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First Flood Risk Management Plans - Member State: Bulgaria

Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the implementation of the Water Framework Directive (2000/60/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 and 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 Bulgaria¹. 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 FRMPs² as per Articles 7 and 15 of the FD: this reporting provides an overview of the plans and details on their measures.
- The FRMPs: Bulgaria has four Units of Management (UoMs) and it reported an FRMP for each UoM. All four FRMPs are covered in this assessment.

¹ The present Member State assessment 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.

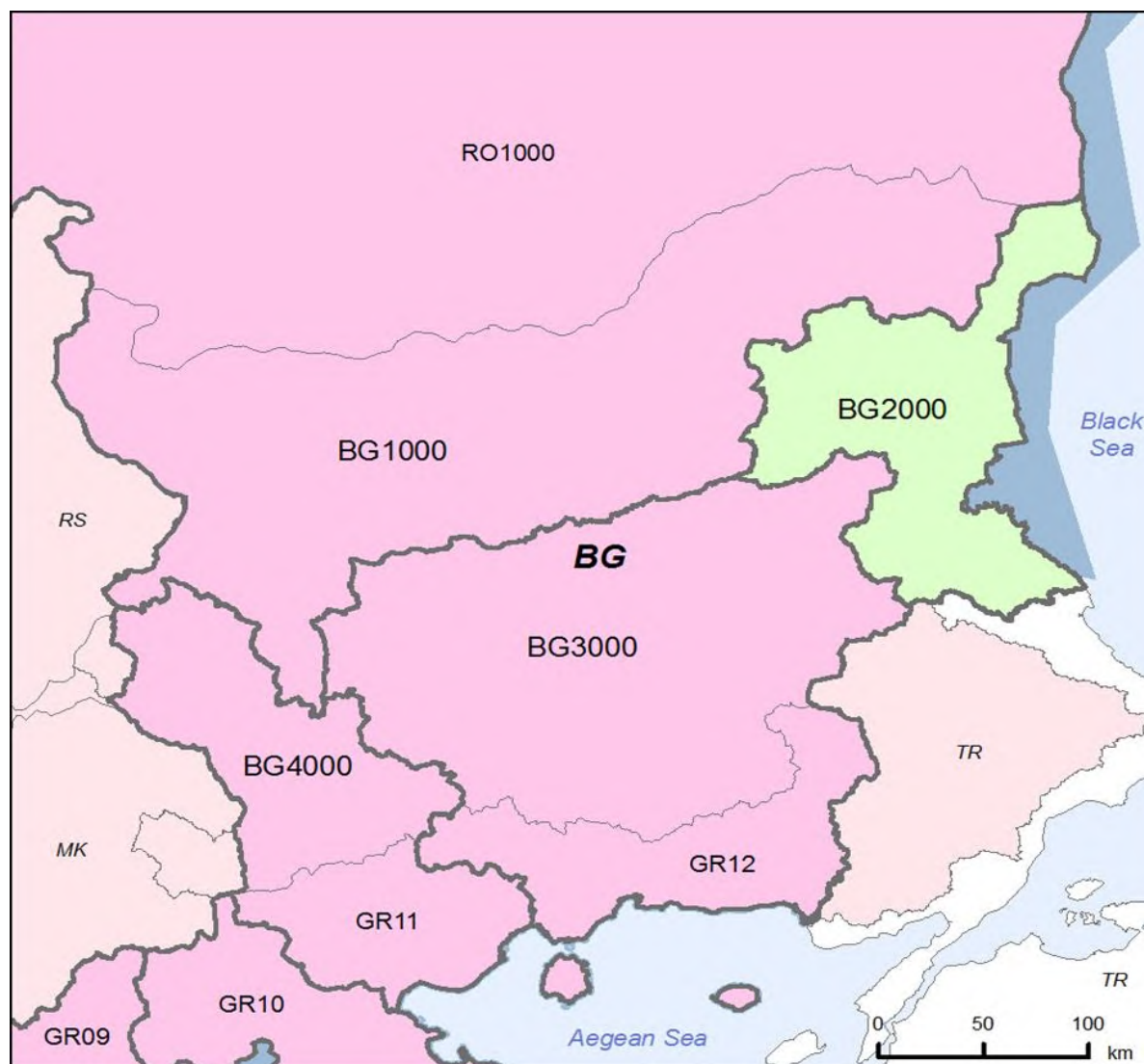
² Referred to as “Reporting Sheets” throughout this report. Data must be reported in a clear and consistent way by all Member States. The format for reporting was jointly elaborated by the Member States and the Commission as part of a collaborative process called the “Common Implementation Strategy”:






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

In Bulgaria, the UoMs designated under the FD are identical to the River Basin Districts (RBDs) under the Water Framework Directive (WFD). For each of the four UoMs (or RBDs) the responsible authorities are Basin Directorates, which prepared one FRMP per UoM.

Water policy is set at the national level and the four FRMPs followed nationally approved methodologies and a catalogue of objectives and measures. The content of the FRMPs is similar to the extent that they follow the national approach, however there are small differences

e.g. due to the size of the UoMs, the presence of coastal waters or other specific features of each UoM. Each FRMP is accompanied by a number of annexes or other supporting documents such as maps, methodologies etc. The content of the annexes is similar across the FRMPs, but the exact number of annexes differs per FRMP as each Basin Directorate had a different approach in grouping maps, tables with information about the objectives, measures and other detailed information.

All FRMPs and the national programmes for their implementation were approved with special Decisions of the Council of Ministers in December 2016³.

Table 1 below gives an overview of all UoMs in Bulgaria, including the UoM code, the name, and the number of APSFRs reported. It also shows if the UoM reported all documents required to the European Environment Agency's (EEA) Water Information System for Europe (WISE)⁴ – the FRMP as a PDF and the reporting sheet as an XML.

Table 1 *Overview of UoMs in Bulgaria*

UoM	Name	Number of APSFRs	XML Reported	PDF Reported
BG1000	DANUBE	26	Yes	Yes
BG2000	BLACK SEA	45	Yes	Yes
BG3000	EAST AEGEAN	31	Yes	Yes
BG4000	WEST AEGEAN	14	Yes	Yes
TOTAL		116		

The final version of the FRMPs can be downloaded from the following web pages:

- Danube RBD/UoM: <http://www.bd-dunav.org/content/upravlenie-na-vodite/upravlenie-na-riska-ot-navodneniia/plan-za-upravlenie-na-riska-ot-navodneniia/>
- Black Sea RBD/UoM: https://www.bsbd.org/bg/page_purn_bsbd.html
- East Aegean RBD/UoM: http://earbd.org/indexdetails.php?menu_id=611
- West Aegean RBD/UoM: <http://www.wabd.bg/index.php/2015-06-25-12-30-02/2016-2021>

Overview of the assessment

Table 2 below gives an overview of the evidence found during the assessment of the FRMPs. The following categorisation was used for the column concerning evidence:

³ With its decisions №1104 for BG1000, №1103 for BG2000, №1109 for BG3000 and №1105 for BG4000, dated from 29th of December 2016, the Bulgarian Council of Ministers approved all FRMPs and the national programmes for their implementation.

⁴ <http://rod.eionet.europa.eu/obligations/603/deliveries?id=603&tab=deliveries&d-4014547-p=1&d-4014547-o=2&d-4014547-s=3>

- **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	Flood Risk Management objectives have been established in all four FRMPs based on five national priorities and 17 corresponding national objectives that constitute the 'national catalogue of objectives'. In most cases all 17 national objectives were translated into UoM and ASPFR objectives considering the specific local characteristics of the area. When necessary, additional UoM or ASPFR-specific objectives were also developed. The objectives are grouped under five priority areas: <ol style="list-style-type: none"> 1. Protecting human lives and public health; 2. Higher level of protection of the critical infrastructure and businesses; 3. Increasing the protection of the environment; 4. Improving the preparedness and reactions of the population; 5. Improving the administrative capacity for flood risk management.
FRM objectives relate to...		
...the reduction of potential adverse consequences	Strong evidence	The objectives planned under the first three national priorities relate to the reduction of the potential adverse consequences of floods. They cover e.g. minimising the number of people hurt or impacted by floods, minimising the number of impacted social infrastructure, improving the protection of the technical infrastructure and important economic,

Criterion	Evidence	Comments
		cultural and historic sites, improving the protection of the sewage systems and industrial sites (mainly IPPC and SEVESO sites).
...to the reduction of the likelihood of flooding	Some evidence	The FRMPs state that this is not a separate priority but instead that it is integrated in the objectives under the other national flood protection priorities.
...to non-structural initiatives	Strong evidence	The objectives planned under the last two national priorities relate to non-structural initiatives and administrative measures. They cover e.g. increasing the preparedness of the population in case of floods, improving the reactions of the population in case of floods, creating a modern normative base for territorial planning and FRM and ensuring the adequate reactions of the public institutions in case of floods.
FRM objectives consider relevant potential adverse consequences to...		
...human health	Strong evidence	The objectives planned under the last two national priorities relate to non-structural initiatives and administrative measures. They cover e.g. increasing the preparedness of the population in case of floods, improving the reactions of the population in case of floods, creating a modern normative base for territorial planning and FRM and ensuring the adequate reactions of the public institutions in case of floods.
...economic activity	Strong evidence	The objectives planned under the national priority for higher level of protection of the critical infrastructure and businesses (priority 2) specifically address the potential adverse effects on economic activity. There are two objectives: 2.1 Improving the protection of the technical infrastructure and 2.2 Improving the protection of important economic, cultural, and historic sites.
...environment	Strong evidence	The objectives planned under the national priority for increasing the protection of the environment (priority 3) specially focus on the

Criterion	Evidence	Comments
		adverse consequences for the environment: 3.1 Improving the protection of the sewage systems; 3.2 Improving the protection of industrial sites (mainly IPPC and SEVESO sites); 3.3 Minimising the impacted areas for protected waters, protected territories and protected zones; 3.4 Improving the water retention capabilities of agricultural, forest and coastal areas.
...cultural heritage	Strong evidence	The potential adverse effects on the cultural heritage are specifically addressed under the objectives of the national priority for higher level of protection of the critical infrastructure and businesses (see the row on economic activity above).
Measures have been...		
...identified	Strong evidence	In total 199 measures are reported across the four UoMs. The highest number of measures are reported for the East Aegean UoM (BG3000; 66 measures) followed by the Danube UoM (BG1000; 52 measures), the Black Sea UoM (BG2000; 49 measures) and the West Aegean UoM (BG4000; 32 measures). Aggregated measures (66) are reported only for the East Aegean UoM, while individual measures (133) are reported only for the other three UoMs. However, Bulgaria does not specify the distinction between individual and aggregated measures. Measures are reported for all five aspects - prevention, protection, preparedness, recovery and review - and other. The most measures are reported for preparedness (61), prevention (60) and protection (53).
...prioritised	Strong evidence	Priority is reported for all measures. The majority of the measures are classified as 'high' priority (107) and 'moderate' priority (36), while the fewest measures are classified as 'low' priority (10). Most of the prevention, protection and preparedness measures are ranked as 'high' priority followed by 'moderate' and 'very high' priority.

Criterion	Evidence	Comments
		The prioritisation of the measures in all four FRMPs was based on the same methodology where the measures were analysed against five criteria: percentage of achieved objectives; urgency of the measure; cost of the measure; extent of problem solving (i.e. effectiveness); and timeline of implementation.
Relevant aspects of Article 7 have been taken into account such as...		
...costs & benefits	Strong evidence	A cost-benefit analysis (CBA) was used for the prioritisation and planning of all measures in all four of the FRMPs, based on a common national CBA methodology.
...flood extent	Strong evidence	The FRMPs contain summaries of the findings from the PRFAs and refer to the FHRMs, which show for several flood scenarios the geographical areas affected, the flood extent, water depths and flow velocity.
...flood conveyance	Some evidence	According to the FRMPs this has been considered in the analysis and in the preparation of the programme of measures, but further details are not provided.
...water retention	Strong evidence	According to the FRMPs this has been considered in the analysis and in the preparation of the programme of measures, and natural water retention measures (NWRMs) were included in all four FRMPs.
...environmental objectives of the WFD	Some evidence	To ensure compatibility and synergies between the FRMPs and the River Basin Management Plans (RBMPs), the analysis of the draft FRM measures included an assessment of the impacts of each draft measure on the objectives of the WFD and the needs for any exceptions in accordance with Art.4.7. Moreover, each of the FRMPs includes green infrastructure or NWRMs that are compatible with the objectives of the WFD.
...spatial planning/land use	Strong evidence	Spatial planning/land use measures are included in all four FRMPs. Most often these measures will remove illegal constructions, stored materials, fences or other objects in

Criterion	Evidence	Comments
		river beds and banks or impeding the water conveyance in the river beds or banks; and they will propose legislative measures for controlling construction in areas of flood risk or ban construction in areas of flood risk.
...nature conservation	Strong evidence	Nature conservation is considered in all FRMPs as one of the five national priorities and corresponding national objectives concern environmental protection. Examples of specific measures from the four FRMPs include protection of wetlands or protected territories, reconstruction of wetlands, 're-naturalisation' of rivers, protection of river coasts from erosion and afforestation.
...navigation/port infrastructure	No evidence	Ports and navigation do not seem to be included in the specific measures for any of the FRMPs. However, one of the five national priorities and corresponding national objectives concern the protection of critical infrastructure. Hence, it is possible that in some cases ports are considered critical infrastructure and addressed by general measures for protection of the critical infrastructure.
...likely impact of climate change	Some evidence	According to the FRMPs this aspect has been considered in the analysis and in the preparation of the programme of measures, but only limited details are provided.
Coordination with other countries ensured in the RBD/UoM	Strong evidence	Coordination with neighbouring countries took place at all steps of the FRMPs preparation (PFRA, APSFRs, FHRMs, draft programmes of measures (PoMs) and draft FRMPs) and the FRMPs provide details about specific meetings that took place and issues/topics that were covered at those meetings.
Coordination ensured with WFD	Strong evidence	The FRMPs and the RBMPs in Bulgaria are developed by the same authorities - the Basin Directorates. In addition, the national law requires the public consultations for both types of plans to be run in parallel so the

Criterion	Evidence	Comments
		public consultations for each of the draft FRMPs and RBMPs for the 2016-2021 period were conducted in parallel.
Active involvement of interested parties	Some evidence	Each of the draft FRMPs was open for six-month public consultations. The main mechanism for consultation was direct involvement in the preparation of the FRMPs through stakeholder meetings and meetings of the Basin Councils. The Basin Councils are multi-stakeholder advisory groups, which comprise of e.g. researchers, public administration, NGOs and water users, and support the Basin Directorates in their work.

Good practices

The assessment identified the following good practices in the Bulgarian FRMPs assessed

Table 3 *Good practices in the Bulgarian FRMPs*

Topic area	Good practices identified
Integration of previously reported information in the FRMP.	The preparation of the APSFRs and the FHRMs followed a common national methodology and was coordinated with all neighbouring countries, even in the cases where no transboundary APSFRs were defined.
Setting of objectives for the management of flood risk.	<p>The objectives in the FRMPs are based on a national catalogue of objectives. For each of the objectives, guidance is given on the priorities associated to objectives and how nine qualitative indicators can be used to set priorities. The indicators include applicability, economic effectiveness and likelihood to reduce the risk of floods. The objectives from the national ‘catalogue’ were translated into UoM or even APSFR objectives considering specific local characteristics. An Annex to each FRMP provides a version of the national catalogue of objectives specific for the UoM. Details on how the national catalogue has been tailored to the specific needs of an FRMP are unclear.</p> <p>In the FRMPs, the national indicators that will be used to assess the progress to achieving each of the objectives are described.</p> <p>The annexes to the FRMP for the Danube (BG1000) provide information how the objectives for each APSFR were set together with the level of confidence of the available information for each objective along three levels: low, medium and high confidence.</p> <p>In their annexes the FRMPs for the Black Sea (BG2000) and the East</p>

Topic area	Good practices identified
	<p>Aegean (BG3000) provide tables that not only describe the objectives from the national catalogue but also qualitatively assess their relevance to certain criteria (e.g. applicability, economic effectiveness, likelihood to reduce the risk of floods).</p> <p>The FRMP of the Black Sea UoM (BG2000) summarises the conflicts and synergies between the 17 national objectives. It is unclear how the trade-offs and synergies have been identified.</p>
<p>Planning/implementing of measures and their prioritization for the achievement of objectives.</p>	<p>All FRMPs provide information about the location, cost, responsible authority, priority and links to the WFD of each planned measure. In addition, this information is provided in a reader-friendly tabular format as annexes to the FRMPs. The prioritisation of all measures is based on a common national methodology. All FRMPs include NWRMs though they differ across the different UoMs.</p> <p>All FRMPs contain the national indicators for tracking progress towards achievement of the objectives (as explained above). The FRMPs for the Black Sea (BG2000), the East (BG3000) and West Aegean (BG4000) also define indicators for tracking the implementation of some of the planned measures (e.g. the measures for monitoring and control). The FRMP for the West Aegean (BG4000) goes one step further to define two separate indicators per planned measure - one for tracking implementation progress and one for tracking progress towards achieving the objectives.</p>
<p>Use of CBA in the FRMP assessed.</p>	<p>All FRMPs provide a description of the CBA methodology either in the main text or in Annexes. The methodology seems comprehensive and it is reported to be consistent with the Commission's 'Guide to CBA of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2014 - 2020'. The applied CBA methodology was used to estimate the costs and benefits of all measures.</p>
<p>Public participation.</p>	<p>All four FRMPs provide details about the public consultations in dedicated chapters often summarising the general stakeholder involvement strategy before describing the actions for consultation for the different steps of the FRMPs (i.e. PFRA, APSFRs, FHRMs). The information is detailed with references to locations and dates of the stakeholder meetings. In addition, each of the FRMPs includes an annex that summarises the changes to the PoMs resulting from the public consultations measure by measure.</p> <p>All four FRMPs also have dedicated chapters that summarise the results of the Strategic Environmental Assessments (SEAs).</p> <p>Furthermore, the public consultations for the draft FRMPs, their SEAs and the public consultations for the draft RBMPs run in parallel.</p>
<p>Flood risk governance.</p>	<p>The links between the FRMPs and the objectives of the WFD have been considered in all FRMPs. In addition to organising the public consultations of the FRMPs and the RBMPs at the same time, to</p>

Topic area	Good practices identified
	<p>ensure compatibility and synergies between the plans, the analysis of the draft FRMP measures included an assessment of the impacts of each draft measure on the objectives of the WFD. Each of the FRMPs provides information (usually in annexes) about the identified synergies or impacts of the planned measures on the objectives of the WFD and the respective RBMPs (overall, conclusions are presented per type of measure from the national catalogue of RBMP measures or per water body/specific FRM measure).</p> <p>The authorities of the UoMs, i.e. the Basin Directorates, are responsible for the development of both the RBMPs and the FRMPs. In addition, each Directorate is supported in their work by Basin Councils that comprise a variety of stakeholders such as local, regional and national authorities, NGOs and public authorities for the drinking water and sewage systems. Other stakeholders can provide feedback through the public consultations as indicated above.</p>
International issues in flood risk management.	<p>Coordination with neighbouring countries took place at all steps of the FRMPs' preparation (PFRA, APSFRs, FHRMs, draft PoMs and draft FRMPs) and dedicated chapters in the FRMPs summarise the outcomes of the coordination at each step with references to specific meetings (e.g. date and location) and concrete issues covered at those meetings. In addition to cooperation via meetings organised by International Commission for the Protection of the Danube River (ICPDR), bilateral meetings were held with Romania, Greece and with Bulgaria's non-EU neighbouring countries: FYROM, Serbia and Turkey.</p>

Areas for further development

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

Table 4 Areas for further development in the Bulgarian FRMPs

Topic area	Areas identified for further development
Integration of previously reported information in the FRMPs.	<p>The reporting of the FHRMs was delayed and Bulgaria was not included in the preliminary EU study assessing the FHRMs.</p> <p>Although the FRMPs report that the results of the previous steps (PFRA, APSFRs and FHRMs) fed into the following steps and the preparation of the FRMPs, details are not provided.</p>
Setting of objectives for the management of flood risk.	<p>Overall, the FRMPs did not provide information about the timeline for achievement of the objectives</p>
Planning/implementation of measures and their prioritization for the	<p>Even though all FRMPs refer to the timely implementation of the measures and explain that the timelines will be considered when monitoring the progress of implementation, they do not report</p>

Topic area	Areas identified for further development
achievement of objectives.	what the timeline for each measure or group of measures is. Although common national indicators for tracking progress to the national and UoM-specific objectives have been formulated, there is no information against what baseline values these indicators will be measured.
Consideration of climate change in the FRMPs assessed.	While climate change is considered in the preparation of three of the four FRMPs, whereas in two of those even different scenarios were taken into account, the FRMPs do not explicitly relate the results of the climate change considerations to the measures planned e.g. to justify or explain the choice of measures. The national climate change adaptation strategy is under development. Nonetheless, all four FRMPs specify that climate change will be considered further in the update of the plans in the next period.
Use of CBA in the FRMPs assessed.	The results of the CBA, measure by measure, are not presented in all FRMPs. Only the FRMPs for the Black Sea (BG2000) and the West Aegean (BG4000) provide annexes with the results of the CBA for all measures. Furthermore, it is unclear if and how the transboundary measures/effects have been considered in the CBA.
Public participation.	The FRMPs do not include a list/summary of the types of stakeholders consulted during the public consultations, this information is available but scattered across the chapters on public consultation.

Recommendations

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

- The application of previously generated information (on PFRA and FHRMs) towards the preparation of the FRMPs should be incorporated better, e.g. through providing concrete examples.
- The elaboration of objectives and measures should be improved by clearly indicating the timeline for achievement and implementation. The baseline values against which progress will be assessed, and which indicators will be tracked, should be considered.
- The second cycle FRMPs should provide more detail on how climate change considerations are addressed in the planned measures, including how these influence the selection and design of measures. Coordination between the Plans and the national adaptation strategy should be ensured as soon as the strategy is adopted (and even before since it is still under development).
- Providing the results of the CBA, measure by measure where possible (e.g. for prioritisation of measures that lend themselves to it), in all FRMPs would make the FRMPs consistent amongst them. Furthermore, the FRMPs should clarify if and how the measures with transboundary effects have been considered in the CBA.

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

1.1 Reporting of the FRMPs

Bulgaria has reported four FRMPs, one for each of its four UoMs. In addition, other documents have been reported for some of the UoMs, such as annexes and supporting documents.

Bulgaria did not make use of Article 13(3) of the FD, which allows Member States to make use of previous FRMPs (provided their content is equivalent to the requirements set out in the Directive).

1.2 Assessment of the FRMPs

All four of the Bulgarian FRMPs have been assessed. Each FRMP covers one of Bulgaria's four UoMs:

Table 5 UoMs in Bulgarian National FRMPs

UoM code	UoM Name
BG1000	Danube
BG2000	Black Sea
BG3000	East Aegean
BG4000	West Aegean

2. Integration of previously reported information

2.1 Conclusions drawn from the preliminary flood risk assessment

In all of the FRMPs, the conclusions of the PRFA are provided in a textual description and summary maps of the APSFRs (usually one map per UoM) are presented in the FRMPs.

The assessment of pre-existing flood risks in Bulgaria was undertaken using a national methodology, approved by the Ministry of Environment and Water in July 2011. Although the structure and level of detail of the PFRA presentation varies across the four UoMs, they all present a brief description of the assessment, information about the main floods and their causes in the past, analysis of the potential floods in the future (e.g. causes and impacts) and designation of APSFRs. In the presentation of the conclusions of the PFRA, the FRMPs of the Black Sea (BG2000) and the East Aegean (BG3000) stand out as more detailed compared to the other two FRMPs. For example, the Black Sea FRMP provides a description of the national methodology for the PFRA, including information used to model future floods, and detailed description of the significant floods in the past. The East Aegean FRMP also provides information about the national PFRA methodology and its annexes contain detailed maps of the past and potential future floods together with references and sources for the analysis⁵.

In addition to the clear references to the APSFR process and analysis, all FRMPs indicate where all APSFR maps can be found. One map with all APSFRs per UoM is presented as an Annex to each of the FRMPs. However, only two of the FRMPs (BG1000 and BG3000) contain direct weblinks to the Basin Directorates' websites where all relevant APSFR information, including more detailed maps, can be found. One FRMP (BG4000) explains in the text that more detailed maps of the APSFRs can be found on the website of the Basin Directorates but without providing direct weblinks. The Black Sea FRMP (BG2000) references only its own annexes that contain an overview map and a list of all APSFRs without further information where to find more detailed or additional APSFR maps⁶. A quick online search suggests that detailed maps and further information about the APSFRs can be found on the websites of all Basin Directorates⁷. All four FRMPs state that the flood extent and conveyance routes were taken into account in the preliminary risk analysis (particularly in the PFRA) and

⁵ FRMPs: BG1000, Chapter 2, pp.12-16 and Annexes 2 and 3; BG2000, Chapter 2, pp.14-39 and Annexes 2 and 3; BG3000, Chapter 2, pp.34-46 and Annexes 2.2.1 and 2.2.2; BG4000, Chapter 2, pp.9-18 and Annexes 1 and 2.

⁶ FRMPs: BG1000, Chapter 2, pp.12-16 and Annex 3; BG2000, Chapter 2, pp.14-39 and Annex 2; BG3000, Chapter 2, pp.34-46 and Annex 2.2.1 and 2.2.2; BG4000, Chapter 2, pp.9-18 and Annex 1

⁷ APSFR information for the Danube UoM (BG1000) can be found at:

<http://www.bd-dunav.org/content/upravlennie-na-vodite/upravlennie-na-riska-ot-navodneniia/rayoni-sas-znachiteln-potencialen-risk-ot-navodneniia/>

APSFR information for the Black Sea UoM (BG2000) can be found at:
https://www.bsbd.org/bg/index_bg_2934486.html

APSFR information for the East Aegean UoM (BG3000) can be found at:

http://earbd.org/indexdetails.php?menu_id=178

APSFR information for the West Aegean UoM (BG4000) can be found at:

<http://www.wabd.bg/index.php/2106-2021/2016-09-08-12-31-55>

the preparation of the programmes of measures (PoMs) together with other important aspects. However, further details are not provided⁸.

2.1.1 Coordination with neighbouring Member States on shared RBDs/UoMs

All four FRMPs contain chapters specifically about the cross-border/transnational coordination of the preparation of the FRMPs. During each step of the FRMP preparation (e.g. PFRA, development of APSFR, FHRMs etc.) authorities from Bulgaria coordinated and exchanged information with relevant counterparts in neighbouring countries. The FRMPs provide summaries of the coordination at each step with references to specific meetings (including their dates and locations) and concrete issues that were covered⁹.

During the coordination of PFRAs, transboundary APSFRs were defined only within the Danube (BG1000) and the East Aegean (BG3000) UoMs, in the latter case for the Maritsa River shared with Greece and Turkey. Transboundary coordination for Bulgaria's Danube UoM takes place in the context of the International Commission for the Protection of the Danube River (ICPDR) and the joint commission with Romania, in the context of the Bilateral Agreement on Cooperation in Water Management. Representatives from Bulgaria's Danube Basin Directorate participate in two expert groups (EGs) of the ICPDR - "Flood protection" and "Information governance and GIS". As part of these two EGs, the Danube Basin Directorate presented the methodology and criteria for the national PFRAs and provided the necessary information for the development of the common APSFR for the internal Danube UoM. During the bilateral coordination with Romania, the authorities discussed the methodologies and decided to designate a transboundary APSFR for the part of the Danube shared by the two countries¹⁰.

Transboundary coordination with Greece for the East Aegean UoM takes place in the context of the Joint Declaration for Cooperation in the Area of Water Management with Greece. The national methodology, criteria and draft APSFRs for the UoM were discussed at the meetings of the joint expert group under this Declaration together with the transboundary APSFR for the Maritsa river¹¹.

Coordination with Member States took place also in the UoMs where no transboundary APSFRs were defined. For the Black Sea UoM (BG2000) the bilateral meeting with Romania (which took place on 5 June 2013 in Bucharest) concluded that there is no need to define

⁸ FRMPs: BG1000, Chapter 5, p.65; BG2000, Chapter 2, p.14; BG3000, Chapter 5, p.102; BG4000, Chapter 3, pp.21-22.

⁹ FRMPs: BG1000, Chapter 9, pp.109-115; BG2000, Chapter 9, pp.123-139; BG3000, Chapter 9, pp.214-219; BG4000, Chapter 9, pp.80-85.

¹⁰ This took place in the context of the second working meeting of the representatives of the competent authorities for implementation of the FD in Bulgaria and Romania and in line with the decisions of the joint commission; the meeting took place on 5 June 2013 in Bucharest

¹¹ APSFRs were discussed at two meetings of the joint expert group (one that took place on 23 April 2013 in Thessaloniki and another that took place on 8 May 2014 in Athens) and a meeting of the technical sub-group to the joint expert group that was held 25-26 July 2013 in Blagoevgrad

transboundary APSFRs. Even though no transboundary APSFRs were designated for the West Aegean UoM (BG4000), methodologies and data were exchanged with Greece in the context of bilateral meetings¹².

Coordination took place also with non-EU countries. The cross-border coordination with Turkey takes place in the context of the Joint Declaration for Coordination in the Area of Water Resources (20 March 2012), which covers also flood risk management. An expert work group was created in the context of this Declaration. The work for designation of APSFRs in the Black Sea and East Aegean UoMs was discussed at the meeting of the expert group on 30-31 May 2013 in Sofia. This meeting covered issues such as the Bulgarian methodology for APSFR determination, criteria for classification of the flood risks and draft APSFRs in the East Aegean.

According to the West Aegean FRMP, the methodologies for PFRA and APSFRs were discussed at the first expert meeting for cooperation with FYROM in the context of the WFD and the FD but more details are not provided. The Danube FRMP explains that cooperation with Serbia is at an initial stage and on 24 February 2014 an expert meeting on water management took place in Belgrade covering e.g. data and results from the APSFR analysis and assessment of the flood risks.

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

The results of the PFRA and the APSFRs fed into the preparation of the FHRMs. All FRMPs state that the FHRMs were prepared using a national methodology approved by the Ministry of Environment and Water, FHRMs were prepared for all APSFRs in a given UoM and cover three different scenarios as requested in the FD (see the next section for more details). The FHRMs confirmed the original findings and the APSFRs were not changed as a result of the FHRMs findings. However, further details about the use of the PFRA for the preparation of the FHRMs are not provided in the FRMPs¹³.

2.2 Presentation of FHRMs in the FRMPs

FHRMs are provided in all of the FRMPs as examples reproduced in the FRMPs and via weblinks to the websites of the Basin Directorates where all FHRMs can be found. Although the FRMPs provide details about the methodology for the preparation of the FHRMs, only two FRMPs (BG2000 and BG3000) specify what kind of floods have been considered. In

¹² Meetings of the joint expert group held 22-24 April 2013 in Thessaloniki and on 8 May 2014 in Athens; and meetings of the technical sub-group held on 26 April 2012 in Kavala and 25-26 July 2013 in Blagoevgrad

¹³ FRMPs: BG1000, Chapter 2, pp.12-16, Chapter 3, pp.17-27; BG2000, Chapter 2, pp.14-39, Chapter 3, pp.39-77; BG3000, Chapter 2, pp.34-46, Chapter 3, pp.47-91; BG4000, Chapter 2, pp.9-18, Chapter 3, pp.19-27.

The national methodology 'Methodology for assessment of the threat and risk of floods in accordance with the requirements of Directive 2007/60/EC', referenced in each FRMPs, can be found at:

<http://www5.moew.government.bg/wp-content/uploads/filebase/Water/Povarnostnivodi/PORN/RZPRN/Final-report.zip>

particular, in the Black Sea FRMP (BG2000) risks from fluvial and seawater floods were considered, while in the East Aegean (BG3000) only fluvial floods were considered.

The FRHMs were developed based on a common national methodology. As a first step, flood hazard maps were developed for each APSFR under three flood scenarios: high probability (20-year occurrence), medium probability (100-year occurrence) and low probability (1000-year occurrence). These maps show several aspects, namely the geographical areas affected, the flood extent, water depths and flow velocity. One of the FRMPs (East Aegean, BG3000) reports two additional scenarios that were considered, namely an extreme scenario in which dam walls break and a special scenario for the transboundary region. As a next step, flood risk maps were prepared for each APSFR and the same scenarios. These maps show potential adverse consequences associated with floods for several categories:

- number of inhabitants potentially affected;
- types of economic activity and land area potentially affected;
- installations that can cause additional pollution if affected (according to the national legislation for environmental protection) or other potential sources of pollution;
- protected areas in accordance with the WFD or other policies (e.g. Natura 2000);
- critical infrastructure (especially facilities of social infrastructure); and
- sites of cultural or historical importance.

In the Danube (BG1000) and West Aegean (BG4000) UoMs the potential impact of floods on the sources of public drinking water supply were considered but not mapped. For the Danube UoM (BG 1000) the results of the analysis are instead included as an Annex to the FRMP¹⁴. For the East Aegean UoM (BG3000), the sources for public drinking water supply have been taken into account and mapped as elements of the critical infrastructure¹⁵.

Overall, the FRMPs aim to summarise the methodology/process and key results from the FHRMs rather than to present actual maps. All of the FRMPs provide one or several examples of the flood hazard maps and the flood risk maps but none of the FRMPs reproduces all of the FHRMs prepared for the respective UoMs. Three of the FRMPs (BG2000, BG3000 and BG4000) provide weblinks to the websites of the Basin Directorates where all FHRMs can be found and explored. The FRMP for the East Aegean (BG3000) even references an interactive 'module' for visualisation of the maps in addition to the complete database of maps. One FRMP (Danube, BG1000) includes only a link to maps for BG1_APSFR_DU_001 but does not include links to other maps. The report explains that there have been some delays with finalising the maps. A survey of the Basin Directorate's website in 2018 shows that all maps are now available¹⁶.

¹⁴ FRMPs: BG1000, Chapter 3, pp.17-27 and Annexes 10 and 11; BG2000, Chapter 3, pp.39-77 and Annexes 6-14; BG3000, Chapter 3, pp.47-91 and Annexes 3.1.1-3.1.4; BG4000, Chapter 3, pp.19-27.

¹⁵ Information clarified by the national authorities.

¹⁶ The maps are available at the following links:

2.2.1 Maps for shared flood risk areas

FHRMs were prepared for all risk areas shared with other Member States in transboundary UoMs. As previously noted, transboundary flood risk areas were defined only within the Danube (BG1000) and East Aegean (BG3000) UoMs for the Danube and Maritsa rivers respectively. The development of the FHRMs for these two transboundary APSFRs was coordinated and based on mutually agreed methodologies within the international Danube river basin and with Greece. The Danube FRMP explains that the FHRMs for the Bulgarian area of the Danube were prepared as part of the project Danube Floodrisk¹⁷, which included all countries from the ICPDR as partners to the project – in Bulgaria the Ministry of Environment and Water and the University of Architecture, Civil Engineering and Geodesy in Sofia were partners – and the ICPDR as one of the observers to the project. As part of the project all national methodologies were coordinated and a common database with all necessary data was set up. The preparation of the FHRMs for the transboundary area with Romania was bilaterally coordinated at each step of the preparation. The preparation of the FHRMs for the transboundary APSFR shared with Greece was coordinated by the technical sub-group to the joint expert group under the Joint Declaration for Cooperation in the Area of Water Management with Greece. At its meetings, the methodologies of the two countries were discussed, a common methodology (e.g. concerning the scenarios to include) for the development of the FHRMs in the transboundary areas was agreed and necessary data exchanged¹⁸.

2.2.2 Conclusions drawn from the FHRMs

Generally, the conclusion from the PFRA, the APSFRs and the FHRMs were all used to prepare the draft FRMPs. Although not many details are provided, it appears that the FHRMs were used: firstly, to verify the defined APSFRs and confirm there were no needs for modifications to those areas; secondly, to define specific objectives and measures per APSFR based on a national ‘catalogue’ of priorities and measures (for further details see sections 3 and 4).

Danube (BG1000) FHRMs: <http://www.bd-dunav.org/content/upravlenie-na-vodite/upravlenie-na-riska-ot-navodneniia/karti-na-zaplahata-i-riska-ot-navodneniia/>;

Black Sea (BG2000) FHRMs: https://www.bsbd.org/bg/karti_na_zaplahata_i_riska_ot_navodneniia.html;

East Aegean (BG3000) FHRMs: http://earbd.org/indexdetails.php?menu_id=564; and interactive module for visualisation of the mapping results: http://bdibr.erp-bg.net/bdibr/map_default.phtml;

West Aegean (BG4000) flood hazard maps: <http://www.wabd.bg/index.php/2106-2021/2016-08-25-08-31-36>; and flood risk maps: <http://www.wabd.bg/index.php/2106-2021/2016-08-25-08-33-09>.

¹⁷ <http://www.danube-floodrisk.eu/>

¹⁸ FRMPs: BG1000, Chapter 9, pp.109-115; BG2000, Chapter 9, pp.123-139; BG3000, Chapter 9, pp.214-219; BG4000, Chapter 9, pp.80-85. Reporting sheets, Summary of coordination.

2.3 Changes to the APSFRs or other Flood Risk Areas

No changes are reported concerning the APSFRs and the FHRMs. In fact, three of the FRMPs (BG2000, BG3000 and BG4000) report that the final APSFRs were confirmed only in 2013. Bulgaria was also late in reporting its FHRMs on time.

2.4 Areas for further development in the earlier assessment of the FHRMs

There is no information about Bulgaria as the country was late with the reporting of the FHRMs and the Commission has not assessed Bulgaria's FHRMs as of yet.

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

The following **good practice** was identified:

- The preparation of the APSFRs and the FHRMs followed a common national methodology and was coordinated with all neighbouring countries, even in the cases where no transboundary APSFRs were defined.

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

- Although the FRMPs report that the results of the previous steps (PFRA, APSFRs and FHRMs) fed into the subsequent steps and eventually into the preparation of the FRMPs, more details, or specific examples illustrating how, should be provided.

3. Setting of Objectives

3.1 Focus of objectives

The Flood Risk Management objectives in Bulgaria were set at the national level through a ‘catalogue’ of five national priorities and 17 national objectives within these priorities. In most cases, all the 17 national objectives were relevant for a given UoM and were therefore translated into UoM and ASPFR objectives considering the specific local characteristics. When the analysis of the local characteristics and conclusions from the PFRA and FHRMs deemed it necessary, additional UoM or ASPFR-specific objectives were developed in addition to the national objectives.

The five national priorities and their corresponding national objectives are:

1. Protecting human lives and public health:
 - 1.1. Minimising the number of people hurt or impacted by floods;
 - 1.2. Ensuring the fast conveyance of waters from urban areas in cases of intensive rainfall or floods;
 - 1.3. Re-establishing normal living conditions;
 - 1.4. Minimising the number of impacted social infrastructure.
2. Higher level of protection of the critical infrastructure and businesses:
 - 2.1. Improving the protection of the technical infrastructure;
 - 2.2. Improving the protection of important economic and cultural and historic sites.
3. Increasing the protection of the environment:
 - 3.1. Improving the protection of the sewage systems;
 - 3.2. Improving the protection of industrial sites (mainly IPPC and SEVESO sites);
 - 3.3. Minimising the impacted areas for protected waters, protected territories and protected zones;
 - 3.4. Improving the water retention capabilities of agricultural, forest and coastal areas.
4. Improving the preparedness and reactions of the population:
 - 4.1. Increasing the preparedness of the population in case of floods;
 - 4.2. Improving the reactions of the population in case of floods.
5. Improving the administrative capacity for FRM:
 - 5.1. Creating a modern normative base for territorial planning and FRM;
 - 5.2. Providing operative information for FRM;
 - 5.3. Enhancing the qualification/skills of the personnel responsible for FRM;
 - 5.4. Minimising the flood risk along the water route of the whole river basin;
 - 5.5. Ensuring the adequate reactions of the public institutions in case of floods¹⁹.

Consequently, in the FRMPs assessed²⁰:

¹⁹ FRMPs: BG1000, Chapter 4, pp.27-35 and Annexes 4,5,6,7 and 8; BG2000, Chapter 4, pp. 77-81 and Annexes 15, 16 and 17; BG3000, Chapter 4, pp. 91-100 and Annex 4.1.1; BG4000, Chapter 4, pp. 27-32 and Annex 3

- The objectives aim to reduce the adverse consequences of floods.
- The objectives aim to reduce the likelihood of flooding²¹.
- The objectives refer to measures that will be implemented.
- The objectives refer to non-structural measures²².

3.2 Specific and measurable objectives

In Bulgaria, the objectives are specific and measurable to a certain extent. They have quantitative targets to achieve and clearly defined locations but there is no information about how or by when they should be achieved. All FRMPs refer to the national ‘catalogue’ of objectives and have formulated APSFR-specific variations of the national objectives. In the chapters describing the implementation of the FRMPs, the plans report indicators²³. Overall, the reported indicators are quantifiable and focus on e.g. number of people, percentages or sizes of areas. There are quantifiable indicators for each of the 17 national objectives and other UoM/APSFR-specific objectives. Some good examples include:

- number of people potentially impacted by floods with a probability of occurrence 1 %;
- number of social infrastructure facilities potentially impacted by floods with a probability of occurrence 1 %; similar indicators are used in relation to industrial facilities, critical infrastructure, cultural and historical sites;
- percentage of the area with ensured fast conveyance of water compared to the total urban area;
- area of protected territories that is exposed to pollution from polluted waters in case of floods, measured in ha;
- proportion of qualified personnel²⁴ compared to the total qualified personnel needed, measured by percentage.

3.3 Objectives to reduce adverse consequences from floods

In the FRMPs assessed, the objectives do not provide further specification of the type of adverse consequences that will be reduced.

²⁰ These categories are included in Art. 7 of the FD.

²¹ 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.

²² Non-structural measures include measures such as flood forecasting and raising awareness of flooding as well as land use planning, economic instruments and insurance

²³ FRMPs: BG1000, Chapter 6, pp.89-94 and Table 9; BG2000, Chapter 6, pp.98-103 and Table 9; BG3000, Chapter 6, pp.200-202 and Table on p.201; BG4000, Chapter 6, pp.68-70 and Table 14

²⁴ As this is an indicator for the objective ‘enhancing the qualification/skills of the personnel responsible for FRM’ it can be assumed it refers to the skills or qualification of personnel in FRM, however the specific qualifications are not defined in the objective or the FRMPs. FRMPs: BG1000, Chapter 6, pp.92-94; BG2000, Chapter 6, pp. 101-102; BG3000, Chapter 6, pp. 201-202; BG4000, Chapter 6, pp. 68-69.

3.4 Objectives to address the reduction of the likelihood of flooding

According to the FRMPs, reducing the likelihood of flood risk was not defined as a separate priority but was instead integrated in the other priorities and objectives of the national ‘catalogue’.

3.5 Process for setting the objectives

During the preparation of the FRMPs a project funded by the European Structural and Investment Funds was implemented to outline a set of national FRM priorities and objectives i.e. a national 'catalogue' of objectives. The draft FRMPs (including the draft objectives) for each UoM were open for public consultation in the process of ensuring public participation (for more details see section 7). Although climate change impacts are mentioned in the concluding chapters of three of the FRMPs (Danube, East and West Aegean), there is no information in the FRMPs to indicate whether and if yes how climate change has influenced the definition of objectives²⁵.

3.6 Good practices and areas for further development regarding setting objectives

The following **good practices** were identified:

- The objectives in the FRMPs are based on a national ‘catalogue’ of objectives (formatted as a table). For each of the objectives, guidance is given on the priorities associated to objectives and how nine qualitative indicators can be used to set priorities. The indicators include applicability, economic effectiveness and likelihood to reduce the risk of floods.
- The objectives from the national ‘catalogue’ were translated into UoM or even APSFR objectives considering the specific local characteristics. The Annexes to the FRMPs provide a FRMP specific version of the national catalogue of objectives. Details on how the national catalogue has been tailored to the specific needs of an FRMP are unclear.
- In Chapter 6 of the FRMPs assessed, the national indicators that will be used to assess the progress to achieving each of the objectives are described.
- The annexes to the FRMP for the Danube UoM (BG1000, Annexes 5, 6, 7 and 8) provide information how the objectives for each APSFR were set together with the level of confidence of the available information for each objective along three levels: low, medium and high confidence²⁶.

²⁵ FRMPs: BG1000, Chapters 4, 11 and 13; BG2000, Chapters 4 and 11; BG3000, Chapters 4, 11 and 13; BG4000, Chapters 4, 11 and 13.

²⁶ The level of confidence appears to assess the credibility of the information used to analyse the local characteristics and thus to define APSFR specific objectives. Examples of low levels of confidence include: no data for past floods, the PFRA was based only on modelling or flood risk management measures have already been taken. Examples of high levels of confidence include: lessons learnt from past floods, significant number of past floods or information based on the FHRMs.

- In their annexes the FRMPs for the Black Sea (BG2000, Annex 15) and the East Aegean (BG3000, Annex 4.1.1) provide tables that not only describe the objectives from the national catalogue but also qualitatively assess their relevance to certain criteria (e.g. applicability, economic effectiveness, likelihood to reduce the risk of floods). Annex 17 to the FRMP of the Black Sea UoM (BG2000) summarises the conflicts and synergies between the 17 national objectives. It is unclear how the trade-offs and synergies have been identified.

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

- Overall, the FRMPs did not provide information about the timeline for the achievement of the objectives. This is the case for all four FRMPs.

4. Planned measures for the achievement of objectives

4.1 Cost of measures

Bulgaria reported 194 measures in total for its four UoMs, without counting measures which have been allocated to more than one measure type^{27 28}.

The most measures were reported for the East Aegean (BG3000; 61 measures) followed by the Danube (BG1000; 52 measures), the Black Sea (BG2000; 49 measures) and the West Aegean (BG4000; 32 measures).

Aggregated²⁹ measures (61) were reported only for the East Aegean UoM, while individual measures (133) were reported only for the other three UoMs. However, the FRMPs do not provide a definition distinguishing individual and aggregated measures. Furthermore, some of the aggregated measures reported for the East Aegean are assigned to more than one measure type. To compare the number of measures by type, a total count is used that includes each time a measure is allocated to a measure type³⁰: this total is 199 measures (including measures which have been allocated to more than one measure type).

Measures were reported for all five aspect categories - prevention, protection, preparedness, recovery and review, as well as under the option, “other type of measure”. The most measures were reported for preparedness (61 measures or around 31 % of the total 199 measures), prevention (60 measures or around 30 % of the total) and protection (53 measures or around 27 % of the total). Bulgaria reported measures of nearly all types (with the exception of type M11³¹ and M23³²)³³.

Under ‘other type of measure’ Bulgaria reported measures such as: ‘assessment of the stability and safety of buildings and infrastructure impacted by floods’ (BG1000 and BG3000), ‘release

²⁷ 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 (the 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.

²⁸ See Annex B for details about all measure aspects and measure types.

²⁹ 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.

³⁰ This approach implies double-counting.

³¹ No Action, No measure is proposed to reduce the flood risk in the APSFR or other defined area.

³² Prevention, Reduction, Measure to adapt receptors to reduce the adverse consequences in the event of a flood actions on buildings, public networks, etc...

³³ Reporting sheets.

of a daily hydro-meteorological bulletin’, ‘issuance of warnings for flood danger’ and ‘restoration of wet zones and coastal forests’ (BG2000)³⁴.

Please see Annex A for detailed tables and charts on measures for this and subsequent questions in this section.

Table 6 Overall budget for the measures in the assessed FRMPs

	Estimated overall budget of planned measures (2015-2021) in BGN
BG1000	216 687 949
BG2000	n/a
BG3000	370 593 837
BG4000	40 400 000

Source: Reporting sheets and FRMP

Three of the Bulgarian FRMPs contain aggregate estimates about the total cost or necessary budget to implement the PoMs, while all FRMPs' annexes with detailed description of the PoMs provide estimated costs for each measure (where such a value could be provided). Therefore, cost estimates for specific measures are available in the PoM annex of the Black Sea FRMP (BG2000) but the format does not allow for an easy aggregation of these costs³⁵.

The FRMPs provide cost information, either as aggregate estimates of the total cost of the measures/PoMs or of specific measures in the PoMs, as well as a brief summary of the methodology used to estimate these costs (often as part of the description of the CBA e.g. BG2000, BG4000). Considering the descriptions provided in the FRMPs, it can be concluded that the cost estimations in the Danube UoM (BG1000) concern the investment and operational costs of the measures based on the indicative costs provided in the national catalogue of measures. The total costs reported for the East Aegean UoM (BG3000) and the costs reported in the annexes to all four FRMPs are based on the same principle and reflect the indicative costs provided in the national catalogue of measures. Furthermore, the estimates in the West Aegean FRMP (BG4000) concern the total available budget for the PoM based on the available public funding sources. However, the information provided in the West Aegean FRMP³⁶ suggests this budget might be insufficient to cover the estimated costs in the three

³⁴ FRMPs: BG1000, Annex 9; BG2000, Annex 18; BG3000, Annex 5.

³⁵ The PoM annexes of the other FRMPs are available as Excel files (which allows for easy sorting and summing up of the data), however the PoM annex of the Black Sea FRMP is available only in PDF format that cannot be manipulated.

³⁶ The West Aegean FRMP reports the likely costs of the PoM in three scenarios: no floods in the UoM during the 2016-2021 period (in this case the cost was estimated at around BGN 42 million); one flood of over 100-year occurrence happens in each of APSFRs over the 2016-2021 period (in this case the cost was estimated at around BGN 51.6 million); one flood of over 1000-year occurrence happens each year in each of the APSFRs over the same period (in this case the cost was estimated at around BGN 99.6 million). The costs given to individual

scenarios considered. It does not clarify how the difference between the estimated costs, even in the 'no floods' scenario, and the available public budget would be covered³⁷.

In their reporting sheets Member States could report costs for each measure and could add relevant information or explanations about these costs as recommended by the *Guidance for Reporting under the FD (2007/60/EC)*. The reporting sheets submitted by Bulgaria contain measure-specific cost explanations only for 101 measures of all measures. They are located in UoMs BG1000 and BG2000, no cost explanation is available for UoMs BG3000 or BG4000 (see Annex A for more details).

4.2 Funding of measures

All four FRMPs cite as sources of financing for the measures the national and municipal budgets, the public Enterprise for Management of the Environmental Protection Activities (EMEPA)³⁸, the Operational Programme (OP) 'Environment' for the implementation of the European Structural and Investment Funds (ESIF) in the period 2014-2020. The FRMPs for Danube (BG1000), East Aegean (BG3000) and West Aegean (BG4000) also cite as financing sources the European Territorial Cooperation programmes (also known as INTERREG and financed by the ESIF) that cover the respective UoMs. The same FRMPs also refer to the Rural Development Programmes of the CAP as sources of financing for the measures. The FRMP for the Black Sea (BG2000) is the only one that references the National Programme for Disaster Protection 2014-2018 and the European Solidarity Fund as sources of financing. Overall, the FRMP for the East Aegean has listed the largest number of different financing sources, including the ESIF OP 'Regions in Growth' 2014-2020 and irrigation system enterprises^{39 40}.

Table 7 *Funding of measures*

	BG1000	BG2000	BG3000	BG4000
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				

measures in the PoM annex of the FRMP amount to around BGN 47 million in total. However, the FRMP does not provide information how these different cost estimates compare or how the available budget will be matched to the costs.

³⁷ FRMPs: BG1000, Chapter 5, p.87-88 and Annex 9; BG2000, Annex 18; BG3000, Chapter 5, pp.163-166 and Annex 5; BG4000, Chapter 5, 56-62 and Annex 4.

³⁸ The EMEPA is a public enterprise whose purpose is to finance environmental projects in different areas e.g. water, waste and biodiversity.

³⁹ The FRMP for East Aegean (BG3000) refers to hydromeliorative systems, which are public enterprises or cooperatives that manage irrigation and channel systems, as another source of funding for the measures.

⁴⁰ FRMPs: BG1000, Chapter 5, pp.85-87; BG2000, Chapter 5, pp.92-97; BG3000, Chapter 5, pp.167-191; BG4000, Chapter 5, pp.54-56.

	BG1000	BG2000	BG3000	BG4000
EU funds (generic)				
EU Structural funds	✓	✓	✓	✓
EU Solidarity Fund		✓		
EU Cohesion funds	✓	✓	✓	✓
EU CAP funds	✓		✓	✓
International funds				
EMEPA	✓	✓	✓	✓
Irrigation system enterprises			✓	

Source: FRMPs

4.3 Measurable and specific (including location) measures

All FRMPs include a clear and explicit 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.

The FRMP annexes with the PoMs provide tables with details about each specific measure planned providing descriptions of the measures and information about e.g. their location, cost, priority, responsible institutions and financing source. However, details about the timeline are not available.

The measures are grouped as measures applied at RBD/UoM-level, sub-basin or APSFR-level. Where relevant the specific water body is also indicated. The table below provides an overview of the location of measures (this is the same across all four UoMs)⁴¹.

Table 8 *Location of measures*

	All UoMs assessed
International	
National	
RBD/UoM	✓
Sub-basin	✓
APSFR or other specific risk area	✓
Water body level	✓
More detailed than water body	

Source: Reporting sheets

⁴¹ FRMPs: BG1000, Annex 9; BG2000, Annex 18; BG3000, Annex 5; BG4000, Annex 4.

4.4 Measures and objectives

The main parts of the FRMPs focus on describing the process and methodology behind the selection of the measures. While the annexes with PoMs provide descriptions how the measures will support the objectives, there is no clear indication how much the measures will contribute to the objectives or whether the objectives will be achieved. Only the annex of the West Aegean FRMP (BG4000) reports information about the expected results and indicators for tracking both implementation progress and progress towards achieving the objectives of each measure. However, such information is not reported for the other three UoMs⁴².

4.5 Geographic coverage/scale of measures

Information about the geographic scale of the location was reported for all 199 measures in the Reporting Sheets. The different types of location given can be grouped in the following general categories:

- APSFRs;
- Multiple APSFRs: when the measures cover more than one APSFR;
- UoM/RBD;
- Other.

In terms of measure aspect, the location of the measures is relatively evenly spread across the different measure aspects. The majority of the prevention and protection measures will be implemented in multiple APSFRs, while most of the preparedness and recovery and review measures will be implemented at the UoM level. Information about the geographic coverage of the expected effects of measures was reported only for the West Aegean UoM (BG4000), where the coverage for all measures is indicated as the UoM (for details see Tables A6 and A7 in Annex A).

The FRMP annexes with PoMs indicate the location of each measure in terms of different geographic categories such as water body (code), APSFR (code), relevant settlements (i.e. names of cities/towns/villages), municipalities and regions for each measure.

4.6 Prioritisation of measures

The priority was reported for all measures in the Reporting Sheets, following the categories in the *Guidance for Reporting under the FD (2007/60/EC)*. The majority of the measures are classified as 'high' priority (107 measures or around 54 % of the total 199 measures) followed by measures of 'moderate' priority (36 measures or around 18 % of the total), 'very high' priority (25 measures or around 13 % of the total) and 'critical' priority (21 measures or around

⁴² FRMPs: BG1000, Annex 9; BG2000, Annex 18; BG3000, Annex 5; BG4000, Annex 4.

11 % of the total). The fewest measures are classified as 'low' priority - only 10 (or around 5 %) of the total. Most of the prevention, protection and preparedness measures are ranked as 'high' priority (32, 28 and 30 measures respectively, representing around 50 % of the measures in all three cases) followed by 'moderate' (12, 11 and 12 measures respectively or around 20 % of the measures in all three cases) and 'very high' priority (10, 6 and 9 measures respectively).

Measures of 'critical' priority are found only in the East Aegean UoM (BG3000), while 'low' priority measures are found only in the Black Sea UoM (BG2000). In the Danube UoM (BG1000) there are 31 measures (around 60 %) of high, 15 measures (around 29 %) of moderate and six measures (around 12 %) of very high priority. In the Black Sea UoM, there are 25 measures (51 %) of high, 14 measures (29 %) of moderate and 10 measures (20 %) of low priority. In the East Aegean UoM, there are 30 measures (45 %) of high, 21 measures (32 %) of critical and 15 measures (23 %) of very high priority. In the West Aegean UoM (BG4000) there are 21 measures (66 %) of high, seven measures (22 %) of moderate and four measures (12.5 %) of very high priority (for details see Tables A8 and A9 in Annex A).

The prioritisation of the measures in all four FRMPs was based on the same methodology. The methodology was originally developed for the Danube UoM through a call for proposals financed by the OP 'Environment' in the 2007-2013 period. In this methodology the measures are analysed against five criteria: percentage of achieved objectives; urgency of the measure; cost of the measure; extent of problem solving (i.e. how effective is the measure in addressing the problems and achieving the objectives); and timeline of implementation. Each criterion has a different weight (the highest weight of 30 % is given to the cost of the measure while the lowest weight of 5 % is given to the timeline of implementation). To give a priority value of each measure in the range one to three, the following steps are taken:

1. For each criterion, a value is assigned between one and three to give an overall priority value in the range one to three, based on considerations of the objectives and priorities of the specific APSFR and a pre-defined scale.
2. The priority value assigned each criterion is multiplied by the criterion's weight coefficient.
3. The results of the previous step are summed up for all criteria providing an overall priority value of each measure in the range one to three.

The overall priority values are then translated into five priority categories: very high; high; moderate/medium; low; and very low using a pre-defined scale. The FRMPs clarify that identical or similar measures can be assigned different priorities in different UoMs or APSFRs as the specificities of each location are also considered. However, the FRMPs do not provide further details about the method or explain how the five national priority categories are translated into the five categories for Member State reporting in the *Guidance for Reporting*

under the FD (2007/60/EC)⁴³ and it is not clear how some measures are categorised as 'critical'⁴⁴.

Bulgaria did not provide information on the timetable for any of the measures in its reporting sheets uploaded to WISE.

4.7 Authorities responsible for implementation of measures

The FRMP annexes with PoMs contain information about the responsible authority for each specific measure. In the reporting sheets, Bulgaria provided information also about the level of responsibility for these authorities in the categories listed in the *Guidance for Reporting under the FD (2007/60/EC)*⁴⁵:

- UoM/RBD authority;
- Municipal authorities - e.g. mayors;
- District/regional authorities - e.g. regional governors;
- National authorities - this includes various ministries such as the Ministry of Environment and Water, the Ministry of Agriculture and Food, the Ministry of Energy etc. and associated national agencies or bodies such as the Directorate General for Fire Safety and Public Protection and the Agency for Road Infrastructure;
- Other - this includes various actors such as the National Institute for Meteorology and Hydrology, the National Energy Company, the public irrigation system operators and owners of private facilities.

The majority of the measures will be implemented by municipal and national authorities, 62 and 53 measures respectively. Most prevention and protection measures will be implemented by municipal authorities (22 and 24 measures respectively) while most preparedness measures will be implemented by national authorities (29). Most measures in the Danube (BG1000) and West Aegean (BG4000) UoMs will be implemented by municipal authorities (19 and 12 measures respectively), while most measures in the East Aegean UoM (BG3000) will be implemented by national authorities (24). In the Black Sea UoM (BG2000) most measures will be implemented by 'other' authorities (16). For details see Tables A10 and A11 in Annex A.

⁴³ According to the *Guidance for Reporting under the FD (2007/60/EC)* (p.56) Member States report the prioritisation of the measures either as a timetable for implementation or using five categories: 'critical', 'high', 'very high', 'moderate' and 'low'.

⁴⁴ FRMPs: BG1000, Chapter 5, pp.76-78; BG2000, Chapter 5, pp.88-90; BG3000, Chapter 5, pp.117-119; BG4000, Chapter 5, pp.49-51.

⁴⁵ https://circabc.europa.eu/sd/a/acbcd98a-9540-80ea876420b7de64eba/Floods%20Reporting%20guidance%20-%20final_with%20revised%20paragraph%204.2.3.pdf, p.56

4.8 Progress of implementation of measures

Bulgaria reported the progress of all measures in the reporting sheets using the categories recommended in the *Guidance for Reporting under the FD (2007/60/EC)*. The vast majority of the measures across all aspects are reported as 'not started' (179, 90% of the total) while no measures are reported as 'completed'. A further 19 measures are reported as 'progress ongoing' (5%) and only one measure is reported as 'ongoing construction' (a prevention measure).

In the Danube UoM (BG1000) 43 measures are reported as 'not started' and 9 as 'progress ongoing'. In the Black Sea UoM (BG2000) 48 measures are reported as 'not started' and 1 as 'progress ongoing'. In the East Aegean UoM (BG3000) 56 measures are reported as 'not started', 9 as 'progress ongoing' and 1 as 'ongoing construction'. All 32 measures in the West Aegean UoM (BG4000) are reported as 'not started'. For details see Tables A12 and A13 in Annex A.

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: Bulgaria reported this information only for some of the FRMPs in the reporting sheets. Only 18 of the measures reported by Bulgaria provide information about other Community Acts of relevance, all of these measures are located in the East Aegean UoM (BG3000) and refer to Directive 85/337/EEA⁴⁶.

4.10 Specific groups of measures

Spatial planning/land use measures are planned in all four FRMPs. Most often these measures will, for example, remove illegal constructions, stored materials, fences or other objects in the river beds and banks or impeding the water conveyance in the river beds; propose legislative measures for controlling construction in areas of flood risk or ban construction in areas of flood risk. There is no information if the overall framework for spatial planning has evolved since 2000⁴⁷.

Natural water retention measures (NWRMs) are included in all four FRMPs. Although not exactly the same NWRMs are considered in each FRMPs, the different examples across the four FRMPs include: 're-naturalisation' of rivers/river beds; re-meandering; cleaning of the river beds; and afforestation of areas along river coasts or dams⁴⁸. For example, in the East

⁴⁶ This Directive and its three amendments have been codified by Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment.

⁴⁷ FRMPs: BG1000, Chapter 5, pp.57-65 and Annex 9; BG2000, Chapter 5, pp.81-87 and Annex 18; BG3000, Chapter 5, pp.100-106 and Annex 5; BG4000, Chapter 5, pp.47-49 and Annex 4.

⁴⁸ Considering the NWRM codes provided in Annex B, the NWRMs in the Bulgarian FRMPs can be grouped as: cleaning of the river beds and 're-naturalisation' of rivers/river beds (N05); re-meandering (N04); and afforestation of areas along river coasts or dams (F03).

Aegean UoM (BG3000) the planned prevention measures (types M21⁴⁹ and M23⁵⁰ as defined in Annex B) concern the planting of tree species appropriate for coastlines or flooding terraces, while the measures planned in the Black Sea UoM (BG2000) include afforestation and creation of a protective forest layer around dams and surface catchment areas.

Measures that specifically consider nature conservation. Nature conservation is considered in all FRMPs as one of the five national priorities and corresponding national objectives concern environmental protection. Examples of specific measures from the four FRMPs include: protection of wetlands or protected territories; reconstruction of wetlands; 're-naturalisation' of rivers; protection of river coasts from erosion and afforestation⁵¹.

Ports and navigation do not seem to be included in the specific measures for any of the FRMPs. However, one of the five national priorities and corresponding national objectives concern the protection of critical infrastructure. Hence, it is possible that in some cases ports are considered critical infrastructure and addressed by general measures for protection of the critical infrastructure.

Measures for cleaning river beds and ensuring the capacity and ability of the river channel to convey water are planned in all four FRMPs. Based on the descriptions provided, these measures include the cleaning of domestic and construction waste, dead or fallen plants and deposits/debris. However, there is no indication that any **dredging** measures with a potential negative effect on the environment are planned⁵².

4.11 Recovery from and resilience to flooding

The role of insurance policies is discussed in general in all four FRMPs, however only one measure related to insurance (i.e. increasing awareness about insurance schemes for floods) is included in the FRMPs for the Danube (BG1000) and the Black Sea (BG2000) UoMs. The other two FRMPs do not contain any measures related to insurance.

None of the FRMPs provide further information or details about different insurance options that might be available or the insurance conditions for making at risk properties flood resilient. There is no information if environmental liability insurance covers restoration costs or whether ecosystem services are considered in estimating restoration costs in cases where potentially polluting sites and installations may be flooded.

⁴⁹ Prevention, Avoidance, Measure to prevent the location of new or additional receptors in flood prone areas, such as land use planning policies or regulation

⁵⁰ Prevention, Reduction, Measure to adapt receptors to reduce the adverse consequences in the event of a flood actions on buildings, public networks, etc...

⁵¹ FRMPs: BG1000, Chapter 5, pp.57-65 and Annex 9; BG2000, Chapter 5, pp.81-87 and Annex 18; BG3000, Chapter 5, pp.100-106 and Annex 5; BG4000, Chapter 5, pp.47-49 and Annex 4.

⁵² RMPs: BG1000, Chapter 5, pp.57-65 and Annex 9; BG2000, Chapter 5, pp.81-87 and Annex 18; BG3000, Chapter 5, pp.100-106 and Annex 5; BG4000, Chapter 5, pp.47-49 and Annex 4.

4.12 Monitoring progress in implementing the FRMPS

The FRMPs report the same national approach for monitoring. The implementation of each of the FRMPs will be assessed on two aspects - progress of the implementation of the measures and progress and results for achieving the objectives. Information about the progress of implementation of the measures will be collected and reported by the authorities responsible for implementing the measures and through the implementation of any monitoring measures resulting from the report on the environmental assessment (i.e. the SEA). The information will be reported to the Basin Directorates on a yearly basis, they will in turn prepare reports about the progress of implementation, monitoring and control of the measures every two years. To monitor the progress towards achieving the objectives a set of indicators for each of the national objectives is defined (examples of these national indicators are listed in section 3 above). In addition, the FRMPs for the Black Sea (BG2000), the East (BG3000) and West Aegean (BG4000) define also indicators for tracking the implementation of some of the planned measures⁵³.

In the Black Sea and West Aegean FRMPs (BG2000, BG4000) indicators are listed for the measures for monitoring and control⁵⁴ and include:

- quality of the drinking water based on the values for priority substances,
- number of permits issued (for construction of new flood defence equipment etc.),
- number and length of dam walls or other equipment inspected etc.

In the East Aegean FRMP (BG3000) indicators are provided for each measure planned in the PoM and include:

- afforested area,
- number of trainings,
- number of participants at the trainings,
- completed stages from the construction of equipment/ infrastructure, number of completed clearings of water beds and banks,
- number of inspections.

The PoM Annex of the West Aegean FRMP (BG4000) provides two different indicators per measure:

⁵³ FRMPs: BG1000, Chapter 6, pp.89-97; BG2000, Chapter 6, pp.97-108; BG3000, Chapter 6, pp.198-209; BG4000, Chapter 6, pp.63-78 and Annex 4.

⁵⁴ These measures are not explicitly listed in the PoMs, they are just mentioned in the FRMPs chapters and include e.g. carrying out monitoring of the water quality after floods, issuing permits for new or reconstruction of existing flood management systems, inspection of dam walls and other equipment, keeping a record of the implementation of the PoM etc.

- indicators for tracking implementation progress (e.g. number of initiatives, number of normative documents, number of inspections etc.) and
- indicators for tracking progress towards achieving the objectives (e.g. minimised number of people impacted by floods, improved administrative capacity for FRM, ensured protection for the life and health of the population in APSFRs, ensured protection of the critical infrastructure or environment etc.).

Even though all FRMPs report indicators for tracking the progress towards achieving the national objectives, they do not provide information about baseline values against which the progress will be assessed. The Danube FRMP (BG1000) states that baseline values will be defined for all indicators, however it is not clear if this process has been completed and what the outcomes are. Baseline values are not mentioned in the other three FRMPs.

4.13 Coordination with the WFD

The table below shows how the development of the FRMP has been coordinated with the development of the second RBMP of the WFD.

Table 9 *Coordination of the development of the FRMP with the development of the second RBMP of the WFD*

	All UoMs assessed
Integration of FRMP and RBMP into a single plan	
Joint consultation of draft FRMP and RBMP	✓
Coordination between authorities responsible for developing FRMP and RBMP	✓
Coordination with the environmental objectives in Art. 4 of the WFD	✓
The objectives of the FD 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 FD, 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	✓
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	
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Notes: ^a based on reporting under the WFD

The FRMPs and the RBMPs in Bulgaria are developed by the same authorities - the Basin Directorates. In addition, the national law requires the public consultations for both types of plans to be run in parallel so the public consultations for each of the draft FRMPs and RBMPs for the 2016-2021 period were conducted in parallel. Furthermore, to ensure compatibility and synergies between the plans, the analysis of the draft FRM measures included an assessment of the impacts of each draft measure on the objectives of the WFD. Measures that were assessed to have a positive or neutral impact were included in the FRMPs, while measures with potentially negative impacts were further assessed to determine if any exception in accordance with Art.4.7 could be defined. The RBMPs also contain information about the synergies between the FRM objectives and measures and the objectives of the WFD⁵⁵. Moreover, each of the FRMPs includes green infrastructure or NWRMs that are compatible with the objectives of the WFD⁵⁶.

Each of the FRMPs provides information about the identified synergies of the planned measures with the objectives of the WFD and the respective RBMPs. This information is presented differently in each of the plans:

The FRMPs for the Danube (BG1000), the Black Sea (BG2000) and the West Aegean (BG4000) contain annexes with a list of the RBMP measures that have a positive impact on the objectives of the FRMPs in the particular UoM/RBD (the measures in BG1000 and BG2000 are presented per type of measure based on the national catalogue of RBMP measures, while in BG4000 the measures are listed per water body; however, the measures are presented without being related to specific FRM objectives). Examples of such measures include (but are not limited to): protection from erosion; collection and treatment of waste water in urban areas; ensuring direct water currents and fish movements; mitigation of the climate change pressures and improvement of the hydro-morphological conditions of rivers.

The FRMP for the East Aegean (BG3000) presents the information the other way around - with a list of the FRMP measures that are compatible with the objectives of the RBMP of the RBD (the measures are presented per water body). Examples of such measures include

⁵⁵ RBMPs: BG1000, Chapter 5.1.3 and 5.1.4 (pp.V-13-V-21) and Annexes 5.1.3.1, 5.1.3.2 and 5.1.3.2.A; BG2000, Chapter 5.1.3 (pp.12-13); BG3000, Chapter 5.1.2.4 and 5.1.3 (pp.23-28) and Annexes 05 and 07; BG4000, Chapter 5.1.2 and 5.1.3 (pp.246-255).

⁵⁶ FRMPs: BG1000, Chapter 7, pp.97-102 and Chapter 11, pp.123-134; BG2000, Chapter 7, pp.108-112 and Chapter 11, pp.137-139; BG3000, Chapter 7, pp.210-213 and Chapter 11, pp.230-237; BG4000, Chapter 7, pp.79-80 and Chapter 11, pp.92-97.

afforestation, limiting any new negative impacts on the hydrological conditions of water bodies, rehabilitation and maintenance of sewage systems⁵⁷.

In its reporting sheets on the FRMPs, Bulgaria provided information in the field “WFD Measures”.

In its reporting under the WFD, Bulgaria indicated that the objectives of the FD were considered in the preparation of its RBMPs. Bulgaria also reported that the PoMs included win-win measures in terms of achieving the objectives of the WFD and FD, drought management and NWRMs.

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

The following **good practices** were identified:

- All FRMPs provide information about the location, cost, responsible authority and priority of each planned measure. In addition, this information is provided in a reader-friendly tabular format as annexes to the FRMPs.
- All FRMPs include NWRMs.
- All FRMPs contain national indicators for tracking the progress towards the achievement of the objectives. The FRMPs for the Black Sea (BG2000), the East (BG3000) and West Aegean (BG4000) define also indicators for tracking the implementation of some of the planned measures. The FRMP for the West Aegean (BG4000) goes one step further to define two separate indicators per planned measure - one for tracking implementation progress and one for tracking progress towards achieving the objectives.

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

- Even though all FRMPs refer to the timely implementation of the measures and explain that the timelines will be considered when monitoring the progress of implementation, they do not include what the timeline for each measure or group of measures is.
- Although, indicators for tracking progress of the national and UoM-specific objectives have been formulated, there is no information against what baseline values these indicators will be measured.

⁵⁷ FRMPs: BG1000, Chapter 7, pp.97-102 and Annex 13; BG2000, Chapter 7, pp.108-112 and Annex 18.2; BG3000, Chapter 7, pp.210-213 and Annex 7; BG4000, Chapter 7, pp.79-80 and Annex 8.

5. Consideration of climate change

Measures to mitigate the expected effects of climate change are planned in only one of the four FRMPs. Only the Danube FRMP (BG1000) explicitly identifies measures that address the impacts of climate change. These measures are: increasing awareness and preparedness of the population to floods; new flood protection equipment designed with the possibility to be adapted in the future; new information about the expected climate change impacts to be taken into account in future versions of the FRMP. The FRMPs of the other three UoMs do not identify measures that have been planned to address climate impacts, even though their PoMs contain similar measures to those in the Danube FRMP i.e. increasing the awareness and preparedness of the population to floods. In addition, other measures that can be beneficial for mitigating the impacts of climate change have been planned across the four FRMPs, namely: establishment of an early warning system (all UoMs); issuing of a daily hydrometeorological bulletin (all UoMs); ban of wood cutting in catchment areas and increase of the forested area/afforestation (BG2000, BG3000 and BG4000)⁵⁸.

None of the FRMPs refers to the national Climate Change Adaptation Strategy, and the Climate-ADAPT website⁵⁹ indicates that this strategy is still being prepared. Nevertheless, two of the four FRMPs – the Black Sea FRMP (BG2000) and the West Aegean FRMP (BG4000) – mention the Third National Climate Change Action Plan for the period 2013-2020 in the chapter on coordination with other plans and strategies as a plan relevant for the FRMPs⁶⁰. This Action Plan provides information and analysis of the relevant climate action policies at EU and national level, impacts, mitigation and adaptation measures per economic sector.

Climate change scenarios were specifically considered in three of the four FRMPs. In the Danube FRMP (BG1000), climate change was one of the significant factors considered during the preparation of the PoMs and some forecasts about the expected effects of climate change in the Danube UoM were considered. However, the FRMP does not indicate if different scenarios were considered. In the Black Sea (BG2000) and East Aegean (BG3000) FRMPs, climate change impacts were considered under different scenarios. In both cases the scenarios were based on IPCC information and the IPCC scenarios RCP 4.5 (emission reductions post-2050) and RCP 8.5 (business as usual). In both cases the timeframes considered were up to 2100⁶¹.

In the West Aegean FRMP (BG4000), climate change was not considered during its preparation.

⁵⁸ Reporting sheets: Summary of Climate Change; FRMPs: BG1000, Chapter 13, pp. 136-139 and Annex 9; BG2000, Annex 18; BG3000, Annex 5; BG4000, Annex 4 and Annex 8.

⁵⁹ <http://climate-adapt.eea.europa.eu/countries-regions/countries/bulgaria> (visited November 2018)

⁶⁰ FRMPs: BG2000, Chapter 8, p. 118.

⁶¹ Reporting sheets: Summary of Climate Change; FRMPs: BG1000, Chapter 5, p. 75 and Chapter 13, pp. 136-139; BG2000, Chapter 3, p.48; BG3000, Chapter 3, pp.71-72; BG4000, Chapter 13, p.106.

The results of the climate change scenarios are not discussed in the FRMPs. Nevertheless, the FRMPs for the Danube (BG1000) and the East Aegean (BG3000) make reference to the expected climate change impacts based on available literature and point out that:

- In the Danube UoM: flash floods caused by extreme rainfall might occur more frequently; the risk of spring floods would be lower due to a decrease in the snow cover; the frequency of winter floods might change due to different rainfall intensity, snow cover and extreme events.
- In the East Aegean UoM: the probability of winter floods would increase; the frequency and probability of formation of ‘high tidal waves’ would increase as a result of the increasing temperatures and earlier and faster snow melting; droughts and lower water flow would be observed⁶².

5.1. Specific measures planned to address climate change

According to the available information in the reporting sheets and the FRMPs, climate change was considered during the preparation of the FRMPs for the Danube (BG1000), the Black Sea (BG2000) and the East Aegean (BG3000). Even though there are measures in the PoMs of all four UoMs that can (have beneficial impacts and contribute to the mitigation of climate change impacts, it is not clear whether or which of the planned measures are specifically planned to mitigate the climate change impacts as a result of the climate change analyses⁶³.

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

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

- While climate change is considered in the preparation of three of the four FRMPs, and in two of those different scenarios were taken into account, the FRMPs do not explicitly relate the results of the climate change considerations to the measures planned e.g. to justify or explain the choices made. Coordination with the national adaptation strategy should be ensured once the strategy is adopted. Nonetheless, all four FRMPs specify that climate change will be considered further in the update of the plans during the 2nd cycle of implementation.

⁶² FRMPs: BG1000, Chapter 13, p.136; BG3000, Chapter 5, pp.194-195.

⁶³ Reporting sheets: Summary of Climate Change; FRMPs: BG1000, Chapter 13, pp. 136-139 and Annex 9; BG2000, Annex 18; BG3000, Annex 5; BG4000, Annex 4.

6. Cost-benefit analysis

A CBA was used for the prioritisation and planning of all measures in all four of the FRMPs. A national CBA methodology was applied in all four FRMPs. The national methodology was based on the '*Guide to Cost-Benefit Analysis of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2014 - 2020*': the methodology was prepared under a call for proposals in the West Aegean UoM and funded by OP Environment 2007-2013. The methodology has several components:

- Financial analysis - in this analysis the direct costs of the measures (e.g. investment and operational costs) are estimated together with their financial net present value. The investment and operational costs for all measures are included in the national catalogue of measures and the analyses in each of the FRMPs is based on these national estimates. Generally, the national catalogue provides estimates for the costs of all measures except those that are an inherent part of the work/services of public institutions and as such are part of the institutions' overall costs (e.g. measures for development of plans, monitoring, transboundary coordination etc.). In the case of non-structural measures, it is assumed that they have only operational costs.
- Economic analysis - here the analysis is expanded to include other costs (if relevant) and benefits of the measures. The results of the financial analyses are used as estimates for the costs while the value of 'avoided damages' is used as an estimate for the benefits of the measures. The value of avoided damages is based on different categories of assets (e.g. homes, public infrastructure or land) and available information about their value e.g. from the National Statistical Institute or public administration. Once all costs and benefits are valorised, the Economic Net Present Value (ENPV) and the Economic Internal Rate of Return (EIRR) of the measures are estimated together with the benefits-costs ratio. The costs and benefits of each measure for a certain ASPFR are valorised for three scenarios (20-year, 100-year and 1000-year flood occurrence) based on the damage information from the FHRMs, except for the Danube UoM (BG1000) where the CBA was performed only for the 100-year scenario. The scenario that generates the highest ENPV, the highest EIRR and the highest benefits-costs ratio for a given ASPFR is chosen (however, results from this analysis are not provided in the FRMPs). Finally, all selected scenarios are consolidated to define a combination of measures for the whole UoM.
- Uncertainties and risk analysis - here different uncertainties and risks are considered in the CBA (e.g. the different flood risks and scenarios as defined in the FHRMs).

The FRMPs provide detailed information about all assumptions used in the CBA. Some of the key ones are: the reference period is the period for implementation of the FRMP i.e. 2016-2021; the distribution of benefits is even for each remaining year of the reference period after

the measure's implementation; the social discount rate is 5% as recommended in the '*Guide to Cost-Benefit Analysis of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2014 - 2020*'⁶⁴.

The available information about the CBA methodology does not indicate if the CBA was applied to measures with transboundary effects or if multi-benefits were considered in the economic analysis. However, this does not mean that multi-benefits were not considered in the qualitative analysis. As previously mentioned, the synergies between FRM measures and the WFD objectives were considered and various measures beneficial for both the WFD and the Flood Directive's objectives were included in the FRMPs⁶⁵.

6.1. Good practices and areas for further development

The following **good practice** was identified:

- All FRMPs provide a description of the CBA methodology either in the main text or in Annexes. The methodology seems comprehensive and consistent with the Commission's 'Guide to Cost-Benefit Analysis of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2014 - 2020'. The applied CBA methodology valorises the costs and benefits of all measures.

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

- Presently the FRMPs for the Black Sea (BG2000, Annex 20) and the West Aegean (BG4000, Annex 7) provide annexes with the results of the CBA for all measures in a certain APSFR (i.e. the information is presented per APSFR and not per measure). This practice should be extended to measures in the other two FRMPs.
- It is unclear if and how measures with transboundary effects have been considered in the CBA.

⁶⁴ FRMPs: BG1000, Chapter 5, pp.79-84; BG2000, Chapter 5, p.90 and Annexes 19 and 20; BG3000, Chapter 5, pp.119-140; BG4000, Chapter 5, pp.51-54 and Annexes 6 and 7.

⁶⁵ FRMPs: BG1000, Chapter 5, pp.79-85; BG2000, Chapter 5, p.90-92 and Annexes 19 and 20; BG3000, Chapter 5, pp.119-150; BG4000, Chapter 5, pp.51-54 and Annexes 6 and 7. Reporting sheets: Summary of Cost/Benefit.

7. Governance including administrative arrangements, public information and consultation

7.1. Competent authorities

The UoMs and the competent authorities for each UoM identified for the FD have not changed since they were first reported to WISE in 2012.

7.2. Public information and consultation

The table below shows how the public and interested parties were **informed** in the four 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*

	BG1000	BG2000	BG3000	BG4000
Media (papers, TV, radio)	✓	✓	✓	✓
Internet	✓	✓	✓	✓
Digital social networking				
Printed material	✓	✓	✓	✓
Direct mailing				
Invitations to stakeholders		✓	✓	✓
Local Authorities				
Meetings	✓	✓	✓	✓
Information centres at the Basin Directorates		✓	✓	
Surveys			✓	
Thematic events/celebrations of environmental days		✓	✓	

Source: FRMPs

Each of the draft FRMPs (including their PoMs) were open for six-month public consultations. In all four UoMs the public and the stakeholders were informed through publications on the websites of the Basin Directorates or local authorities, announcements in national media and during stakeholder meetings. In addition, some of the Basin Directorates distributed brochures/leaflets or other materials (BG1000, BG2000, BG3000). Three of the UoMs (BG2000, BG3000, BG4000) also maintain a list of relevant stakeholders and sent direct invitations for meetings informing them of the FRMPs consultations. Two of the UoMs (BG2000 and BG3000) also report that they maintain information centres at the Basin Directorates and use thematic events or celebrations of environmental days to inform the

public of ongoing consultations. One of the UoMs (BG3000) reports that the public was informed also through a social survey⁶⁶.

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

Table 11 *Methods used for the actual consultation*

	All UoMs assessed
Via Internet	✓
Via Digital social networking	
Direct invitation	✓
Exhibitions	
Workshops, seminars or conferences	✓
Telephone surveys	
Direct involvement in drafting FRMP	✓
Basin Councils	✓
Surveys or questionnaires (face-to-face or online surveys)	✓

Source: FRMPs

In all four UoMs the public consultation of the FRMPs was carried out:

- Through direct involvement in the preparation of the FRMPs. This usually took the form of meetings e.g. stakeholder meetings at regional and national levels and meetings of the Basin Councils. All four of the UoMs have Basin Councils (as required by national law) that consist of different stakeholders and provide feedback during the preparation of the FRMPs (for further information see the section on ‘active involvement of stakeholders’ below). In addition, the East Aegean FRMP (BG3000) reports also that a social survey was carried out during the preparation of the Plan in order to ask the public what the main issues and needs that the Plan should address are. The Danube FRMP (BG1000) reports that during the preparation of the plan, a survey questionnaire for gathering opinions about the FRMP was available on the Basin Directorate's website, on the websites of the nine regional governors and on the website of the private company that carried out the public consultation (after winning a public procurement call financed through OP Environment 2007-2013). Both FRMPs provide a summary of the surveys’ results, the Danube FRMP (BG1000) provides also a weblink⁶⁷ to the complete analysis and results of the survey.
- Via the internet - the draft FRMPs for consultation were published on the websites of the Basin Directorates.

⁶⁶ FRMPs: BG1000, Chapter 11, pp.118-134; BG2000, Chapter 11, pp.129-139; BG3000, Chapter 11, pp.220-237; BG4000, Chapter 11, pp.86-97.

⁶⁷ Results of the survey carried out in the preparation of the BG1000 FRMP:
http://www.bd-dunav.org/uploads/content/files/konsultacii-s-obshtestvenostta/Rezult_Anketa_PURN_Web.pdf

- During stakeholder meetings - stakeholder meetings to discuss the draft FRMPs were organised at regional, UoM/RBD and national levels.
- Via surveys and questionnaires - surveys or questionnaires of different length (in the different UoMs) were published on the websites of the Basin Directorates or distributed during stakeholder meetings to collect feedback on the draft FRMPs⁶⁸.

Table 12 *Methods used to provide the documents for the consultation*

	All UoMs
Downloadable	✓
Direct mailing (e-mail)	
Direct mailing (post)	
Paper copies distributed at exhibitions	
Paper copies available in municipal buildings (town hall, library etc.)	

Source: FRMPs

Information about how the documents for the consultation were provided is not explicitly reported within the FRMPs. The draft FRMPs were published on the websites of the Basin Directorates but the FRMPs do not specify in what other formats the drafts were shared with the stakeholders⁶⁹.

7.3. Active involvement of Stakeholders

As part of the overall consultation, authorities should encourage the active involvement of stakeholders. The table below shows the groups of **stakeholders** that have been actively involved in the development of the four FRMPs assessed:

Table 13 *Groups of stakeholders*

	BG1000	BG2000	BG3000	BG4000
Civil Protection Authorities such as Government Departments responsible for emergency planning and coordination of response actions	✓	✓	✓	✓
Flood Warning / Defence Authorities ⁷⁰	✓	✓	✓	✓
Drainage Authorities	✓	✓	✓	✓
Emergency services				
Water supply and sanitation	✓	✓	✓	✓

⁶⁸ FRMPs: BG1000, Chapter 11, pp.118-134; BG2000, Chapter 11, pp.129-139; BG3000, Chapter 11, pp.220-237; BG4000, Chapter 11, pp.86-97.

⁶⁹ FRMPs: BG1000, Chapter 11, pp.118-134; BG2000, Chapter 11, pp.129-139; BG3000, Chapter 11, pp.220-237; BG4000, Chapter 11, pp.86-97.

⁷⁰ The national authorities clarified that these are the same stakeholders as the Civil Protection Authorities.

	BG1000	BG2000	BG3000	BG4000
Agriculture / farmers	✓	✓	✓	✓
Energy / hydropower	✓	✓	✓	✓
Navigation / ports		✓		
Fisheries / aquaculture		✓		
Private business (Industry, Commerce, Services)	✓	✓	✓	✓
NGOs including nature protection, social issues (e.g. children, housing)	✓	✓	✓	✓
Consumer Groups				
Local / Regional authorities	✓	✓	✓	✓
Academia / Research Institutions	✓	✓	✓	✓
National authorities, citizens, water users and owners	✓	✓	✓	✓

Source: FRMPs

As previously mentioned, all UoMs have Basin Councils, which are required by the national law and whose composition and obligations are defined in the law. According to the examples provided in the Danube FRMP the Basin Councils consist of representatives of local and regional administration, national ministries and authorities, the public water supply and sewage company, the Bulgarian Academy of Science and other academic institutions, water users, NGOs and others. According to the website of the Black Sea Basin Directorate, the split of the members of the Basin Council is as follows: local administration (30 %), water users and owners (30 %), national administration (20 %) and NGOs and research institutions (20 %). The overall role of the Basin Councils is to support the Basin Directorates in the management of the UoMs/RBDs. They are consulted during the preparation of the FRMPs and participate in meetings during the public consultation of the draft plans⁷¹.

In addition, different stakeholders provide feedback on the draft FRMPs during the public consultations. Although the FRMPs do not list all stakeholders that participated in the stakeholder meetings to discuss the draft FRMPs, the websites of the Basin Directorates provide information about all consultation meetings that took place together with lists of the participants. This information shows that the draft FRMPs were consulted with e.g. national ministries and authorities (e.g. agencies for civil protection, nature protection etc.), regional and local authorities, citizens, businesses, agriculture, aquaculture and port stakeholders, the

⁷¹ FRMPs: BG1000, Chapter 11, pp.118-134; BG2000, Chapter 11, pp.129-139; BG3000, Chapter 11, pp.220-237; BG4000, Chapter 11, pp.86-97. Website of the Black Sea RBD: https://www.bsbd.org/bg/basin_board.html

National Energy Company, NGOs, research institutions and the public water supply and sewage company⁷².

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

Table 14 *Mechanisms used to ensure the active involvement of stakeholders*

	BG1000	BG2000	BG3000	BG4000
Regular exhibitions				
Establishment of advisory groups	✓	✓	✓	✓
Involvement in drafting	✓			
Formation of alliances				
Surveys and questionnaires	✓	✓	✓	✓
Printed materials	✓			
Interactive online tools			✓	

Source: FRMPs

In addition to the Basin Councils, which can be considered as advisory groups, and surveys, some FRMPs report using surveys and questionnaires. One of the FRMPs (BG3000) also mentions the creation of an interactive tool for visualisation and sorting of all draft measures that aimed to facilitate the stakeholders' involvement⁷³.

⁷² FRMPs: BG1000, Chapter 11, pp.118-134; BG2000, Chapter 11, pp.129-139; BG3000, Chapter 11, pp.220-237; BG4000, Chapter 11, pp.86-97.

Websites of the Basin Directorates with information about the stakeholder meetings (together with lists of participants) for each UoM:

BG1000: <http://www.bd-dunav.org/content/konsultacii-s-obshtestvenostta/konsultacii-pri-izgotviane-na-purn/konsultacii-v-dunavski-rayon-za-baseynovo-upravlenie/>

BG2000: https://www.bsbd.org/bg/index_bg_8808391.html

BG3000: https://earbd.bg/indexdetails.php?menu_id=603

BG4000: <https://wabd.bg/index.php/2015-06-25-12-25-12/2016-12-09-14-33-54>

⁷³ FRMPs: BG1000, Chapter 11, pp.118-134; BG2000, Chapter 11, pp.129-139; BG3000, Chapter 11, pp.220-237; BG4000, Chapter 11, pp.86-97.

7.4. Effects of consultation

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

Table 15 *Effects of consultation*

	All UoMs assessed
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	

Source: FRMPs

In all four FRMPs the PoMs were revised as a result of the public consultations. All revisions to the PoMs are reported in dedicated annexes of the FRMPs. In general, the following changes were made:

- new measures were added to the PoM;
- details of selected measures were modified e.g. the responsible authority, location or cost;
- some measures were reformulated or merged;
- some measures were removed usually due to same or similar measures existing in the RBMPs⁷⁴.

7.5. Strategic Environmental Assessment

All four FRMPs underwent a SEA procedure. Moreover, the results of the SEA procedures were open for public consultations at the same time as the FRMPs and both drafts were discussed together in the process of the public consultations. Overall, all four FRMPs focus on providing information about the conclusions of the SEA procedures rather than the methodology for the SEA. Two of the FRMPs (BG2000 and BG4000) provide information about the step-by-step process of preparing the SEA, however a methodology is not explicitly reported. All four FRMPs contain annexes with a summary of the mitigation measures to take during the implementation of the FRMPs according to the SEA, one of the FRMPs (BG4000) even annexed the whole SEA document and all its annexes⁷⁵.

⁷⁴ FRMPs: BG1000, Annex 12; BG2000, Annex 18.1; BG3000, Annex 5.1; BG4000, Chapter 11, pp.95-97 and Annex 11.

⁷⁵ FRMPs: BG1000, Chapter 12, pp.134-136 and Annexes 16 and 17; BG2000, Chapter 12, pp.139-144 and Annex 26; BG3000, Chapter 12, pp.237-242 and Annex 5.3; BG4000, Chapter 12, pp.97-106 and Annex 12.

7.6. Good practices and areas for further development regarding Governance

The following **good practices** were identified:

- All four FRMPs provide details about the public consultations in dedicated chapters often summarising the general stakeholder involvement strategy before describing the actions for consultation for the different steps of the FRMPs (i.e. PFRA, APSFRs, FHRMs).
- The information is detailed with references to locations and dates of the stakeholder meetings.
- In addition, each of the FRMPs includes an annex that summarises the changes to the PoMs resulting from the public consultations measure by measure.

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

- The next FRMPs should include a list/summary of the types of stakeholders consulted during the public consultations. In the current versions, this information is available but scattered across the chapters on public consultation. Links to protocols/summaries of public consultation meetings should be provided more consistently in the FRMPs.

Annex A: Supplementary tables and charts on measures

This Annex gives an overview of the data on measures provided by Bulgaria 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 assessor 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 FD)⁷⁶, 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 the raw data when conducting the assessment, and this Annex does not reflect these observations.

⁷⁶ <http://icm.eionet.europa.eu/schemas/dir200760ec/resources>

- 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 on the name of the Responsible Authority, above), are categorised as “no information”.

Types of measures used in reporting

The following table⁷⁷ 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’.

Table A1 *Types of measures used in reporting*

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

⁷⁷ Guidance for Reporting under the FD (2007/60/EC):
<https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a/>

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Measures overview

Table A2 *Number of measures reported in the reporting sheets*

Number of individual measures	133
Number of individual measures including measures which have been allocated to more than one measure type	133
Number of aggregated measures	61
Number of aggregated measures including measures which have been allocated to more than one measure type	66
Total number of measures	194
Total number of measures including measures which have been allocated to more than one measure type	199
Range of number of measures between UoMs including measures which have been allocated to more than one measure type (Min-Max)	32-66
Average number of measures across UoMs including measures which have been allocated to more than one measure type	50

Table A3 *Total number of measures (aggregated and individual) per measure type and UoM, including duplicates*

	Prevention			Protection				Preparedness				Recovery and review			Other	Grand
	M21	M22	M24	M31	M32	M34	M35	M41	M42	M43	M44	M51	M52	M53	M61	Total
BG3000	6	3	16	1	5	3	6	2	3	5	6	1	3	5	1	66
Grand Total	6	3	16	1	5	3	6	2	3	5	6	1	3	5	1	66
Average per UoM	6	3	16	1	5	3	6	2	3	5	6	1	3	5	1	66

Note: For the codes, see Types of measures (above), and Annex B. The total includes measures assigned to more than one measure type

Note also that not all UoMs have aggregated measures, and thus not all UoMs are represented in this table.

Table A4 *Number of individual measures per measure type and UoM*

	Prevention			Protection					Preparedness				Recovery	Other	Grand Total
	M21	M22	M24	M31	M32	M33	M34	M35	M41	M42	M43	M44	M53	M61	
BG1000	2	1	11	2	4	3	2	4	3	4	3	7	5	1	52
BG2000	1	1	13	4	5	1	1	3	1	4	3	5	4	3	49
BG4000	1	1	4	1	5		1	2	1	3	3	8	2		32
Grand Total	4	3	28	7	14	4	4	9	5	11	9	20	11	4	133
Average per	1	1	9	2	5	1	1	3	2	4	3	7	4	1	44

Note: For the codes, see Types of measures (above), and Annex B. The total includes measures assigned to more than one measure type.

Note also that not all UoMs have aggregated measures, and thus not all UoMs are represented in this table.

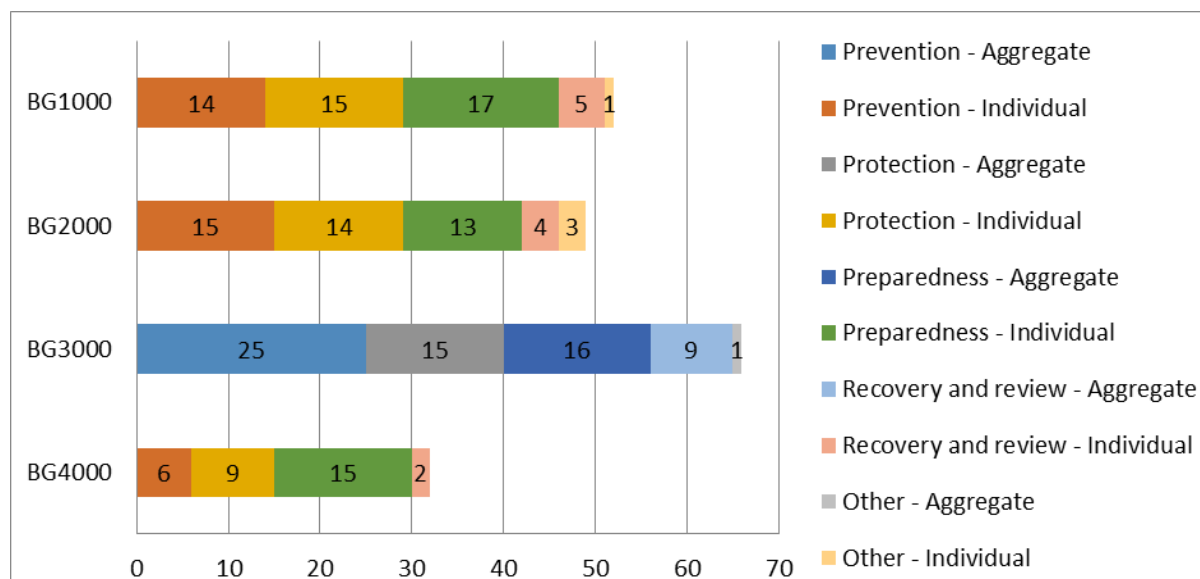
Table A5 *Total number of measures (aggregated and individual) per measure type and UoM, including duplicates*

	Prevention			Protection			Preparedness			Recovery and review			Other			Grand Total
	Aggregate	Individual	Total	Aggregate	Individual	Total	Aggregate	Individual	Total	Aggregate	Individual	Total	Aggregate	Individual	Total	
BG1000		14	14		15	15		17	17		5	5		1	1	52
BG2000		15	15		14	14		13	13		4	4		3	3	49
BG3000	25		25	15		15	16		16	9		9	1		1	66
BG4000		6	6		9	9		15	15		2	2				32
Grand Total	25	35	60	15	38	53	16	45	61	9	11	20	1	4	5	199
Average per UoM	6	9	15	4	10	13	4	11	15	2	3	5	<1	1	1	50

Note: For the codes, see Types of measures (above), and Annex B. The total includes measures assigned to more than one measure type

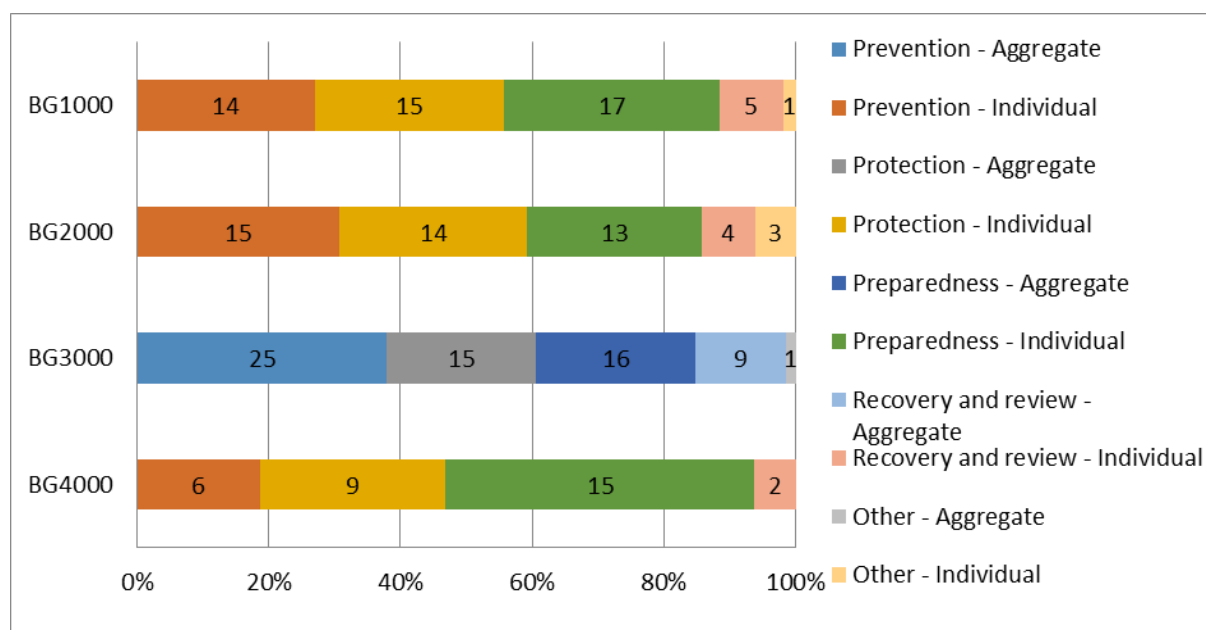
The information in Tables A3, A4 and A5 is visualised in Figures A1 and A2 below:

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



Notes: The total includes measures assigned to more than one measure type.

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



Notes: The total includes measures assigned to more than one measure type.

Measure details: cost

Member States were requested to report information on:

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

Cost was not given for any of the measures in the reporting sheets. (However, as explained in section 4 of this report, the FRMPs did provide some information about the costs of the measures planned.)

In the reporting sheets, cost explanation was provided for 101 measures in UoMs BG1000 and BG2000, no cost explanation was provided for UoMs BG3000 or BG4000.

The cost explanation for the measures in BG1000 is the same for all measures: *‘In the Danube RBD, a cost-benefit analysis (CBA) was performed for the selected combinations of measures for management of the flood risks for each of the 26 AFSFR defined. In the analysis the costs of the planned measures for reducing the flood risk are compared to the economic benefits (avoided damage) in case of events with probability of occurring once in 100 years. The impact of the selected combination of measures on reducing the flood risk and on the common wellbeing were assessed with the results of the CBA.’*

The cost explanation for all measures in BG2000 is: *‘On the basis of the conducted CBA for each APSFR, for each scenario of the programme of measures for 20, 100 and 1000-year wave, a programme of measures for each APSFR is chosen and included in the FRMP. The methodology for conducting the CBA can be found in Annex 19 of the FRMP’.*

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

Bulgaria has reported this information for all 199 measures. The different types of location given can be grouped in the following general categories:

- APSFR;
- Multiple APSFRs: when the measures cover more than one APSFR;

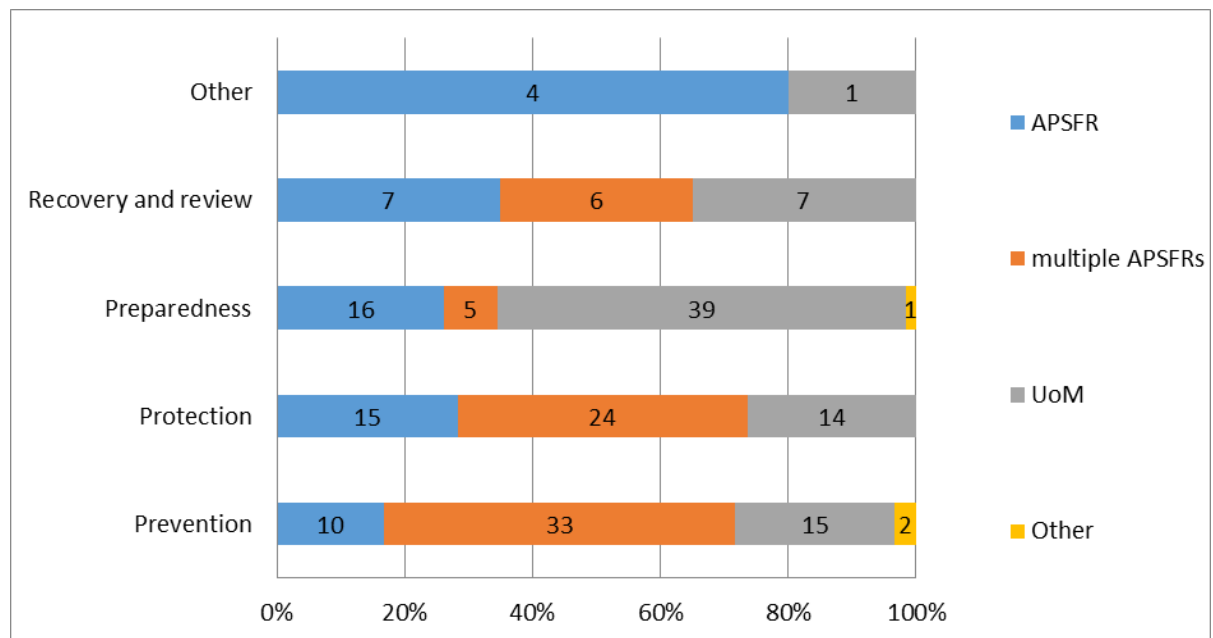
- UoM;
- Other.

Table A6 *Timetable of implementation by measure aspect*

	APSFR	Multiple APSFRs	UoM	Other	Grand Total
Prevention	10	33	15	2	60
Protection	15	24	14		53
Preparedness	16	5	39	1	61
Recovery and review	7	6	7		20
Other	4		1		5
Grand Total	52	68	76	3	199

Notes: The total includes measures assigned to more than one measure type.

Figure A3 *Visualisation of Table A6: Geographic location by measure aspect*



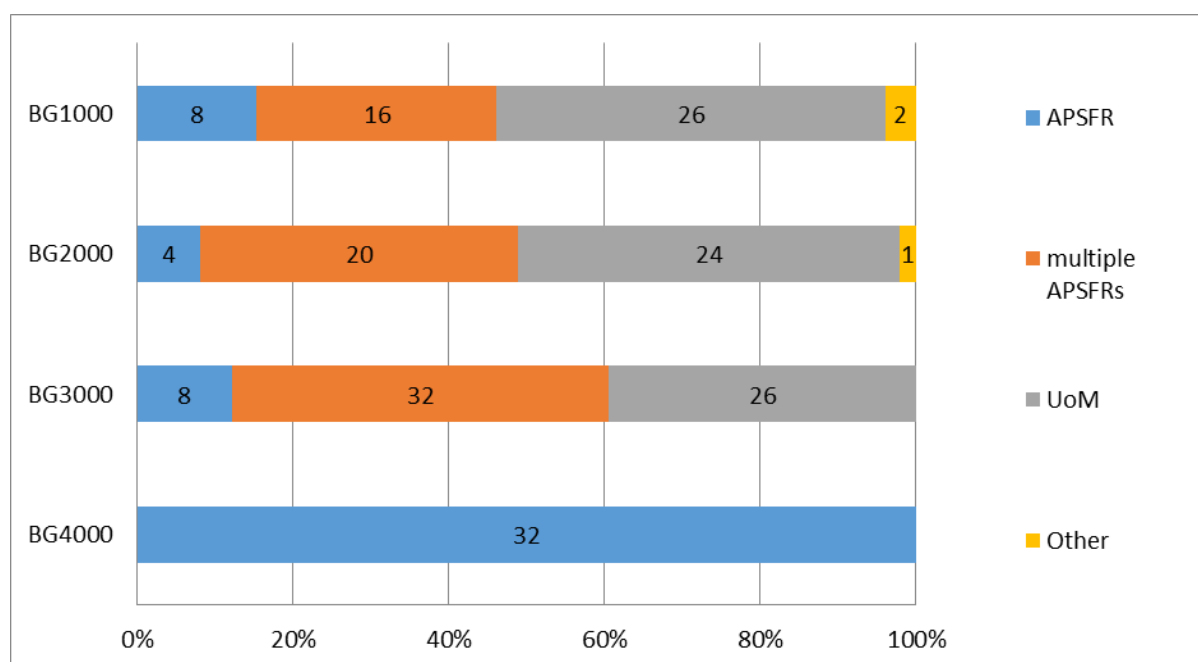
Notes: The total includes measures assigned to more than one measure type.

Table A7 *Geographic location by UoM*

	APSFR	Multiple APSFRs	UoM	Other	Grand Total
BG1000	8	16	26	2	52
BG2000	4	20	24	1	49
BG3000	8	32	26		66
BG4000	32				32
Grand Total	52	68	76	3	199
Average per UoM	13	17	19	1	50

Notes: The total includes measures assigned to more than one measure type.

Figure A4 Visualisation of Table A7: Geographic location by UoM



Notes: The total includes measures assigned to more than one measure type.

Geographic coverage

Bulgaria has provided information in the reporting sheets about the geographic coverage only of the measures in UoM BG4000, where the coverage is indicated as the RBD i.e. UoM.

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

Objectives were reported for all 199 measures. As they vary largely, it has not been possible to aggregate the information.

Category of priority

The priority is reported for all 199 measures. The following categories are used in reporting:

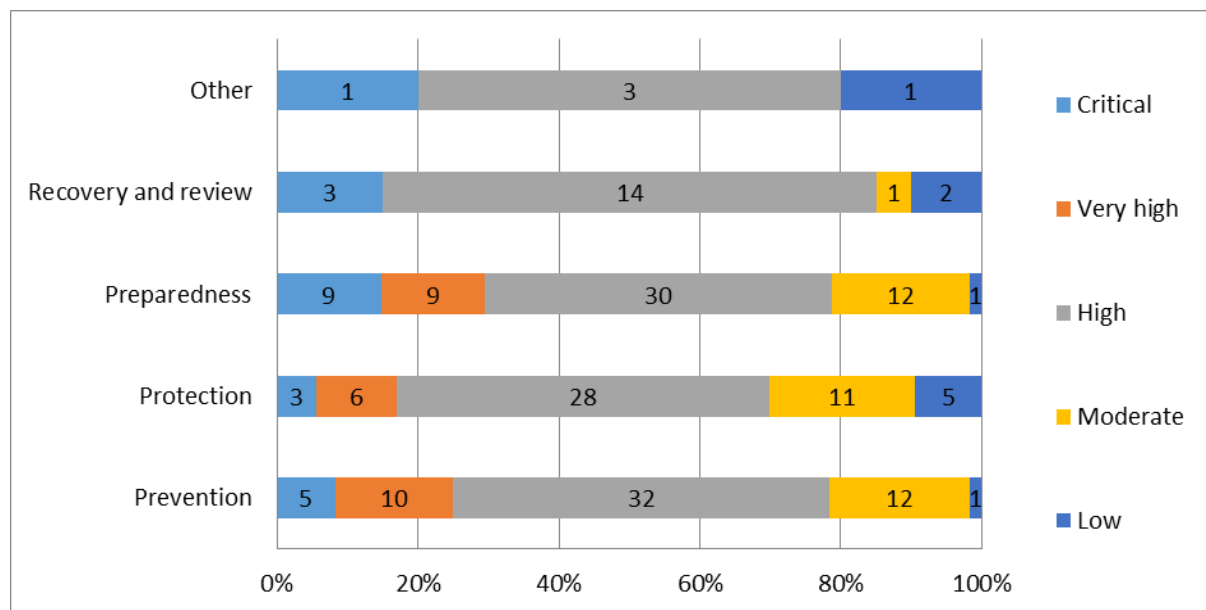
- Critical;
- Very high;
- High;
- Moderate;
- Low.

Table A8 *Category of priority by measure aspect*

	Critical	Very high	High	Moderate	Low	Grand Total
Prevention	5	10	32	12	1	60
Protection	3	6	28	11	5	53
Preparedness	9	9	30	12	1	61
Recovery and review	3		14	1	2	20
Other	1		3		1	5
Grand Total	21	25	107	36	10	199

Notes: The total includes measures assigned to more than one measure type.

Figure A5 *Visualisation of Table A8: Category of priority by measure aspect*



Notes: The total includes measures assigned to more than one measure type.

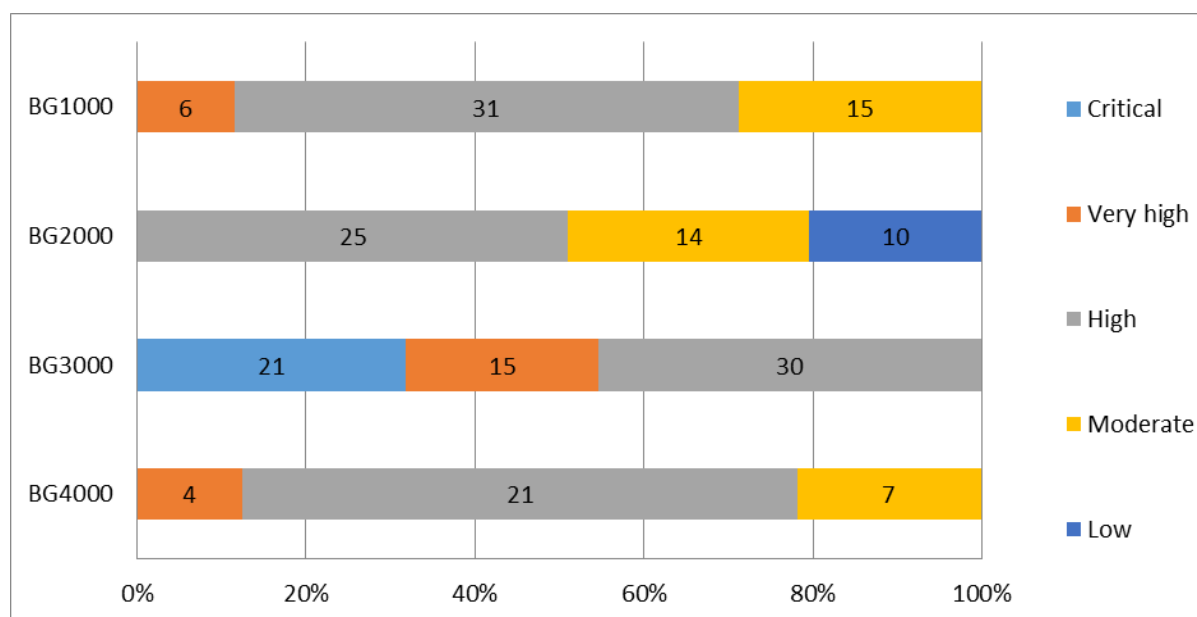
Table A9 *Category of priority by UoM*

	Critical	Very high	High	Moderate	Low	Grand Total
BG1000		6	31	15		52
BG2000			25	14	10	49
BG3000	21	15	30			66

	Critical	Very high	High	Moderate	Low	Grand Total
BG4000		4	21	7		32
Grand Total	21	25	107	36	10	199
Average per UoM	5	6	27	9	3	50

Notes: The total includes measures assigned to more than one measure type.

Figure A6 Visualisation of Table A9: Category of priority by UoM



Notes: The total includes measures assigned to more than one measure type.

Timetable

Bulgaria did not provide information on the timetable for any of the measures in the reporting sheets.

Measure details: authorities

Member States were requested to report information 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).

Bulgaria reported the level of the responsible authority for all measures except those for UoM BG4000. These blanks have been categorised following the examples from the other UoMs so that the level of responsible authority can be grouped in the following categories:

- UoM/RBD authority;

- Municipal authorities - e.g. mayors;
- District/regional authorities - e.g. regional governors;
- National authorities - this includes various ministries such as the Ministry of Environment and Water, the Ministry of Agriculture and Food, the Ministry of Energy etc. and associated national agencies or bodies such as the Directorate General for Fire Safety and Public Protection and the Agency for Road Infrastructure;
- Other - this includes various actors such as the National Institute for Meteorology and Hydrology, the National Energy Company, the public irrigation system operators and owners of private facilities.

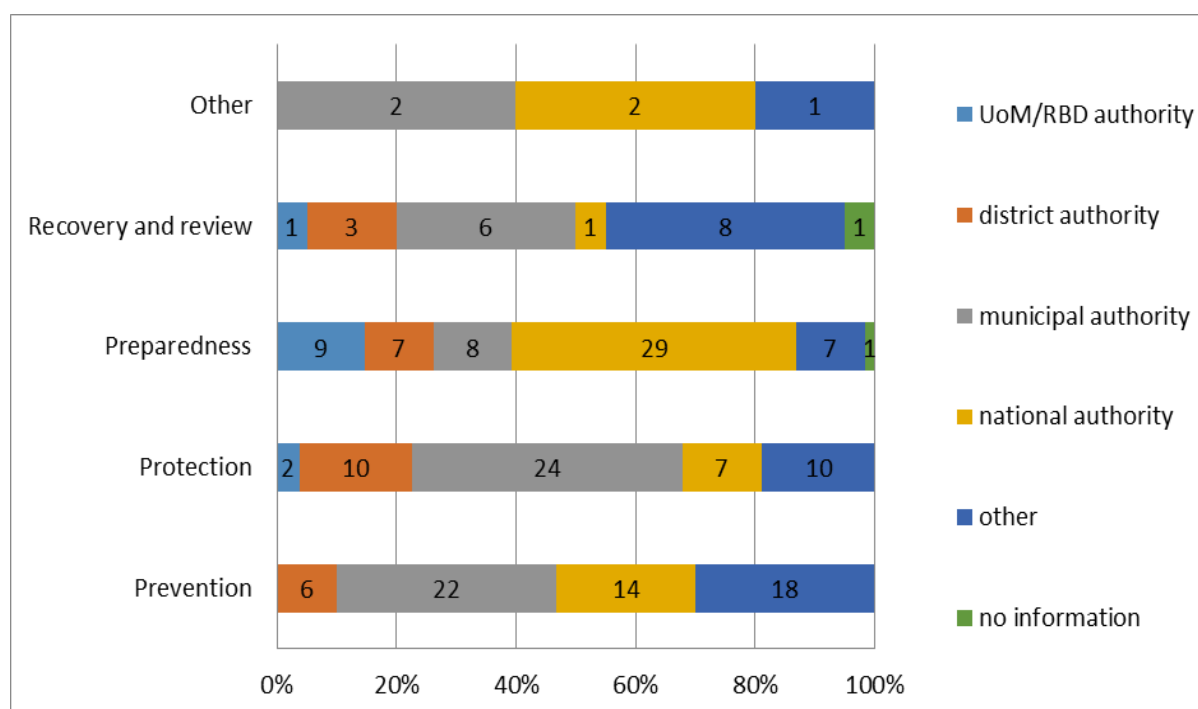
Table A10 *Level of responsibility by measure aspect*

	UoM/ RBD Authority	District Authority	Municipal Authority	National Authority	Other	No Information	Grand Total
Prevention		6	22	14	18		60
Protection	2	10	24	7	10		53
Preparedness	9	7	8	29	7	1	61
Recovery and review	1	3	6	1	8	1	20
Other			2	2	1		5
Grand Total	12	26	62	53	44	2	199

Notes: The total includes measures assigned to more than one measure type.

Some of the measures have responsible authorities at different levels, for simplicity all these measures have been classified under the first level of authority mentioned.

Figure A7 Visualisation of Table A10: Level of responsibility by measure aspect



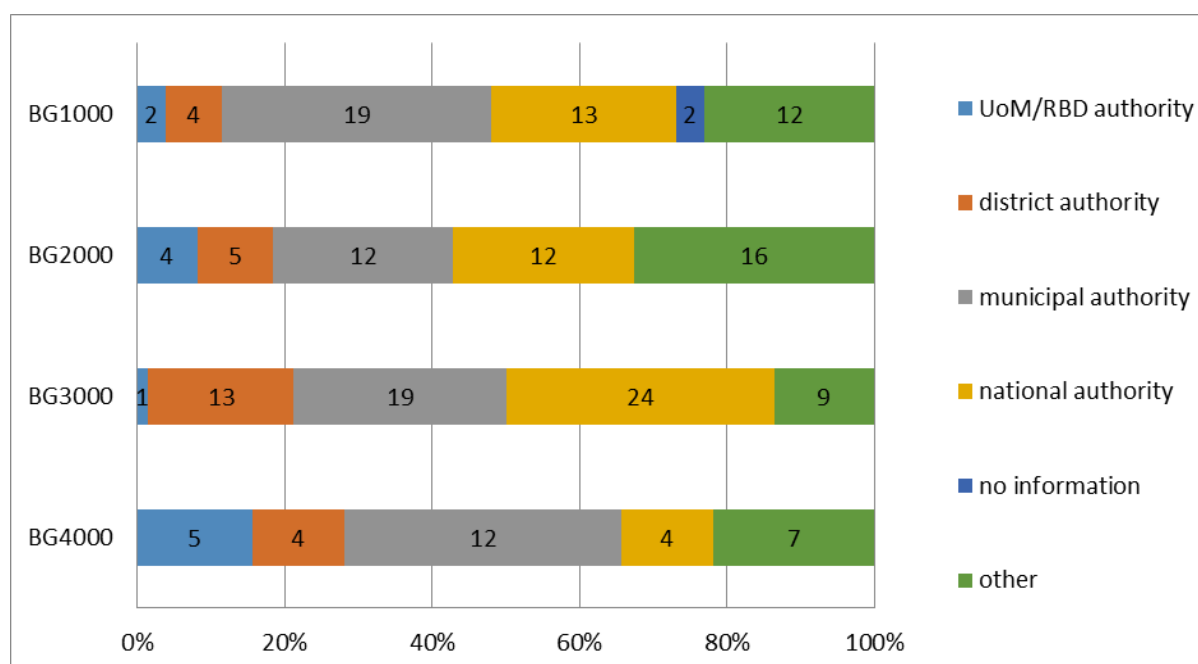
Notes: The total includes measures assigned to more than one measure type. Some of the measures have responsible authorities at different levels, for simplicity all these measures have been classified under the first level of authority mentioned.

Table A11 Level of responsibility by UoM

	UoM/RBD Authority	District Authority	Municipal Authority	National Authority	No Information	Other	Grand Total
BG1000	2	4	19	13	2	12	52
BG2000	4	5	12	12		16	49
BG3000	1	13	19	24		9	66
BG4000	5	4	12	4		7	32
Grand Total	12	26	62	53	2	44	199
Average per UoM	3	7	16	13	1	11	50

Notes: The total includes measures assigned to more than one measure type. Some of the measures have responsible authorities at different levels, for simplicity all these measures have been classified under the first level of authority mentioned.

Figure A8 Visualisation of Table A11: Level of responsibility by UoM



Notes: The total includes measures assigned to more than one measure type. Some of the measures have responsible authorities at different levels, for simplicity all these measures have been classified under the first level of authority mentioned.

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.

Bulgaria reported information about the progress of implementation of the measures in the reporting sheets. The progress of implementation was reported as⁷⁸:

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

⁷⁸ Guidance for Reporting under the FD (2007/60/EC): <https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a>

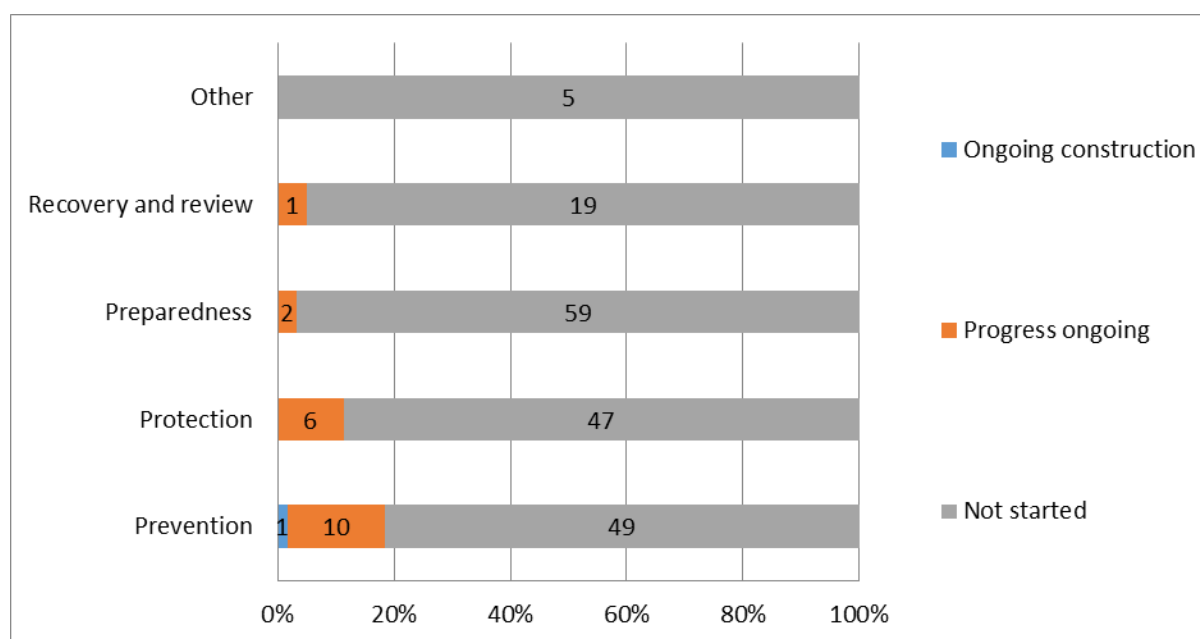
A full definition of these terms can be found at the end of this section.

Table A12 *Progress of implementation by measure aspect*

	Ongoing construction	Progress ongoing	Not started	Grand Total
Prevention	1	10	49	60
Protection		6	47	53
Preparedness		2	59	61
Recovery and review		1	19	20
Other			5	5
Grand Total	1	19	179	199

Notes: The total includes measures assigned to more than one measure type. No measures were reported as completed (COM).

Figure A9 *Visualisation of Table A12: Progress of implementation by measure aspect*



Notes: The total includes measures assigned to more than one measure type. No measures were reported as completed (COM).

Table A13 *Progress of implementation by UoM*

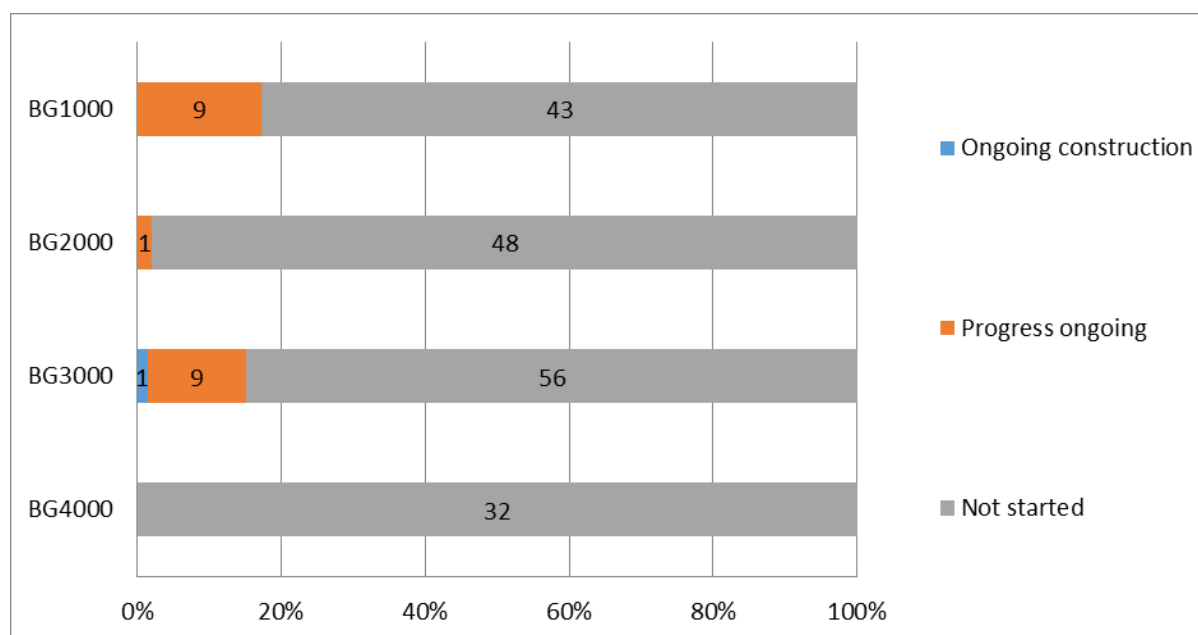
	Ongoing construction	Progress ongoing	Not started	Grand Total
BG1000		9	43	52
BG2000		1	48	49
BG3000	1	9	56	66
BG4000			32	32

	Ongoing construction	Progress ongoing	Not started	Grand Total
Grand Total	1	19	179	199
Average per UoM	0	5	45	50

Note: The total includes measures assigned to more than one measure type.

No measures were reported as completed (COM).

Figure A10 Visualisation of Table A13: Progress of implementation by UoM



Note: The total includes measures assigned to more than one measure type. No measures were reported as completed (COM).

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

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 finalised.
- 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 report information on:

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

Only 18 of the measures reported by Bulgaria provide information about other Community Acts of relevance in the reporting sheets; all measures are located in BG3000 and refer to Directive 85/337/EEA.

Annex B: Definitions of measure types

Table B1 *Types of flood risk management measures*

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 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, that 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 streams	U06 Filter Strips
A07 Low till agriculture	F07 'Water sensitive' driving	N07 Reconnection of oxbow lakes and similar features	U07 Soakaways

Agriculture	Forest	Hydro Morphology	Urban
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