internet	✓	✓	✓	✓	✓
Digital social networking					
Printed material	✓		✓	✓	✓
Direct mailing					
Invitations to stakeholders	✓	✓	✓	✓	✓
Local Authorities	✓			✓	✓
Meetings	✓	✓	✓	✓	✓

Source: FRMPs

The table below shows how the actual **consultation** was carried out:

Table 11 Methods used for the actual consultation

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
Via Internet	✓	✓	✓	✓	✓
Digital social networking					
Direct invitation	✓			✓	✓
Exhibitions					
Workshops, seminars or conferences	✓	✓	✓	✓	✓
Telephone surveys					
Direct involvement in drafting FRMP					
Written comments	✓	✓	✓	✓	✓

Source: FRMPs

The table below shows how the **documents** for the consultation were provided:

Table 12 Methods used to provide the documents for the consultation

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
Downloadable	✓	✓	✓	✓	✓
Direct mailing (e-mail)					
Direct mailing (post)					✓
Paper copies distributed at exhibitions					
Paper copies available in municipal buildings (town hall, library etc.)					
Paper copies at the main office of the competent authority	✓		✓	✓	✓

Source: FRMPs

7.3 Active involvement of Stakeholders

The table below shows the groups of **stakeholders** that have been actively involved in the development of the five FRMPs assessed[66]:

[66] Germany subsequently commented that optimising the reporting of stakeholder involvement would be useful.

Table 13 Groups of stakeholders

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
Civil Protection Authorities such as Government Departments responsible for emergency planning and coordination of response actions	✓	✓	✓	✓	✓
Flood Warning / Defence Authorities	✓	✓	✓	✓	✓
Drainage Authorities		✓			✓
Emergency services	✓	✓	✓	✓	✓
Water supply and sanitation	✓	✓		✓	✓
Agriculture / farmers	✓	✓	✓	✓	✓
Energy / hydropower	✓	✓			✓
Navigation / ports [67]	✓		✓	✓	✓
Fisheries / aquaculture	✓				✓
Private business (Industry, Commerce,	✓	✓	✓	✓	✓
NGO's including nature protection, social	✓	✓	✓	✓	✓
Consumer Groups		✓			
Local / Regional authorities	✓	✓		✓	✓
Academia / Research Institutions					
Cultural institutions	✓	✓	✓	✓	✓
Insurance providers	✓		✓	✓	✓
Infrastructure providers (telecom, transport)	✓		✓		✓
Planning departments		✓	✓	✓	✓
Coastal managers					✓

Source: FRMPs

The DE1000 and DE2000 FRMPs describe who was involved and provide lists of stakeholders. The FRMPs for the other UoMs covered describe who was involved and, in addition, describe how active involvement was carried out and which methods have been used. In addition to the groups listed in the table above, the FRMP for DE9610 (Schlei Trave) indicates the participation of community level and of government departments for education, labour and social issues; the FRMP for DE5000 (Elbe) identifies building departments and infrastructure.

The table below shows the **mechanisms** used to ensure the active involvement of stakeholders:

[67] The Wasser- und Schifffahrtsverwaltung (Water and Navigation Authority) was involved in the development of the FRMP. This information was subsequently provided by Germany and is not found in the FRMP.

Table 14 Mechanisms used to ensure the active involvement of stakeholders

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
Regular exhibitions					
Establishment of advisory groups			✓	✓	✓
Involvement in drafting	✓				✓
Formation of alliances					
Meetings or working groups with relevant	✓	✓		✓	✓
Meetings for different sub-catchments of the	✓	✓	✓	✓	✓
Questionnaires	✓		✓		
Information events	✓			✓	✓

Source: FRMPs

While the plans mention the mechanisms listed above, they do not provide further details – e.g. the names of the advisory groups, their roles or the number and focus of the meetings with stakeholders.

7.4. Effects of consultation

The table below shows the **effects** of consultation:

Table 15 Effects of the consultation

	DE1000 (Bavaria FRMP)	DE2000 (NRW FRMP)	DE4000 (Weser)	DE5000 (Elbe)	DE9610 (Schlei Trave)
Changes to selection of measures	✓				
Adjustment to specific measures					
Addition of new information	✓		✓	✓	
Changes to the methodology used					
Commitment to further research					
Commitment to action in the next FRMP cycle	✓	✓		✓	
Editorial changes	✓	✓	✓	✓	✓

Source: FRMPs

All FRMPs assessed refer to editorial changes following the public consultation, including to improve readability or correct names of streams. For the Danube/Bavaria FRMP, this is the only effect of consultation found[68] [69].

[68] Germany subsequently provided the information that for DE1000 (Bavaria) all stakeholders were involved in a very early stage of the development of the FRMPs as well as the in the selection of measures. Because of this

In the Weser FRMP (DE4000), new information on flood protection measures and changes in the description of the text related to protected areas following the consultation are reported.

In the Elbe FRMP (DE5000), it is reported that most statements submitted consisted of proposals for measures but also approaches for optimising and prioritising of measures. The FRMP indicates that the comments submitted include many good ideas and approaches which will be further elaborated in the second cycle. New information was added mainly to improve the legal context (e.g. cross references to existing legislation) in several parts of the plan.

7.5. Strategic Environmental Assessment

Some of the plans assessed have been subject to an SEA. In addition, Germany reported several SEAs via WISE for each UoM; however, SEAs were not uploaded to WISE for the Danube/Bavaria (DE1000), Rhine/NRW (DE2000), the Elbe (DE5000) and the Weser (DE4000). For all RBDs assessed, the results of the SEA are found on the websites of the competent authorities. In the Danube FRMP the results are also part of the plan itself. No SEA was found for the Weser B level plan (UoM), but SEAs have been carried out for the Weser C level plans (sub-catchments)[70].

7.6. Good practices and areas for further development regarding Governance

The following **good practices** were identified:

- In all UoMs assessed the competent authorities have made significant efforts for public consultation, also reaching for active involvement.
- Many actions (e.g. meetings with various stakeholders at different levels, conferences, information brochures, media outreach etc.) were set up and public involvement has been organised in an early stage of the Plans' development.
- A wide range of stakeholders contributed actively during the various stages of the plan development.

intensive involvement many stakeholders did not feel the need to comment when the Plan was put on public display. The contents were already agreed upon before the final consultation process.

69 Subsequently Germany clarified that the draft of the Schlei Trave (DE9610) FRMP was confirmed by the public consultation and only editorial clarifications were necessary.

70 CDR, www.wasserblick.net

8. Use of Art. 13.3

Under Art. 13.3, Member States may decide to make use of earlier flood risk management plans (i.e. finalised before December 2010), provided that their content is equivalent to the requirements of Art. 7 of the Floods Directive. While none of the five FRMPs assessed used Art. 13.3, a small share of Germany's FRMPs did.

The reporting sheets include references to the use of Art. 13.3 in DE2000 (specifically for the Bavarian part of the sub-basin of the Main, a tributary to the Rhine); DE4000 (concerning the Fulda, a sub-basin of the Weser for which a D-level plan exists in Hesse); and in DE5000 (Elbe), where it is very generally stated that in Saxony, flood management plans compliant with Art. 6 and 7 of the Floods Directive already existed before 2010, and that these were used according to Art. 13 1-3 (there are no C- or D-level plans, so unlikely that Art. 13.3 has been used in this UoM).

Annex A: Supplementary tables and charts on measures

This annex gives an overview of the data on measures reported by Germany in the reporting sheets. These tables and charts were used for the preparation of section 4 on measures.

Background & method

This document was produced as part of the assessment of the Flood Risk Management Plans (FRMPs). The tables and charts below are a summary of the data reported on measures by the Member States, and were used by the Member State assessors to complete the questions on the Flood measures. The data are extracted from the XMLs (reporting sheets) reported by Member States for each FRMP, and are split into the following sections:

- **Measures overview** – Tabulates the number of measures for each UoM;
- **Measure details: cost** – Cost & Cost explanation;
- **Measures details: name & location** – Location & geographic coverage;
- **Measure details: authorities** – Name of responsible authority & level of responsibility;
- **Measure details: objectives** – Objectives, Category of priority & Timetable;
- **Measure details: progress** – Progress of implementation & Progress description;
- **Measure details: other** – Other Community Acts.

On the basis of the reporting guidance (which in turn is based on the Floods Directive)[71], not all fields are mandatory, and, as such, not all Member States reported information for all fields.

Some of the fields in the XMLs could be filled in using standardised answers – for example, progress is measured via the categories set out in the Reporting Guidance. This means that producing comprehensive tables and charts required little effort. For many fields, however, a free data format was used. For some Member States, this resulted in thousands of different answers, or answers given in the national language.

In such situations, tables and charts were developed using the following steps:

- A first filter is applied to identify how many different answers were given. If a high number of different answers are given, Member States assessors were asked to refer to

[71] http://icm.eionet.europa.eu/schemas/dir200760ec/resources

the raw data when conducting the assessment, and this Annex does not reflect these observations.

- If a manageable number of answers are given, obvious categories are identified, and raw data sorted.
- Measures missing information may be assigned categories based on other fields (for example, if the level of Responsibility Authority is missing, the information may be obvious from the field "name of Responsible Authority").
- Measures where obvious categories cannot be defined based on other available information (as in the example above on the name of the responsible authorities), are categorised as "no information".

Types of measures used in reporting

The following table[72] is used in the reporting on the types of measures. Each type of measures is coded as an M-number. Measures are grouped in an 'aspect'.

NO ACTION M11: No Action	**PREPAREDNESS** M41: Flood Forecasting & Warning M42: Emergency response planning M43: Public Awareness M44: Other preparedness
PREVENTION M21: Avoidance M22: Removal or relocation M23: Reduction M24: Other prevention	**RECOVERY & REVIEW** M51: Clean-up, restoration & personal recovery M52: Environmental recovery M53: Other recovery
PROTECTION M31: Natural flood management M32: Flow regulation M33: Coastal and floodplain works M34: Surface Water Management M35: other protection	**OTHER MEASURES** M61: Other measures

[72] Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a

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Measures overview

Table A1 - Total number of measures

Number of individual measures	0
Number of individual measures including measures which have been allocated to more than one measure type	0
Number of aggregated measures	17 568
Number of aggregated measures including measures which have been allocated to more than one measure type	25 023
Total number of measures	17 568
Total number of measures including measures which have been allocated to more than one measure type	25 023
Range of number of measures between UoMs including measures which have been allocated to more than one measure type (Min-Max)	54 - 13 108
Average number of measures across UoMs including measures which have been allocated to more than one measure type	2 502

Note: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Figures in this section consequently refer to aggregated measures – groups of measures as opposed to individual measures.

Table A2 - Total number of measures per measure type and UoM, including duplicates

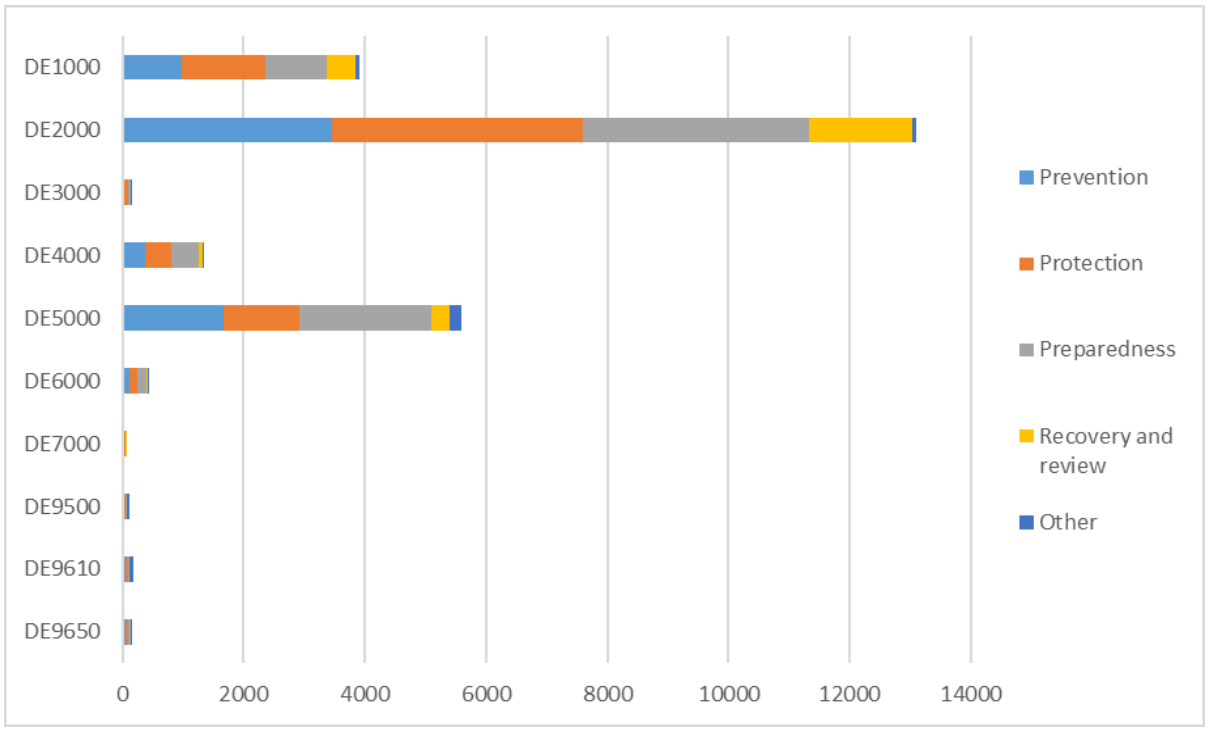
	Prevention				Total	Protection					Total	Preparedness				Total	Recovery and review			Total	Other	Total	Grand total
	M21	M22	M23	M24		M31	M32	M33	M34	M35		M41	M42	M43	M44		M51	M52	M53		M61		
DE1000	435	50	401	92	978	578	261	260	244	39	1 382	385	262	262	108	1 017	191	92	194	477	56	56	3 910
DE2000	1 580	18	1 332	533	3 463	1 798	772	768	693	106	4 137	1 384	902	1 062	379	3 727	595	384	724	1703	78	78	13 108
DE3000	16	1	11	8	36	22	7	7	6	9	51	10	9	16	6	41	3		1	4	2	2	134
DE4000	176	2	124	65	367	204	37	77	64	62	444	129	100	155	61	445	33		31	64	27	27	1 347
DE5000	830	39	570	230	1 669	451	127	231	318	126	1 253	524	430	512	705	2 171	201		116	317	179	179	5 589
DE6000	87	1	22	4	114	35	31	40	30	3	139	55	28	28	28	139	27		4	31	5	5	428
DE7000	10		9	4	23	7	4	3	4	1	19	4	2	4		10			2	2			54
DE9500	16		1	8	25	7		12	7		26	10	7	2	7	26					43	43	120
DE9610	27		24	9	60	9		12	9	1	31	14	4	2	10	30	1		1	2	57	57	180
DE9650	34	2	20	4	60	9	6	9	7	6	37	12	6	6	8	32	6		6	12	12	12	153

	Prevention				Total	Protection					Total	Preparedness				Total	Recovery and review			Total	Other	Total	Grand total
	M21	M22	M23	M24		M31	M32	M33	M34	M35		M41	M42	M43	M44		M51	M52	M53		M61		
Grand Total	3 211	113	2 514	957	6 795	3 120	1 245	1 419	1 382	353	7 519	2 527	1 750	2 049	1 312	7 638	1 057	476	1 079	2 612	459	459	25 023
Average all UoMs	321	11	251	96	680	312	125	142	138	35	752	253	175	205	131	764	106	48	108	261	46	46	2 502

Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type. All measures are aggregated as Germany did not report any individual measures.

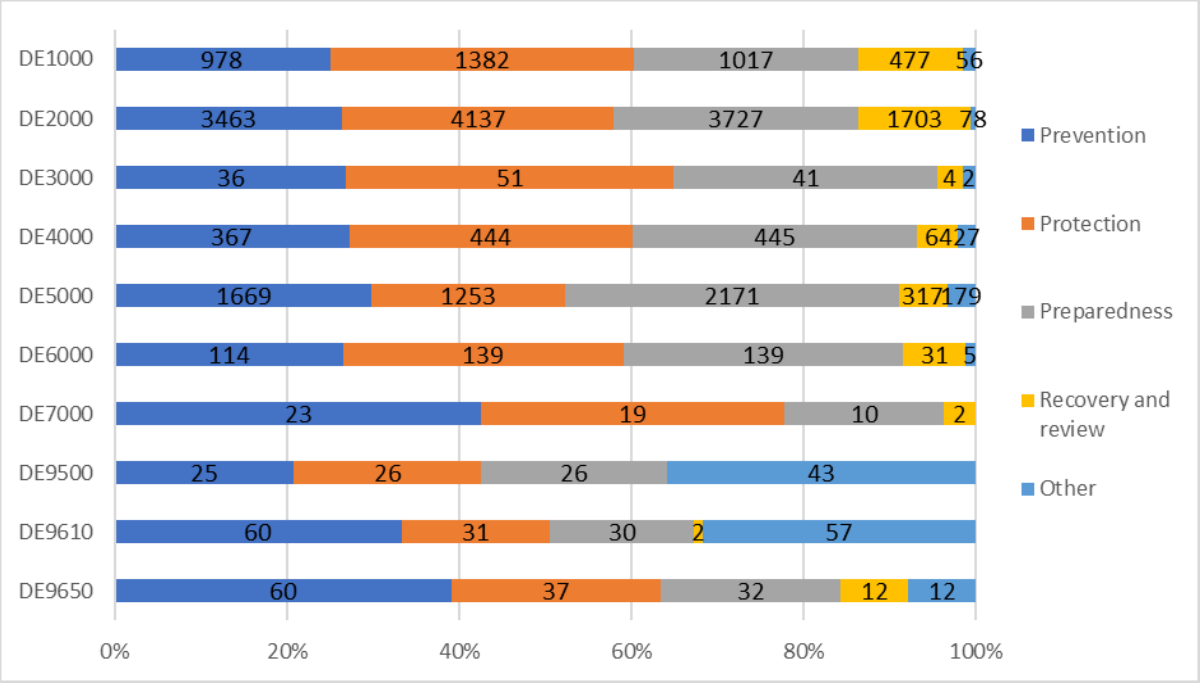
The information in Table A2 is visualised in Figures A1 and A2 below:

Figure A1 - Number of total measures (individual and aggregate) by measure aspect



Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type. All measures are aggregated as Germany did not report any individual measures. Note also that several UoMs reported considerably more measures than others, making some measures less visible.

Figure A2 - Share of total measures (aggregated and individual) by measure aspect



Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type. All measures are aggregated as Germany did not report any individual measures. Note also that several UoMs reported considerably more measures than others, making some measures less visible.

Measure details: cost

Member States were requested to report information on:

- Cost (optional field);
- Cost explanation (optional field).

Information about costs was not provided in the reporting sheets.

Measure details: name & location

Member States were requested to report information on the following:

- Location of implementation of measures (mandatory field);
- Geographic coverage of the impact of measures (optional field).

Location of measures

Germany provided information about the location of all its 25 023 measures, however, this was an open question in the reporting sheets, and as such, the level of detail varies and a large

number of different responses were given. It was thus not practical to aggregate the information.

Geographic coverage

Germany did not provide information about the geographic coverage of any of the measures in the reporting sheets.

Measure details: objectives

Member States were requested to report information on:

- Objectives linked to measures (optional field, complementary to the summary provided in the textual part of the XML);
- Category of priority (conditional, reporting on either 'category of priority' or 'timetable' is required);
- Timetable (conditional, reporting on either 'category of priority' or 'timetable' is required).

Objectives

Germany did not report information about the objectives of the measures.

Category of priority

Germany provided information for the priority of all measures. The following categories are used in the reporting sheet:

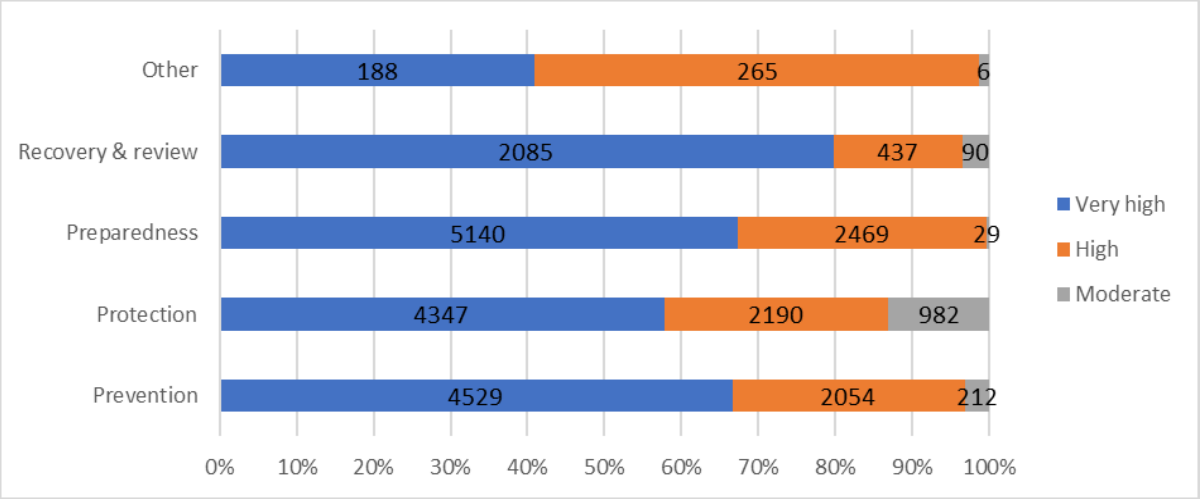
- Critical;
- Very high;
- High;
- Moderate;
- Low.

Table A3 - Category of priority by measure aspect

	Very high	High	Moderate	Grand Total
Prevention	4 529	2 054	212	6 795
Protection	4 347	2 190	982	7 519
Preparedness	5 140	2 469	29	7 638
Recovery & review	2 085	437	90	2 612
Other	188	265	6	459
Grand Total	**16 289**	**7 415**	**1 319**	**25 023**

Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type. No measures of priority 'critical' or 'low' were reported.

Figure A3 - Visualisation of Table A3: Category of priority by measure aspect



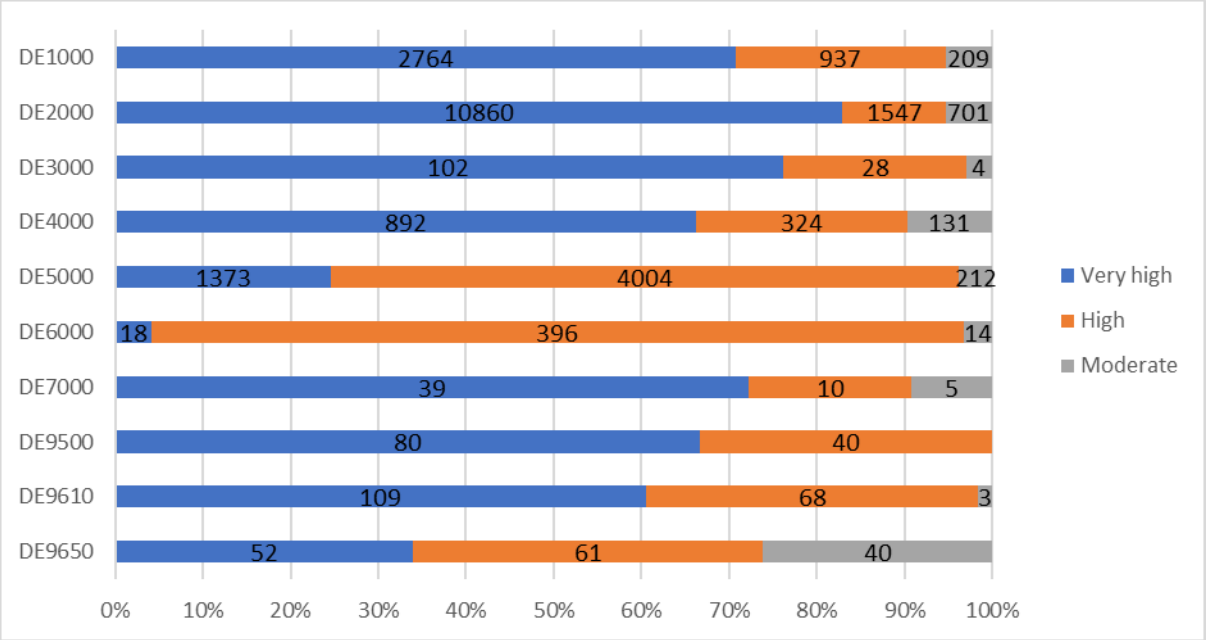
Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type. No measures of priority 'critical' or 'low' were reported.

Table A4 - Category of priority by UoM

	Very high	High	Moderate	Grand Total
DE1000	2 764	937	209	3 910
DE2000	10 860	1 547	701	13 108
DE3000	102	28	4	134
DE4000	892	324	131	1 347
DE5000	1 373	4 004	212	5 589
DE6000	18	396	14	428
DE7000	39	10	5	54
DE9500	80	40		120
DE9610	109	68	3	180
DE9650	52	61	40	153
Grand Total	**16 289**	**7 415**	**1 319**	**25 023**
Average all UoMs	**1 629**	**742**	**132**	**2 502**

Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type. No measures of priority 'critical' or 'low' were reported.

Figure A4 - Visualisation of Table A4: Category of priority by UoM



Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type. No measures of priority 'critical' or 'low' were reported.

Timetable

Germany did not report any information about the timetable of the measures in the reporting sheets.

Measure details: authorities

Member States were requested to report on:

- Name of the responsible authority (optional if 'level of responsibility' is reported);
- Level of responsibility (optional if 'name of the responsible authority' is reported).

Information about the names of the responsible authorities was not provided in the reporting sheets but the level of responsibility of the authorities was indicated for all measures. However, the measures reported more than one level of responsible authority, creating some double counting and making the aggregation of the data difficult. The majority of the measures will be implemented by authorities at the federal state, municipal and regional level.

Measure details: progress

Member States were requested to report information on:

- Progress of implementation of measures (mandatory field) – this is a closed question whose responses are analysed below;
- Progress description of the implementation of measures (optional field) – this is an open text question for which not all Member States reported and whose answers are not analysed here.

Germany reported information about the progress of implementation of all measures. The Progress of implementation was reported as[73]:

- COM (completed);
- OGC (ongoing construction);
- POG (progress ongoing);
- NS (not started).

A full definition of these terms can be found at the end of this section.

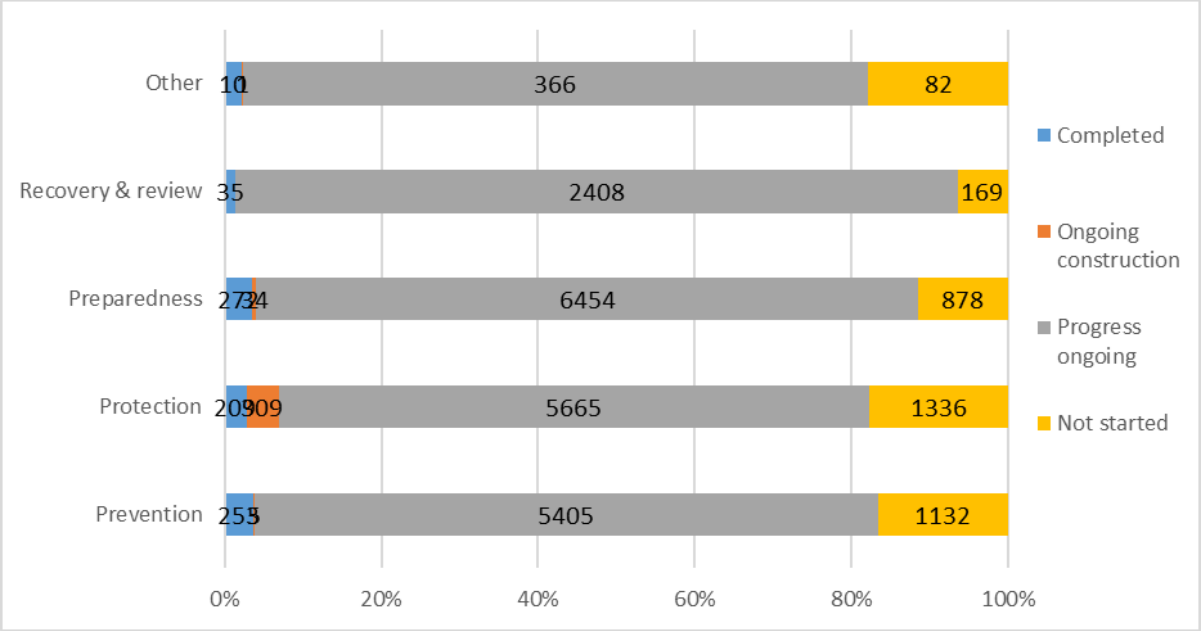
Table A5 – Progress of implementation by measure aspect

	Completed	Ongoing construction	Progress ongoing	Not started	Grand Total
Prevention	253	5	5 405	1 132	6 795
Protection	209	309	5 665	1 336	7 519
Preparedness	272	34	6 454	878	7 638
Recovery & review	35		2 408	169	2 612
Other	10	1	366	82	459
Grand Total	**779**	**349**	**20 298**	**3597**	**25 023**

Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type.

[73] Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a

Figure A5 - Visualisation of Table A5: Progress of implementation by measure aspect



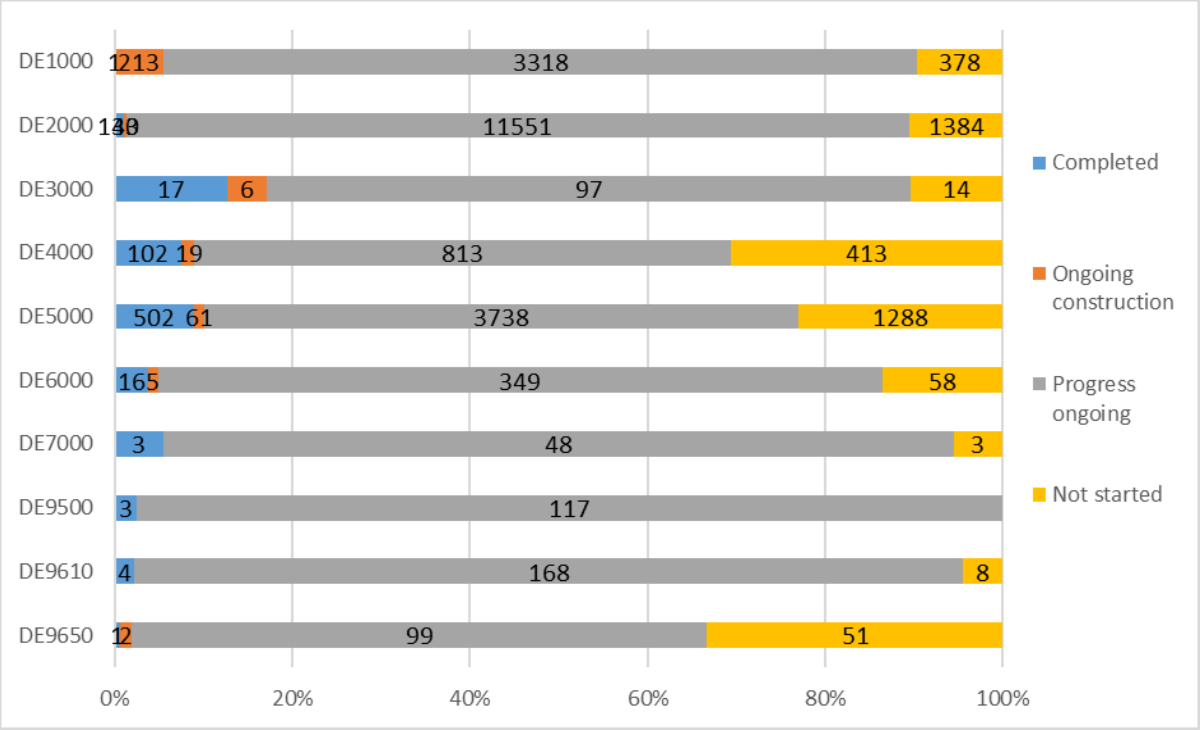
Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type.

Table A6 – Progress of implementation by UoM

	Completed	Ongoing construction	Progress ongoing	Not started	Grand Total
DE1000	1	213	3 318	378	3 910
DE2000	130	43	11 551	1 384	13 108
DE3000	17	6	97	14	134
DE4000	102	19	813	413	1 347
DE5000	502	61	3 738	1 288	5 589
DE6000	16	5	349	58	428
DE7000	3		48	3	54
DE9500	3		117		120
DE9610	4		168	8	180
DE9650	1	2	99	51	153
Grand Total	**779**	**349**	**20 298**	**3 597**	**25 023**
Average all UoMs	**78**	**35**	**2 030**	**360**	**2 502**

Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type.

Figure A6 - Visualisation of Table A6: Progress of implementation by UoM



Notes: Germany reported only aggregated measures and has indicated that each measure reported refers to a series of actions and projects. Consequently, the total count of measures is not reflected in the numbers reported. The total includes measures assigned to more than one measure type.

The categories describing the progress of measures are defined in the EU Reporting Guidance Document on the Floods Directive:

For **measures involving construction or building works** (e.g. a waste water treatment plant, a fish pass, a river restoration project, etc.):

- Not started (NS) means the technical and/or administrative procedures necessary for starting the construction or building works have not started.
- Progress on-going (POG) means that administrative procedures necessary for starting the construction or building works have started but are not finalised. The simple inclusion in the RBMPs is not considered planning in this context.
- On-going construction (OGC) means the construction or building works have started but are not finalized.
- Completed (COM) means the works have been finalised and the facilities are operational (maybe only in testing period in case e.g. a waste water treatment plant).

For measures involving **advisory services** (e.g. training for farmers):

- Not started (NS) means the advisory services are not yet operational and have not provided any advisory session yet.
- Progress on-going (POG) means the advisory services are operational and are being used. This is expected to be the situation for all multi- annual long/mid-term advisory services that are expected to be operational during the whole or most of

RBMP cycle.

- On-going construction (OGC): Not applicable
- Completed (COM) means an advisory service that has been implemented and has been finalised, i.e. is no longer operational. This is expected only for advisory services that are relatively short term or one-off, and which duration is time limited in relation to the whole RBMP cycle.

For **measures involving research, investigation or studies:**

- Not started (NS) means the research, investigation or study has not started, i.e. contract has not been signed or there has not been any progress.
- Progress on-going (POG) means the research, investigation or study has been contracted or started and is being developed at the moment.
- On-going construction (OGC): Not applicable
- Completed (COM) means the research, investigation or study has been finalised and has been delivered, i.e. the results or deliverables are available (report, model, etc.).

For **measures involving administrative acts** (e.g. licenses, permits, regulations, instructions, etc.):

- Not started (NS) means the administrative file has not been opened and there has not been any administrative action as regards the measure.
- Progress on-going (POG) means an administrative file has been opened and at least a first administrative action has been taken (e.g. requirement to an operator to provide information to renew the licensing, request of a permit by an operator, internal consultation of draft regulations, etc.). If the measure involves more than one file, the opening of one would mean already "ongoing".
- On-going construction (OGC): Not applicable
- Completed (COM) means the administrative act has been concluded (e.g. the license or permit has been issued; the regulation has been adopted, etc.). If the measure involves more than one administrative act, "completed" is achieved only when all of them have been concluded.

Measure details: other

Member States were requested to provide information on:

- Other Community Acts associated to the measures reported (optional field);
- Any other information reported (optional field).

Germany reported no information about other Community Acts in the reporting sheets. Nevertheless, 2 801 measures had information for 'any other information', however as this was an open question, there was a large number of different responses and aggregation of the data was not possible.

Annex A1: Overview of Germany's FRMPs

Note: FRMPs not reported to WISE are indicated in *italics*. FRMPs assessed in this report are indicated in **bold**.

Table A1.1Overview of Germany's FRMPs

UoM	A-Level (International level)	B-Level (National level)	C-Level (*Land* level)
DE1000 Donau / Danube	• Management Plan of the International Management Unit Danube		• Floods Risk Management Plan on the Share of the State of Baden-Württemberg in the Danube River Basin District • Flood Risk Management Plan for the State of Bavaria in the Danube River Basin District
DE2000 Rhine	• *Management Plan of the international Management unit Rhine*	• *Flood Risk Management Plan for the Mosel-Saar processing area in the international Rhine river basin*	• Flood Risk Management plan on the share of the Free State of Bavaria in the Rhine river basin –Bodensee part • Flood Risk Management Plan on the share of the Free State of Bavaria - Main part (Art. 13) • Flood Risk Management Plan on the share of the free state of Thuringia in the Rhine River Basin District • Flood Risk Management Plan on the share of the state of Baden-Württemberg in the Rhine River Basin District - Alpenrhein part • Coordination reports for each plan mentioned above addressing the link to the international level • Flood Risk Management Plan on the share of the state of Baden-Württemberg in the Rhine River Basin District - Hochrhein part • Flood Risk Management Plan on the share of the state of Baden-Württemberg in the Rhine River Basin District - Oberrhein part

UoM	A-Level (International level)	B-Level (National level)	C-Level (*Land* level)
			• Flood Risk Management Plan on the share of the state of Baden-Württemberg in the Rhine River Basin District - Neckar part • Flood Risk Management Plan on the share of the state of Baden-Württemberg in the Rhine River Basin District - Main part • Coordination reports for each plan in BW mentioned above addressing the link to the international level • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Gersprenz part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Kinzing part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Main part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Muemling part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Neckar part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Nidda part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Rhein-Hessisches Ried part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Rhein-Rheingau part • Flood Risk Management Plan on the share of the state of

UoM	A-Level (International level)	B-Level (National level)	C-Level (*Land* level)
			Hesse in the Rhine River Basin District –Schwarzbach part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District –Sulzbach-Liederbach part • Flood Risk Management Plan on the share of the state of Hesse in the Rhine River Basin District – Lahn part • Flood Risk Management Plan on the share of the state of Lower Saxony in the Rhine River Basin District • **Flood Risk Management Plan on the share of the state of North Rhine-Westphalia in the Rhine River Basin District** • Flood Risk Management Plan on the share of the state of Rhineland-Palatinate in the Rhine River Basin District - Mittelrhein part • Flood Risk Management Plan on the share of the state of Rhineland-Palatinate in the Rhine River Basin District - Niederrhein part • Flood Risk Management Plan on the share of the state of Rhineland-Palatinate in the Rhine River Basin District - Oberrhein part • Flood Risk Management Plan on the share of the state of Rhineland-Palatinate in the Rhine River Basin District - Mosel-Saar part • Flood Risk Management Plan on the share of the state of Saarland in the Rhine River Basin District
DE3000 Ems	• *International Reconciliation Report Ems*	• German part of the management plan of the international management unit Ems	• Flood Risk Management Plan for the share of North Rhine-Westphalia in the Ems river basin district

UoM	A-Level (International level)	B-Level (National level)	C-Level (*Land* level)
			• Flood Risk Management Plan for the share of Lower Saxony in the river basin district of Ems
DE4000 Weser		• **Flood Risk Management Plan of the Weser River Basin District**	• Flood Risk Management Plan for the share of the state of Hessen in the Weser river basin district, Diemel-Weser part • Flood Risk Management Plan for the share of the state of Hessen in the Weser river basin district, Fulda part • Flood Risk Management Plan for the share of the state of Hessen in the Weser river basin district, Werra part • *Flood Risk Management Plan for the share of the state of Lower Saxony in the Weser river basin district* • Flood Risk Management Plan for the share of North Rhine-Westphalia in the Weser river basin district
DE5000 Elbe	• *Flood Risk Management Plan for the international river basin Elbe*	• **Flood Risk Management Plan of the national share of the Elbe river basin district**	• *Statements by the State of Schleswig-Holstein on the Flood Risk Management Plan on the national share of the Elbe river basin district* • Statements by the State of Bavaria on the Flood Risk Management Plan on the national share of the Elbe river basin district
DE6000 Oder	• Flood Risk Management Plan of international river basin district Oder	• Floods Risk Management Plan on the national share of the river basin district Oder	
DE7000 Maas	• Management plan of the Maas international unit of management		• Flood Risk Management Plan for the share of North Rhine-Westphalia in the river basin district of Maas
DE9500 Eider	• Flood Risk Management Plan of the International River Basin District Eider prepared by Schleswig		

UoM	A-Level (International level)	B-Level (National level)	C-Level (*Land* level)
	Holstein as the international share with DK is very little		
DE9610 Schlei-Trave	• **Flood Risk Management Plan of the Schlei/Trave** (international UoM/RBD: FRMP prepared by Schleswig Holstein and Mecklenburg-Vorpommern as the international share with DK is quite small)		
DE9650 Warnow-Peene			• Flood Risk Management plan for the share of the state of Mecklenburg-Vorpommern in the river basin district Warnow Peene

Links to Germany's FRMPs can be found via the following web page: http://www.wasserblick.net/servlet/is/148748/

Annex B: Definitions of measure types

Table B1 Types of flood risk management measures[74]

No Action	
M11	No Action, No measure is proposed to reduce the flood risk in the APSFR or other defined area,
Prevention	
M21	Prevention, Avoidance, Measure to prevent the location of new or additional receptors in flood prone areas, such as land use planning policies or regulation
M22	Prevention, Removal or relocation, Measure to remove receptors from flood prone areas, or to relocate receptors to areas of lower probability of flooding and/or of lower hazard
M23	Prevention, Reduction, Measure to adapt receptors to reduce the adverse consequences in the event of a flood actions on buildings, public networks, etc...
M24	Prevention, Other prevention, Other measure to enhance flood risk prevention (may include, flood risk modelling and assessment, flood vulnerability assessment, maintenance programmes or policies etc...)
Protection	
M31	Protection Natural flood management / runoff and catchment management, Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and / or storage, enhancement of infiltration, etc and including in-channel, floodplain works and the reforestation of banks, that restore natural systems to help slow flow and store water.
M32	Protection, Water flow regulation, Measures involving physical interventions to regulate flows, such as the construction, modification or removal of water retaining structures (e.g., dams or other on-line storage areas or development of existing flow regulation rules), and which have a significant impact on the hydrological regime.
M33	Protection, Channel, Coastal and Floodplain Works, Measures involving physical interventions in freshwater channels, mountain streams, estuaries, coastal waters and flood-prone areas of land, such as the construction, modification or removal of structures or the alteration of channels, sediment dynamics management, dykes, etc.
M34	Protection, Surface Water Management, Measures involving physical interventions to reduce surface water flooding, typically, but not exclusively, in an urban environment, such as enhancing artificial drainage capacities or though sustainable drainage systems (SuDS).
M35	Protection, Other Protection, Other measure to enhance protection against flooding, which may include flood defence asset maintenance programmes or policies
Preparedness	
M41	Preparedness, Flood Forecasting and Warning, Measure to establish or enhance a flood forecasting or warning system
M42	Preparedness, Emergency Event Response Planning / Contingency planning, Measure to establish or enhance flood event institutional emergency response planning
M43	Preparedness, Public Awareness and Preparedness, Measure to establish or enhance the public awareness or preparedness for flood events
M44	Preparedness, Other preparedness, Other measure to establish or enhance preparedness for flood

[74] Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a

	events to reduce adverse consequences
Recovery & Review	
M51	Recovery and Review (Planning for the recovery and review phase is in principle part of preparedness), Individual and societal recovery, Clean-up and restoration activities (buildings, infrastructure, etc), Health and mental health supporting actions, incl. managing stress Disaster financial assistance (grants, tax), incl. disaster legal assistance, disaster unemployment assistance, Temporary or permanent relocation, Other
M52	Recovery and Review, Environmental recovery, Clean-up and restoration activities (with several sub-topics as mould protection, well-water safety and securing hazardous materials containers)
M53	Recovery and Review, Other, Other recovery and review Lessons learnt from flood events Insurance policies
Other	
M61	Other

Catalogue of Natural Water Retention Measures (NWRM)

NWRM cover a wide range of actions and land use types. Many different measures can act as NWRM, by encouraging the retention of water within a catchment and, through that, enhancing the natural functioning of the catchment. The catalogue developed in the NWRM project represents a comprehensive but non prescriptive wide range of measures, and other measures, or similar measures called by a different name, could also be classified as NWRM.

To ease access to measures, the catalogue of measures hereunder is sorted by the primary land use in which it was implemented: Agriculture; Forest; Hydromorphology; Urban. Most of the measures however can be applied to more than one land use type.

Table B2 List of NWRMs

Agriculture	Forest	Hydro Morphology	Urban
A01 Meadows and pastures	F01 Forest riparian buffers	N01 Basins and ponds	U01 Green Roofs
A02 Buffer strips and hedges	F02 Maintenance of forest cover in headwater areas	N02 Wetland restoration and management	U02 Rainwater Harvesting
A03 Crop rotation	F03 Afforestation of reservoir catchments	N03 Floodplain restoration and management	U03 Permeable surfaces
A04 Strip cropping along contours	F04 Targeted planting for 'catching' precipitation	N04 Re-meandering	U04 Swales
A05 Intercropping	F05 Land use conversion	N05 Stream bed re-naturalization	U05 Channels and rills
A06 No till agriculture	F06 Continuous cover forestry	N06 Restoration and reconnection of seasonal	U06 Filter Strips

Agriculture	Forest	Hydro Morphology	Urban
		streams	
A07 Low till agriculture	F07 'Water sensitive' driving	N07 Reconnection of oxbow lakes and similar features	U07 Soakaways
A08 Green cover	F08 Appropriate design of roads and stream crossings	N08 Riverbed material renaturalisation	U08 Infiltration Trenches
A09 Early sowing	F09 Sediment capture ponds	N09 Removal of dams and other longitudinal barriers	U09 Rain Gardens
A10 Traditional terracing	F10 Coarse woody debris	N10 Natural bank stabilisation	U10 Detention Basins
A11 Controlled traffic farming	F11 Urban forest parks	N11 Elimination of riverbank protection	U11 Retention Ponds
A12 Reduced stocking density	F12 Trees in Urban areas	N12 Lake restoration	U12 Infiltration basins
A13 Mulching	F13 Peak flow control structures	N13 Restoration of natural infiltration to groundwater	
	F14 Overland flow areas in peatland forests	N14 Re-naturalisation of polder areas	

Source: www.nwrm.eu