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First Flood Risk Management Plans - Member State: Austria

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
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
WLV	Wildbach- und Lawinenverbauung

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) and to identify the river basins and coastal areas at risk of flooding (Areas of Potential Significant Flood Risk – APSFRs). By the end of 2013, Flood Hazard & Risk Maps (FHRMs) were to be drawn up for such areas. On this basis, Member States were to prepare Flood Risk Management Plans (FRMPs) by the end of 2015.

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

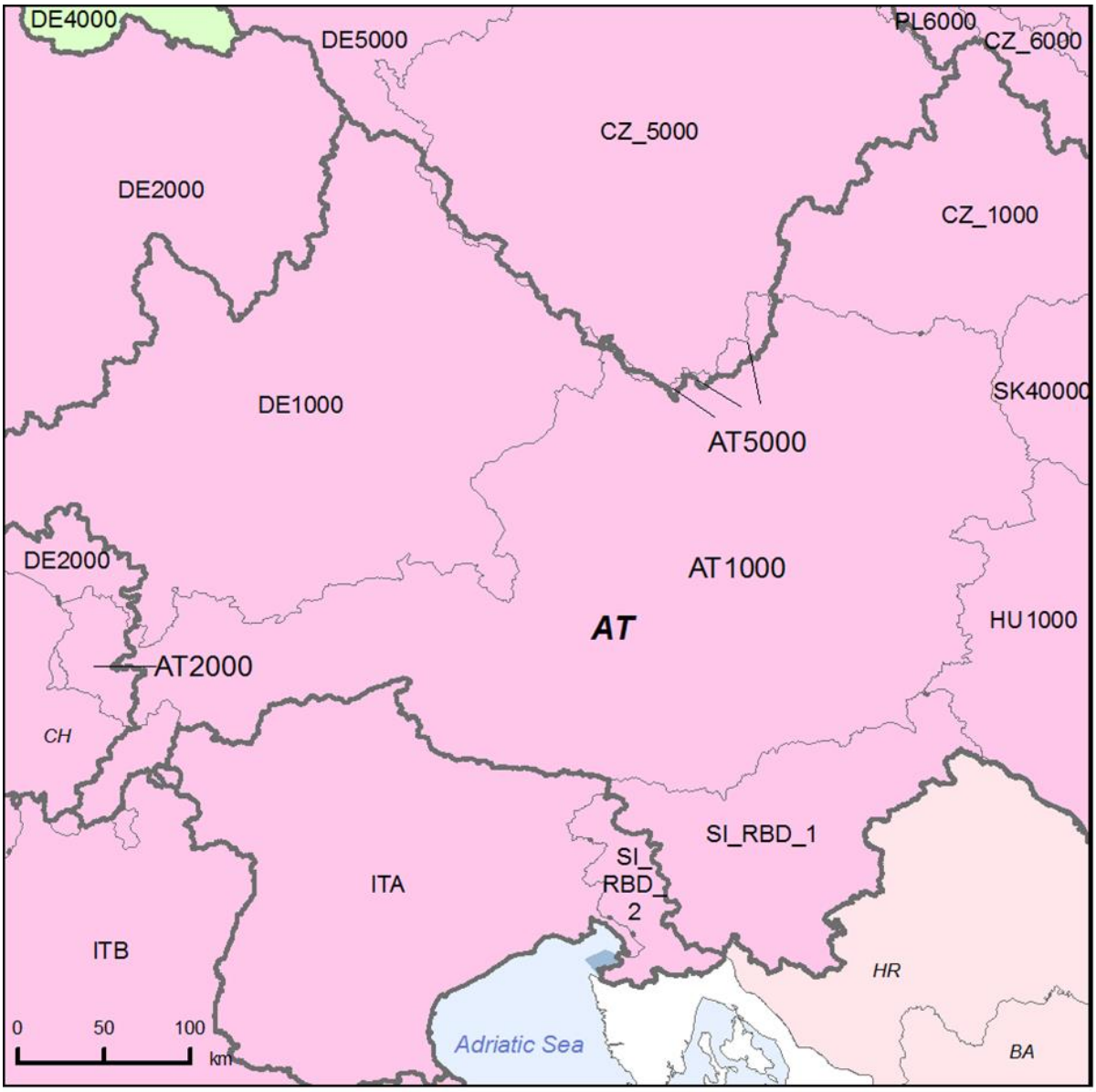
- Member State reporting to the European Commission on the FRMPs[2] as per Articles 7 and 15 of the FD: this reporting provides an overview of the Plans and details on their measures.
- The actual FRMP: Austria has three Units of Management (UoMs), of which two have APSFRs, however, one FRMP was reported on the national level, covering all three UoMs AT1000, AT2000 and AT5000. The national-level FRMP was assessed, as well as the reported information on AT1000 and AT2000 (from the reporting sheets). On AT5000, there is no such data, as there are no APSFRs, there are no flood hazard maps or flood risk maps.

[1] The present Member State assessment report reflects 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 MSs 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

Austria has three Units of Management (UoMs) for which in total 391 Areas of Potentially Significant Floods Risk (APSFRs) have been assigned, see the table below for an overview.

Austria reported one FRMP on the national level, covering all three UoMs: AT1000 (Danube), AT2000 (Rhine) and AT5000 (Elbe). The territories of these three UoMs correspond to the territories of Austria's three River Basin Districts (RBDs) designated under the Water Framework Directive (WFD) and have the same codes and names: AT1000 Danube, AT2000 Rhine and AT5000 Elbe.

The FRMP document consists of a main body plus annexes (two PDFs), and four supplementary documents (four PDFs[3]). Austria submitted reporting sheets to the European Commission for AT1000 and AT2000. Files were not reported for AT5000, and a supplementary note states that as there are no APSFRs identified in AT5000, there are no flood hazard maps, flood risk maps, and hence no requirement to report an FRMPs. Nevertheless, for each UoM individually (also for AT5000), the respective International FRMPs were submitted (three PDFs, plus one annex).

Austria's FRMP was approved by an order of the Minister of Agriculture, Forestry, Environment and Water Management[4].

The table below gives an overview of all UoMs in Austria, 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)[5] – the FRMP as a PDF and the reporting sheet as an XML. The table does not show if hyperlinks to national websites were reported, even if these national websites contain the FRMP.

Table 1 Overview of UoMs in Austria

UoM	Name	Number of APSFRs	XML Reported	PDF Reported
AT1000	Danube	372	Yes	Yes
AT2000	Rhine	19	Yes	Yes
AT5000	Elbe	0	No	No
TOTAL		**391**		

[3] These are labelled "Background Documents" and consist of: a brochure for the public participation campaign, two documents on measures (background on the catalogue of measures and on the planning of measures), and one document on the environment report of the SEA.

[4] Currently the Ministry for Sustainability and Tourism.

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

The FRMP can be downloaded from the following web pages:

- https://www.bmnt.gv.at/wasser/wisa/fachinformation/hochwasserrisiko/hochwasserrisikoplan/managementplan.html
- https://www.ris.bka.gv.at/Dokumente/Bundesnormen/NOR40186903/II_268_2016_Anhang_1.pdf

Overview of the assessment

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

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

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

Criterion	Evidence	Comments
Flood risk management objectives have been established	Strong evidence	The Austrian objectives are general and based on the "*Hochwasserrisikokreislauf*" (flood risk cycle), which itself is based on the disaster risk management cycle (response/rehabilitation and reconstruction/prevention and mitigation/ preparedness).
Flood risk management objectives relate to...		
...the reduction of potential adverse consequences	Strong evidence	This aspect is mentioned in the definition of objectives in the FRMP.
...to the reduction of the likelihood of flooding	Strong evidence	This aspect is mentioned in the definition of objectives in the FRMP.
...to non-structural initiatives	Strong evidence	This aspect is specified in the definition of objectives in the FRMPs.
Flood risk management objectives consider relevant potential adverse consequences to...		
...human health	Some evidence	Objective No 3 ("Reduction of adverse consequences during and after a flood event") refers to adverse consequences, which are described later on in the FRMP and encompass human health, economic activity, environment and cultural heritage. Hence, it can be concluded that

Criterion	Evidence	Comments
		the objectives consider potential adverse consequences to all four aspects.
...economic activity	Some evidence	See above under human health
...environment	Some evidence	See above under human health.
...cultural heritage	Some evidence	See above under human health
Measures have been...		
...identified	Strong evidence	The FRMP describes a set of 22 planned, ongoing or completed measures; the annex complements this description by showing the status of each measure for each APSFR.
...prioritised	Strong evidence	The measures in the FRMP are prioritised. However, there is no concrete methodology used in setting priorities. Instead, the national FRMP describes several factors which were consulted for setting the priorities, but without explaining in any detail how these factors where weighed. It is only mentioned that the factors were discussed and consulted, and the priorities set accordingly. The factors are: contribution of the measure to reach the objectives, effect on risk reduction, cost-effectiveness or cost-benefit, general need for the measure, whether it is a structural or non-structural measure, relevance for WFD implementation and climate change adaptation.
Relevant aspects of Article 7 have been taken into account such as...		
...costs & benefits	Some evidence	The FRMP refers to cost-effectiveness and cost-benefit relations as a criterion for the establishment of priorities for the selection of measures, but without going into any detail.
...flood extent	Strong evidence	The flood extent is shown for each APSFR on the corresponding map.

Criterion	Evidence	Comments
...flood conveyance	Some evidence	Flood conveyance routes are not mentioned specifically in the FRMP[6], especially not with regard to the PFRA. However, the APSFRs were coordinated with the "*Wildbach- und Lawinenverbauung* (WLV)", i.e. with small streams and avalanche routes, which could be regarded as conveyance routes.
...water retention	Strong evidence	There are a great number of measures on natural water retention measures (NWRM) (M07).
...environmental objectives of the WFD	Strong evidence	The FRMP refers to the necessity of coordination between the FRMP and River Basin Management Plan (RBMP), and the obligation to foster the achievement of the WFD objectives, which often leads to the selection of sustainable solutions, like NWRM. Also, the relevance for WFD implementation is a factor in the prioritisation of measures.
...spatial planning/land use	Strong evidence	With regard to spatial planning/land use measures, eight measures are included in the national FRMP.
...nature conservation	Strong evidence	One national measure type (M07, Restoration of flood plains and sedimentation areas) refers to nature conservation.
...navigation/port infrastructure	No evidence	In the Austrian FRMP, measures do not specifically consider ports and navigation.[7]
...likely impact of climate change	Some evidence	With regard to climate change, the Austrian FRMP refers to the Austrian Climate Change Adaptation Strategy and accompanying research reports and predictions. The results, to date, of these studies analysing climate change are that the uncertainties regarding the modelling of extreme fluvial flood events are very significant, and still higher than the

[6] Austria noted subsequently that Austrian planning instruments, especially the hazard zone plan (according to the water law and forest law) and the hydrodynamic modelling in the frame of the so called "*Abflussuntersuchung* – river flow analyses", provide all relevant information of flood conveyance routes. This had been reported under the FHRM and, therefore, was not reported again under the FRMP.

[7] Austria noted subsequently that navigation, port infrastructure and dredging are implicitly incorporated into a national measure on maintenance of protection and mitigation measures, river maintenance.

Criterion	Evidence	Comments
		expected effects of climate change on expected future extreme events (themselves based on extrapolations of past observations). Hence, climate change is considered, but there are neither specific measures for this, nor are measures adapted to accommodate for climate change[8].
Coordination with other countries ensured in the RBD/UoM	Strong evidence	All three Austrian UoMs are transboundary UoMs, and in all three an international coordination process has taken place.
Coordination ensured with WFD	Strong evidence	The FRMP refers to the necessity of coordination between the FRMP and RBMP, and the obligation to foster the achievement of the WFD objectives. Furthermore, the consultation process was coordinated with the WFD process, and the impacts of measures for reaching WFD objectives were considered in the prioritisation of measures.
Active involvement of interested parties	Strong evidence	In Austria, a broad public information and consultation strategy was followed for the consultation on the FRMP (including information of the public), using multiple public relations channels, notably dialogue platforms for topics related to water management (namely the Round Table on Water and a platform called "Flussdialog"/River Dialogue, which targeted a large number of stakeholders as well as the general populace).

Good Practices

The assessment identified the following good practices in the Austrian FRMPs assessed:

Table 3 Good practices in the Austrian FRMPs

Topic area	Good practice identified
Integration of previously reported information in	The processes of the PFRA and the preparation of the FHRMs are described comprehensively. Also, information and data sources in

[8] Austria clarified subsequently that the effectiveness of measures for climate change adaptation was considered in the prioritization of measures (p.163 of the FRMP).

the FRMPs.	addition to the PFRA are identified (results from run-off models, zoning/hazard zoning according to Austrian law, hazard zoning plans according to the 1975 forestry law, and the floods zoning (HORA) for Austria); these sources also seem to have been used to enhance the overall quality of the FHRMs, but how or to which degree is unclear.
Planning/implementing of measures and their prioritization for the achievement of objectives.	Austria has implemented or planned a great number of Natural Water Retention Measures: in 96 APSFRs, NWRM are ongoing or planned; in 32 APSFRS, NWRM are already completed; and in over 200 APSFRs, NWRM are foreseen in the second implementation cycle.
Consideration of climate change in the FRMPs assessed.	There is a reference to the Austrian Climate Change Adaptation Strategy and the respective background documents/prognoses and a good summary of their findings. The effectiveness of measures for climate change adaptation was considered in the prioritisation of the measures. Non-structural and spatial planning measures are considered no regret measures with regard to climate change adaptation.
Use of cost-benefit analysis in the FRMPs assessed.	Cost-effectiveness of measures is assessed qualitatively, in a comprehensive way, and summarised in three clear categories (very high / high / 'balanced', i.e. no net benefit determined in a qualitative way): these cost-effectiveness assessments are reported to be used as a criterion for the prioritisation of measures.
Coordination with the WFD	Austria's FRMP highlights coordination with the country's RBMP and the obligation to foster WFD objectives, which can lead to the selection of sustainable solutions, notably NWRM. Moreover, the overlap between APSFRs and water bodies with WFD requirements, especially with regard to hydromorphology, has been assessed, and a summary of status and objectives for each of the concerned water bodies produced: in overlapping water bodies/APSFRs, coordination is required between concerned authorities.
Public participation.	A broad public information and consultation strategy was followed for the consultation on the FRMP.
Flood risk governance.	A Strategic Environmental Assessment (SEA) has been carried out for the FRMP. Coordination of the FRMP with the RBMPs under the WFD was conducted. Coordination with local authorities and authorities from other departments (than those responsible for floods) was undertaken.
International issues in flood risk management.	All three Austrian UoMs are transboundary UoMs, and in all three an international coordination process has taken place.

Areas for further development

The assessment identified the following areas for further development in the Austrian FRMPs assessed:

Table 4 Areas for further development in the Austrian FRMPs

Topic area	Areas identified for further development
Integration of previously reported information in the FRMPs.	It is not clearly described in the FRMP how the PFRA and the FHRMs influenced the objectives, priorities and planning of measures. The hyperlinks included in the FRMP to the FHRMs do not work anymore[9,10].
Setting of objectives for the management of flood risk.	The objectives are not measurable (no timeframe, no indicators), since they are formulated in a very generic way[11].
Planning/implementation of measures and their prioritization for the achievement of objectives.	It is neither clear how measures will contribute to the objectives, nor by how much, as there is both a lack of a baseline[12], as well as of indicators that would allow this (also, the objectives are not specific and measurable). It is also not clear whether the objectives will be achieved, when all measures are completed. Information on costs and financing sources is incomplete and in many cases missing. Additionally, the prioritisation of the measures is not clearly described, and the overall evaluation of the effects of the FRMP is only vaguely described in Austria's 1st FRMP. There is no indication in the tables on measures and measure implementation, in the annex to the FRMP, of the priority of the measure at hand, which would be useful to assess the relation between priority and planned implementation. The measures in the Austrian FRMP could be described best as "partly specific and measurable", as it is made clear what the measures are trying to achieve, where they are to be achieved, and by when. The "how" is not or only partly answered[13]. With regard to the coordination with the WFD, Austria does not associate the reported FD measures to WFD measures.
Consideration of climate	The reference to the Austrian Climate Change Adaptation Strategy and

[9] In addition, several other hyperlinks were found to not work, including those to the Austrian Climate Change Adaptation Strategy and the respective background documents/prognoses and to the SEA Environmental report.

[10] Austria informed subsequently that the renaming of the Ministry may have caused inaccessibility of certain links. The problem has been resolved since; https://maps.wisa.bmnt.gv.at/hochwasser

[11] Austria informed subsequently that even a general objective like "reducing existing risk" is measurable by comparing e.g. the people exposed. A methodology will be considered for the second cycle following the incorporation of lessons learnt.

[12] Austria informed subsequently that the situation at the start of the implementation cycle in 2015 will serve as a baseline.

[13] In the background document "Maßnahmenkatalog", the responsible authorities, the legal framework and the coordination needs are briefly stated.

change in the FRMPs assessed.	the respective background documents is not provided directly. It is unclear how the climate change adaptation effects of measures were considered in the prioritisation of the measures.
Use of cost-benefit analysis in the FRMPs assessed.	It is not clearly described how cost-effectiveness assessments influenced the prioritisation of measures.
Public participation.	The concrete effects of the consultation are not summarised in the FRMP.

Recommendations

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

- To be able to assess progress, the objectives of the FRMP should be measurable to the extent possible. How measures link to objectives should be considered.
- The process of prioritisation of measures should be better explained, e.g. how the different factors were considered and weighted (including where applicable consideration of climate change).
- More detailed information on costs and financing sources should be included in the planning of measures. Based on cost and benefit information, a more detailed methodology for assessing cost-effectiveness/cost-benefits should be considered (e.g. for prioritisation of measures that lend themselves to it).
- It is important to ensure that FRMPs, PFRAs/APSFRs and FHRMs refer to each other as appropriate and that they are continuously available to all concerned and the public in an accessible format, including digitally.

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

1.1 Reporting of the FRMPs

Austria has three UoMs for which in total 391 APSFRs have been assigned.

Austria reported one FRMP on the national level, covering all three UoMs: AT1000, AT2000 and AT5000. Additionally, for each UoM individually, the respective International Plans were submitted (three PDFs, plus one annex for the Danube). Austria did not employ Art. 13.3 of the FD, which allows Member States to make use of previous flood risk management plans (provided their content is equivalent to the requirements set out in the Directive).

1.2 Assessment of the FRMPs

For Austria, the national-level FRMP has been assessed, as well as the reported information on AT1000 and AT2000 (reporting sheets and XML data uploaded to WISE). For AT5000, which has no APSFRs, Austria did not provide reporting sheets. The national FRMP was assessed. As noted, this plan covers all three UoMs in Austria:

Table 5 UoMs covered by the national FRMP assessed

UoM code	UoM Name
AT1000	Danube
AT2000	Rhine
AT5000	Elbe

2. Integration of previously reported information

2.1 Conclusions drawn from the preliminary flood risk assessment

The conclusions of the preliminary flood risk assessment are described in detail in chapters 3.1 to 3.3 of the FRMP, both as text and tables, and as a summary map. APSFR or other flood risk areas shared with other Member States in international UoMs are not explicitly depicted, although these are included in the main summary map; the scale of this map is not big enough to discern individual APSFRs or water bodies.

There is no link provided to maps/the summary map for the APSFRs[14]. A link is provided to national hazard and risk maps[15], and these should also include the APSFRs, but the link does not work[16].

Flood conveyance routes are not mentioned specifically in the FRMP, and not with regard to the PFRA[17]. However, the APSFR considered the WLV, i.e. small streams and avalanche routes, which could be regarded as conveyance routes[18].

2.1.1 Coordination with neighbouring Member States on shared RBDs/UoMs

Section two of the FRMP describes the coordination with neighbouring states, which takes place in the context of the respective international river commissions; in the Danube, coordination took place also in the respective expert group on floods. In the International FRMP of the Danube Commission, shared APSFRs are identified. In the Austrian part of the Rhine basin, 19 APSFRs are identified, but it is not explained in the FRMP whether these were coordinated in the Rhine Commission's Expert Group[19]. In the Elbe international RBD, no APSFRs were identified in Austria.

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

The FRMP reports that the PFRA and the identified APSFRs were used as the basis for developing the flood hazard (FHM) and flood risk (FRM) maps; some additional sources of

[14] The following link was subsequently provided by Austria: http://maps.wisa.bmnt.gv.at/hochwasser
[15] FRMP p.16.
[16] https://www.bmlfuw.gv.at/wasser/wisa/wasserkarten/hochwasser/gefahrenkarten.html
[17] Austria noted subsequently that Austrian planning instruments, especially the hazard zone plan (according to the water law and forest law) and the hydrodynamic modelling in the frame of the so called "Abflussuntersuchung – river flow analyses", provide all relevant information of flood conveyance routes. This had been reported under the FHRM and, therefore, was not reported again under the FRMP.
[18] FRMP p. 13 and Annex.
[19] Austria subsequently confirmed that coordination takes place.

information were also consulted (results from run-off models, zoning/hazard zoning according to Austrian law, hazard zoning plans according to the 1975 forestry law, and the floods zoning (HORA) for Austria). The FRMP (chapters 3.4 and 3.5) states that the flood hazard maps cover more areas than the APSFR if possible, but it is not specified how much more or which areas in addition to the APSFRs.

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

The FHRM have been provided in the form of hyperlinks in the FRMPs. There are references to maps for fluvial floods, but not for floods from pluvial, groundwater, artificial water bearing structures or non-specific sources[20], nor the combined effects of more than one source of flooding. It must be noted that the link to both the flood hazard and the flood risk maps as provided in the FRMP do not work[21].

In Austria, fluvial and pluvial past flood events have been considered as significant. However, no APSFRs have been designated for pluvial flooding, as these are very local events in Austria[22], and the uncertainties were considered too high. Floods from groundwater and artificial water bearing structures are not considered significant, and again no APSFRs have been designated. Hence, only for fluvial floods (including floods from lakes) have APSFRs been designated, and only for these floods have flood hazard and flood risk maps been produced[23].

2.2.1 Maps for shared flood risk areas

Flood hazard and flood risk maps have not been specifically prepared for flood risk areas shared with other Member States as there are none according to Austria. However, in the International FRMP of the Danube Commission, shared APSFRs are identified, and in Annex I to the Report, aggregate maps showing summaries of the national flood hazard or flood risk maps are presented, but these are not flood hazard or flood risk maps in the sense of the Directive[24].

[20] Nor for seawater sources, which are not relevant for Austria.
[21] https://www.bmlfuw.gv.at/wasser/wisa/wasserkarten/hochwasser/risikokarte.html
[22] Austria clarified subsequently that pluvial flooding is considered a general risk, which will be incorporated to the second cycle PFRA by means of a hazard indication map.
[23] FRMP chapter 3.1 for significance (p. 11 and 12), chapter 3.4 and 3.5 for the maps; links on p. 16 and 19.
[24] FRMP chapters 3.4 (FHM) and 3.5 (FRM); International FRMP Danube chapter 3 and Annex I.

2.2.2 Conclusions drawn from the flood hazard and flood risk maps

It is not clear in the FRMP how the FHRMs have inspired the content of the plan, in particular, with regard to priorities, objectives and measures. The conclusions drawn from the flood hazard and flood risk maps presented in the FRMP describe the flood hazard and flood risk maps only "statistically" in terms of "area impacted", "people impacted", "number of industry locations impacted" etc. Though it is indicated that the FHRMs are used as a basis for the planning of measures (FRMP, p.20), it is not described how. Regarding priorities and objectives, there is no mention of the FHRMs[25].

2.3 Changes to the APSFRs or other Flood Risk Areas

Any changes in the identification of APSFRs or other Flood Risk Areas since December 2011 should be reflected in the FRMP. No such changes are described in the FRMP[26]. In addition, there are no changes described in the FRMP for the Flood Hazard and Flood Risk Maps since December 2013[27].

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

The review of Austria's FHRMs[28] did not identify significant negative issues identified regarding the flood risk and hazard maps in the FHRM assessment for Austria: They are all of a very high quality and good scale (1:50 000[29]), were at the time easily accessible, and comprehensive.

Minor issues that could be improved were: to add contact information to the maps or website (specific mail address or telephone number); furthermore, the expressions "hazard" and "risk" or "potentially significant risk" are not explained on the maps, but sound very technical - an easy-to-grasp explanation could be helpful for the public.

None of these minor areas for further development are explicitly addressed within the FRMPs assessed or the reporting. Furthermore, the links provided in the FRMP no longer work[30].

[25] FRMP chapters 3.5 (FRMP), 4 (objectives) and 5 (PoM).
[26] Austria confirmed subsequently that there are no changes to the APSFRs.
[27] FRMP chapter 3.
[28] Based on: European Commission, Assessment of Flood Hazard and Flood Risk Maps – Member State Report: AT – Austria, 2015. Available at: http://ec.europa.eu/environment/water/flood_risk/pdf/fhrm_reports/AT%20FHRM%20Report.pdf
[29] Austria recalled that the scale of the maps is 1:25 000, however the text on the maps suggests differently.
[30] FRMP chapter 3, links on p. 16 and 19.

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

The following **good practice** was identified:

- The processes of the PFRA and the preparation of the FHRMs are described comprehensively. Also, information and data sources in addition to the PFRA are identified (results from run-off models, zoning/hazard zoning according to Austrian law, hazard zoning plans according to the 1975 forestry law, and the floods zoning (HORA) for Austria); these sources also seem to have been used to enhance the overall quality of the FHRMs.

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

- It is not clearly described in the FRMP how the PFRA and the FHRMs influenced the objectives, priorities and planning of measures.
- Maintain the internet links to the FHRMs.

3. Setting of Objectives

3.1 Focus of objectives

The Austrian objectives are based on the "*Hochwasserrisikokreislauf*" (flood risk cycle), which itself is based on the disaster risk management cycle (response/rehabilitation, reconstruction/prevention and mitigation/preparedness). From this, four generic objectives are formulated (and referred to below):

1. Avoidance of new risks prior to a flood event.
2. Reduction of existing risks prior to a flood event.
3. Reduction of adverse consequences during and after a flood event.
4. Strengthening the awareness of hazard and risk.

These four objectives fall, in a very general sense, into the following categories below[31]:

- The objectives aim to reduce the adverse consequences of floods.
- The objectives aim to reduce the likelihood of flooding[32].
- The objectives refer to measures that will be implemented.
- The objectives refer to non-structural measures[33].

3.2 Specific and measurable objectives

In Austria, objectives are neither specific nor measurable, with the four objectives described above formulated in a very generic way[34].

3.3 Objectives to reduce adverse consequences from floods

In the FRMPs assessed, objectives do not provide further specification of the type of adverse consequences that will be reduced. As mentioned previously, objectives are formulated in a very generic way. In terms of adverse consequences, it is mentioned that "the risk for all protected assets can be reduced" (Objective No 3).

[31] These categories are included in Art. 7 of the FD.
[32] 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.
[33] Non-structural measures include measures such as flood forecasting and raising awareness of flooding as well as land use planning, economic instruments and insurance.
[34] Austria subsequently noted that even a general objective such as "reducing existing risk" is measurable by comparing e.g. the people exposed and that a methodology will be considered for the 2nd cycle of the FD.

3.4 Objectives to address the reduction of the likelihood of flooding

Objectives No 1 (Avoidance of new risks prior to a flood event) and 2 (Reduction of existing risks prior to a flood event) are the objectives that address the reduction of the likelihood of flooding. These objectives do not specifically mention measures, but name general measure types that could serve to reach these objectives. They are planning and other non-structural measures, modification of structural measures, new structural measures, and removal of assets at risk from risk areas.

3.5 Process for setting the objectives

There is no description in the national FRMP how the objectives were coordinated at national or regional levels, whether climate change has been taken into account, or whether the objectives have been discussed with stakeholders, except for general statements concerning the overall coordination of all aspects of the FRMP.

3.6 Good practices and areas for further development regarding setting objectives

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

- The objectives are not measurable (no timeframe, no indicators), since they are formulated in a very generic way. How to assess achievement of should be considered.

4. Planned measures for the achievement of objectives

Across all three of Austria's UoMs, the total number of individual measures reported to WISE is 0[35], and the number of aggregated[36] measures is 9 775[37].

Many of the national measures are assigned to more than one measure type[38]. As the assessment database focuses on measures by type, this total count is used for comparison across types: the total number of measures across all the measure types, counting those which have been allocated to more than one measure type[39], is 15 249. Nearly all measures (around 95 %) are undertaken in AT1000 (Danube): 14 508, compared to 741 in AT2000 (Rhine). In AT5000 (Elbe), no measures are located, as no APSFRs are defined.

Across the four measure aspects defined, protection measures are in the majority, with 5 474 measures or around 36 % of the total measures. These are followed by prevention (4 301 or around 28 %), preparedness (3 128 or around 21 %) and recovery measures (2 346 or about 15 %)[40].

4.1 Cost of measures

Information on the costs of planned measures were not reported for any of the measures. The FRMP does not provide any explanation of the costs, though for some measures, rough costs are provided but without details that would allow any overall estimation:

- For Austrian measure type M01 in the FRMP (equivalent to EU measure type M21[41] – see Annex B below), costs per area/length are provided (i.e. "euro per river kilometre").

[35] Austria noted subsequently that FRMPs are also developed at APSFR level: these include individual measures.

[36] 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.

[37] 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.

[38] Measure types are listed in Annex B.

[39] i.e. measures allocated to more than one type are counted each time.

[40] Counting each time a measure is allocated to a type. More information can be found in Annex A.

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

- For Austrian measure type M03 in the FRMP (part of M24[42] in Annex B) general costs for planning documents and studies are provided (i.e. "more than €10 000 up to several €100 000 ").
- For Austrian M17 in the FRMP (part of EU M24 in Annex B) general costs for modelling studies are provided ("more than €10 000 up to several €100 000").
- For Austrian M09 in the FRMP (EU M35[43] in Annex B), costs for private protection measures are stated to be "several €1 000".
- For Austrian M18 in the FRMP (EU M51[44] in Annex B) general costs for reaction and recovery plans are provided ("more than €1 000 up to several €10 000").

The national FRMP is valid for all three UoMs, hence there are no differences between UoMs (except of course that no measures are planned in AT5000).

4.2 Funding of measures

For some of the described measures, there is a section on financing (FRMP chapter 5.6 on the Programme of Measures - PoM). It lists the possible sources of financing, mostly in terms of responsibilities (e.g. federal/regional/local level). Beside the public funds, the beneficiary of the measures is listed as responsible several times; this was ticked as "private investments". The EU-LIFE programme was mentioned for Austrian measure type M07 (NWRM).

The table below provides an overview of the information found. Please note that these are indicated as “possible sources of financing” and that the information is not provided for all measures.

Table 6 Funding of measures

	All UoMs assessed
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)	✓

[42] 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...)

[43] Protection, Other Protection, Other measure to enhance protection against flooding, which may include flood defence asset maintenance programmes or policies.

[44] 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.

Private investment	✓
EU funds (generic)	
EU Structural funds	
EU Solidarity Fund[45]	
EU Cohesion funds	
EU CAP funds	✓
International funds	
EU-LIFE programme	✓

Source: FRMPs

4.3 Measurable and specific (including location) measures

An annex to the national FRMP, the catalogue of measures, provides a general description of measures, including what they are trying to achieve; however, neither the FRMP (in its presentations at the level of the UoM) nor the catalogue provides a clear and explicit description of the measures with regard to how they are to be achieved.

The measures described in the national FRMP are not specific and measurable; instead, the 22 measures described are a list of general options, to be concretely planned and implemented at the level of each APSFR. Consulting the annex to the national FRMP, it is made clear in which APSFRs (i.e. where) the measures are foreseen.

The (national) FRMP also does identify by when measures are expected to be achieved: in the annex to the national FRMP, there is a list containing each measure (organised by APSFRs), identifying the current status of the measure (from "not begun" to "fully implemented"), and the target status for 2021. In the description of the measures in the (national) FRMP, it is described "what the measures are trying to achieve" on a very general level, i.e. not APSFR-specific or with regard to reaching objectives.

Summarising, the measures in the Austrian FRMP could be described best as "partly specific and measurable", as it is made only partly clear what the measures are trying to achieve, where they are to be achieved, and by when. The "how" is not or only partly answered[46], e.g. in the background document “Maßnahmenkatalog”, where the responsible authorities, the legal framework and the coordination needs are briefly stated.

[45] Austria subsequently noted that in case of major flood disasters, funding of measure type M20 (Sofortmaßnahmen) can be supported by the EU Solidarity Fund which was mobilised for the enormous flood damages in the years 2002, 2005 and 2013.

[46] FRMP chapter 5, especially 5.6 (the PoM), and the Annex to the FRMP.

4.4 Measures and objectives

It is not clear how measures will contribute to the achievement of objectives, nor clear by how much they will contribute. It is also not clear whether the objectives will be achieved when all measures are completed. The measures have associated indicators that monitor the effort (i.e. the change in the status), but not the impact. Additionally, the (general) objectives established in the FRMP are not measurable (as discussed above). For these reasons, it may not be possible to assess progress against objectives[47] [48].

4.5 Geographic coverage/scale of measures

Each measure reported by Austria has been designated a single ASPFR. Thus, the location of all measures is at APSFR level.

Table 7 Location of measures

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

Source: FRMPs

While Austria reported on the geographic scale of measures (i.e., as indicated above, the location), it did not report information on the geographic coverage of the expected impacts of measures.

4.6 Prioritisation of measures

In the reporting sheets, the majority of measures are categorised as low priority (8 109 or around 53 % of the total), followed by critical (3 483 or around 23 %), high priority (2 801 or around 18 %) and moderate priority (856 or around 6 %). (See Annex A, Table A3.) The low

[47] Austria subsequently informed that 2015 will serve as a baseline. A methodology will be developed for the 2nd FRMP.
[48] FRMP chapter 5.

priority measures are all "recovery and review" measures, the other priorities are evenly distributed among the other measure categories (preparedness, prevention and protection).

In the national FRMP, the priority categories are different than the ones that were reported to the European Commission through the reporting sheets: there are only three categories: priority 1, 2 and 3[49].

No concrete methodology appears to have been used, or conveyed through the reporting, for setting priorities in Austria. Instead, the national FRMP describes several factors which were considered for setting the priorities, but without explaining in any detail how these factors where weighed. It is only mentioned that the factors were discussed and consulted, and the priorities set accordingly. The factors are:

- contribution of the measure to reach the objectives,
- effect on risk reduction,
- cost-effectiveness or cost-benefit,
- general need for the measure,
- whether it is a structural or non-structural measure,
- relevance for WFD implementation,
- climate change adaptation.

There is no different approach in setting priorities between the four types of measures[50].

Timetable

The implementation timetable of measures in Austria is measured according to the "status" of the measure, ranging from "not started" to "fully implemented". As such, there are tables for each measure in the annex to the FRMP, stating the current (year 2015) and future (year 2021) status for each measure in each APSFR where it is planned. According to this, not all measures will reach the "fully implemented" status in all APSFRs in 2021, and some measures will not change their status in this period of time.

Also, there is no indication in the table in the FRMP regarding the priority of the measure at hand, which would be useful to assess the relation between priority and planned implementation. Looking at overall measure aspects, there is no difference in the timetable/status changes between "prevention", "protection" and "preparedness" measures, i.e. it cannot be stated that a certain type of measure is implemented before another. Only for

[49] FRMP chapters 5.5 (p. 35) and 5.7 (p. 171).
[50] FRMP chapters 5.5 (p.35) and 5.7 (p. 171)

"recovery and review" measures, there is a difference, in terms that they will be implemented only in case of an emergency (i.e. no status information provided).

A timetable was not reported to the European Commission in the reporting sheets – consequently, Annex A to this document does not contain an overview of the timetable for Austria's measures[51].

4.7 Authorities responsible for implementation of measures

Information about the responsible authority/authorities is provided for all measures. It needs to be noted that measures often have more than one responsible authorities reported, with a total of 30 different authorities reported. Austria reports that national and regional authorities (national level ministries and federal state administrations) are responsible for the implementation of the majority of measures (15 640 measures on the national level, 13 685 measures on the federal state level), local/municipal authorities are responsible for the implementation of 7 429 measures, owners/operators are responsible for the implementation of 5 083 measures, civil protection (agencies) for 4 692 measures, licensing authorities for 3 910 measures, and water authorities as well as "others" for 1 173 measures each. Across the four measure types (prevention, protection, preparedness, recovery), the national and federal state authorities are in all cases responsible for the highest number of measures, with the exception of protection measures, where local authorities play a more significant role (5 083 measures), also compared to other types of measures.

4.8 Progress of implementation of measures

For all measures reported, the majority are on-going for all aspects, considering "progress ongoing" and "ongoing construction" (6 575 measures summed up, 43 % of the total). 5 757 measures were reported as "not started" (38 %), and 2 917 measures "completed" (19 %).

Regarding prevention measures, 1 679 out of 4 301 are completed (39 %), and 1 142 not yet started (26,5 %). In addition, a significant proportion of protection measures, 2 086 out of 5 474 (38,1 %), has not yet started, as well as all recovery and review measures (which is due to the fact that these are only implemented in case of a flood event), (see Annex A Table A5).

[51] Austria subsequently informed that APSFR-level programmes of measures provide indications on the timetable of measures to 2027 and beyond. Moreover, the second FRMP will collect information on the status of measures.

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: Austria has reported this information in the national FRMP, which refers to the RBMP under the WFD (in chapter 8 of the FRMP), and two other Directives (Seveso and INSPIRE). In this chapter, synergies are described between the FRMP measures M07 (NWRM/M31[52] in Annex B below) and M08 (M32 in Annex B[53]), and the objectives of the WFD. Combined national financing programs are described here as well. In the description of the measures (the program of measures), for each measure the legislative background is described, mostly with regard to the Austrian national regulations/laws concerned, for example covering urban land use management, forestry and road infrastructure, without providing any corresponding references to the EU Act.

Aside from the WFD, the Seveso Directive is referenced in M13, which targets rules of operation of technical installations, and in M18, which handles emergency planning. The INSPIRE-Directive 2007/2/EG is mentioned in M14, handling the preparation and presentation of data and information on risk to the general public.

4.10 Specific groups of measures

With regard to **spatial planning/land use measures**, the following national types of measures are included in the national FRMP:

- M01 and M02: Creation, actualisation and consideration of risk zoning plans/planning (M21 in Annex B).
- M03: Concepts and planning for river basin-related improvements of the water and substance balances (M24 in Annex B).
- M04: Create and/or consider local and regional plans and planning (M21 in Annex B).
- M06: Maximising retention effects of land-use in the basin (M31 in Annex B).
- M07: NWRM (M31 in Annex B).

[52] 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.

[53] 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.

- M10: Investigate and/or conduct relocation and change of land-use (M22 in Annex B[54]).

The framework for managing construction in flood prone areas has evolved since 2000, mainly through the obligatory consideration of flood prone areas in local spatial planning/zoning plans; planning law, however, is managed at the level of the federal states, and there is no more detailed information to be found about the framework for managing construction in flood prone areas in the national FRMP. At the national level, with the update of the Water Law in 2011, binding rules for risk zoning plans have been created, and currently, the spatial planning and municipal building codes are being revised[55].

NWRM have been planned in the FRMP. With regard to NWRM, the following national measure types are included in the national FRMP:

- National measures type M07: NWRM (focus is on room for the river)

NWRMs are ongoing or planned in 96 APSFRs; in 32 APSFRS, NWRM are already completed; and in over 200 APSFRs, NWRM are foreseen in the second implementation cycle.

Measures that specifically consider nature conservation are included in Austria's national measure type M07 (these would be under M31 in Annex B below): Natural Water Retention Measures[56].

In the Austrian FRMP, measures do not specifically consider **navigation and port infrastructure**. No reference has been found in the FRMP to **dredging** to increase the river channel capacity and its ability to convey water for flood alleviation purposes[57]. In Austria, dredging for flood alleviation purposes is not specifically indicated[58].

4.11 Recovery from and resilience to flooding

The role of insurance policies is discussed in the FRMP, with regard to the recovery from flooding, preparedness/resilience to flood or other issues. In the FRMP[59], Austrian measure

[54] 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.
[55] FRMP chapter 5.6.
[56] FRMP chapter 5.6.
[57] Austria stated subsequently that navigation, port infrastructure and dredging are implicitly incorporated into national measure M12, Maintenance of protection and mitigation measures, river maintenance.
[58] FRMP chapter 5.
[59] FRMP chapter 5.6.

M21 (equivalent to EU measure type M53[60]) mentions the development of insurance schemes that provide better cover, but without being specific. Also, the measure has only a high priority after a flood event[61].

With regard to existing flood insurance for properties in all flood risk areas, and in particular in high flood risk areas, no information has been found on this specific detail in the FRMP. No information was found whether insurance is conditional on making risk properties (domestic, industrial) as flood resilient as possible, nor if environmental liability insurance covers the restoration costs arising from flooding of potentially polluting sites and installations[62].

With regard to estimating restoration costs in cases where potentially polluting sites and installations may be flooded, ecosystem services are not considered[63].

4.12 Monitoring progress in implementing the FRMP

There is no clear description in the Austrian FRMP of how the implementation of the planned measures will be monitored. In the annex to the FRMP, there are tables depicting the current (2015) and planned future (2021) status, for each measure in each APSFR. For example, a measure for the Creation and actualisation of risk zoning plans/planning in APSFR 1021 "Raab" has the current status "1", meaning "planning progress ongoing"; in 2021, this status should change to "2", meaning "planning completed". Hence, it could be monitored whether the planned changes in the status of the measures are implemented in 2021, though a clear commitment to do so is not specified. No baseline against which progress will be monitored and assessed was indicated in the FRMP[64].

The arrangements for reporting progress are not specified. Instead, the FRMP contains a very general description of the evaluation of the FRMP, which refers to the six-year planning cycle. It also states that a methodology for evaluating the FRMP is being developed in the first implementation cycle, along with a comprehensive data base for evaluation. The results, including further information on cost-benefit relations, will be available in 2020 or 2021.

[60] Recovery and Review, Other, Other recovery and review Lessons learnt from flood events, Insurance policies.
[61] Austria explained subsequently that the approach is based on so-called “catastrophe funds”, which would cover on average 40% of damages resulting from a flood event.
[62] FRMP chapter 5.6; Austria clarified subsequently that flood insurance is voluntary in Austria.
[63] FRMP chapter 5.
[64] Austria explained subsequently that the baseline will be the status in 2015, the time of the first FRMP; progress will be assessed against the state of implementation and against the FHRMs.

Apart from the Competent Authority, there are no other organisations or bodies identified as being responsible for overseeing the monitoring[65].

4.13 Coordination with the Water Framework Directive

The table below shows how the development of the FRMP has been coordinated with the development of the second River Basin Management Plan of the WFD.

[65] FRMP chapters 5 and 6, and Annex to the FRMP.

Table 8 Coordination of the development of the FRMPs with the development of the second River Basin Management Plans of the WFD

	All UoMs assessed
Integration of FRMP and RBMP into a single plan	
Joint consultation of draft FRMP and RBMP	[66]
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 NWRM [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 for achieving WFD Environmental Objectives [a]	✓
The use of sustainable drainage systems, such as the construction of wetland and porous pavements, have been considered to reduce urban flooding and also to contribute to the achievement of WFD Environmental Objectives	✓

Notes: [a] based on reporting under the WFD

The national FRMP[67] refers to the necessity of coordination between the FRMP and the RBMP, and the obligation to foster the achievement of the WFD objectives, which can lead to the selection of sustainable solutions, like M07 (NWRM/included in M31 in Annex B below). More specifically, the overlap between APSFRs and water bodies with WFD requirements, especially with regard to hydromorphology, has been assessed, and in particular a summary of their status and objectives for each of the concerned water bodies produced. In these overlapping water bodies/APSFRs, coordination is required between concerned authorities. In

[66] Austria subsequently informed that there was a joint brochure, joint event (roundtable on water), etc. to start the consultation process.

[67] FRMP chapter 8.

cases of conflicts between the FD and WFD objectives, it is stated that WFD objectives must not be endangered and have priority over FD objectives.

In its reporting under the WFD, Austria indicated that the objectives of the FD had been considered in its river basin management plan. Austria also indicated that win/win measures in terms of achieving the objectives of the WFD and FD, drought management and use of NWRM were included in the PoM.

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

The following **good practices** have been identified:

- Austria has implemented or planned a great number of Natural Water Retention Measures: in 96 APSFRs, NWRM are ongoing or planned; in 32 APSFRS, NWRM are already completed; and in over 200 APSFRs, NWRM are foreseen in the second implementation cycle.
- Austria's FRMP highlights coordination with the country's RBMP and the obligation to foster WFD objectives, which can lead to the selection of sustainable solutions, notably NWRM. Moreover, the overlap between APSFRs and water bodies with WFD requirements, especially with regard to hydromorphology, has been assessed, and a summary of status and objectives for each of the concerned water bodies produced: in overlapping water bodies/APSFRs, coordination is required between concerned authorities.

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

- It is not clear how measures will contribute to the objectives, nor clear by how much, as there is both a lack of a baseline, as well as of indicators that would allow this (this is compounded by the problem, highlighted in section 3, that the objectives are not specific and measurable).
- The measures in the Austrian FRMP could be described best as "partly specific and measurable", as it is made clear what the measures are trying to achieve, where they are to be achieved, and by when. The "how" is not or only partly answered[68].
- It is also not clear whether the objectives will be achieved, when all measures are completed.

[68] In the background document "Maßnahmenkatalog", the responsible authorities, the legal framework and the coordination needs are briefly stated.

- Information on costs and financing sources is incomplete and in many cases missing.
- The prioritisation of the measures is not clearly described. One improvement would be an indication in the tables on measures and measure implementation, in the annex to the FRMP, regarding the priority of each.

5. Consideration of climate change

In Austria, no measures have specifically been taken[69] to mitigate the expected effects of climate change on the likelihood and potential adverse consequences of flooding. Furthermore, the FRMP states that no specific "factor" with regard to climate change and floods needs to be taken into account when designing measures (specifically, this refers to the possibility of a country-wide elevation of embankments for climate change reasons, which option of elevation was not validated in recent Austrian studies). At the same time, the FRMP refers to the Austrian Climate Change Adaptation Strategy[70], and states that all measures in the plan are in line with the recommendations taken in the Strategy. The Austrian FRMP also refers to research reports and predictions accompanying the Strategy. The FRMP states that the results of these prognoses are that the uncertainties regarding extreme events are very significant, and much stronger than the expected effects of climate change on extreme events. Consequently, the FRMP does not provide any indication if or how climate change might affect the occurrence of extreme events and change the numerical recurrence times[71].

With regard to timeframes for the climate change scenarios considered, there are neither concrete scenarios presented, nor any timeframes mentioned. There is also no mention in the FRMP if it is expected that the main sources of flooding will change under the long-term climate change scenarios[72].

5.1 Specific types of measures planned to mitigate expected effects of climate change

With regard to measures to reduce pollution risk in flood prone zones, three measures in the Austrian FRMP explicitly mention the storage and handling of hazardous goods/commodities (national measure types M08, M09 and M13), but no reference is made to indicate that they consider climate change[73].

[69] Austria subsequently noted that several measures within the FRMP are seen as win-win- or no-regret measures according to climate change adaptation principles. However, no measures have specifically been taken to mitigate expected effects of climate change, as studies contributing to the Austrian climate change adaptation strategy showed that the long-time uncertainty in the estimation of flood events is larger than the uncertainty surrounding the effects of climate change.

[70] A reference is provided to the Strategy, but no direct hyperlink to it or its background documents/prognoses is provided.

[71] FRMP chapter 9; Austria acknowledged subsequently that further research is necessary to close this knowledge gap.

[72] FRMP chapter 9.

[73] FRMP chapters 5 and 9.

Three non-structural measures - national measure types M03 (EU measure type M24[74]), M06 and M07 (EU measure type M31[75]) - explicitly consider climate change in stating that a) they are non-structural and hence considered no-regret, and b) can "contribute" or "significantly contribute" to climate change adaptation. Measures under national types M06 and M07 are also considered spatial planning measures[76].

Economic instruments or incentives are not mentioned in the Austrian FRMP, and it also does not consider climate change in the use of structural measures (M08 and M09). These are not regarded as no regret measures (i.e. it is not mentioned). In the FRMP, climate change is not cited as an argument for more measures associated with changing/adapting the operational practices of existing flood defences or the increased dredging of rivers[77].

5.2 Good practices and areas for further development concerning climate change

The following **good practices** were identified:

- There is a reference to the Austrian Climate Change Adaptation Strategy and the respective background documents/prognoses and a good summary of their findings.
- The effectiveness of measures for climate change adaptation was considered in the prioritisation of the measures.
- Non-structural and spatial planning measures are considered no regret measures with regard to climate change adaptation.

[74] 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...).
[75] 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.
[76] FRMP chapters 5 and 9.
[77] FRMP chapters 5 and 9.

6. Cost-benefit analysis

The FRMP does not use cost benefit as a criterion for the establishment of priorities for the selection of measures. Instead, under each measure's description in chapter 5.6 of the FRMP, there is a qualitative estimation of the cost-effectiveness of the measure. For example, for M01: "As the costs of this measure are relatively low, and the associated reduction in risk potentially very high, it can be assumed that the cost-effectiveness is normally very high".

These qualitative estimations of the cost-effectiveness are then also included in a summary table for each of the four measure categories, in terms of "very high" (++), "high" (+) and "even" (~). Additionally, it is mentioned that statements regarding the cost-effectiveness/cost-benefit were discussed and considered for the prioritization of the measures. However, no further information is provided.

No cost-benefit assessment of measures with transnational effects has been undertaken in Austria in the first implementation cycle[78].

6.1 Good practices and areas for further development concerning cost/benefit analysis

The following **good practice** was identified:

- Cost-effectiveness of measures is assessed qualitatively, in a comprehensive way, and summarized in three clear categories (very high/high/'balanced' i.e. no net benefits determined in a qualitative way): these cost-effectiveness assessments are reported to be used as a criterion for the prioritisation of measures.

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

- It is not clearly described how cost-effectiveness assessments influenced the prioritisation of the measures.

[78] Reporting sheet: Summary of Cost/benefit and FRMP.

7. Governance including administrative arrangements, public information and consultation

7.1 Competent authorities

No information was reported on any updates to the Competent Authorities and/or the Units of Management identified for the FDS since 2011[79].

7.2 Public information and consultation

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

Table 9 Methods used to inform the public and interested parties of the FRMPs

	All UoMs assessed
Media (papers, TV, radio)	✓
Internet	✓
Digital social networking	✓
Printed material	✓
Direct mailing	✓
Invitations to stakeholders	✓
Local Authorities	✓
Meetings	✓

Source: FRMPs

In Austria, a broad public information and consultation strategy was followed for the consultation on the FRMP (including information of the public), using many means of public relations channels and several dialogue platforms for topics related to water management: namely, the Round Table on Water and a platform called "*Flussdialog*"/River Dialogue, which targeted a large number of stakeholders as well as the general populace. The activities are described as two individual measures in the national FRMP, M14 and M15[80].

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

[79] Austria recalled subsequently the reporting of an update to the CA in March 2018.
[80] FRMP 5.6 and 7.

Table 10 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	

Source: FRMPs

In order to obtain the views of stakeholders and/or members of the public about the FRMP, Austria used - besides the internet - the "Round Table on Water" and "*Flussdialog*"/River Dialogue, tools already in use. In these workshop-like meetings, the views of stakeholders and the public were elicited using the meetings themselves as well as mailings/online questionnaires[81].

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

Table 11 Methods used to provide the documents for the consultation

	All UoMs assessed
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

As well as using the *Das Wasserinformationssystem Austria* (WISA)[82] internet platform to access to all relevant documents, in each federal state, the FRMP was physically accessible at the "*Landeshauptmann*" (a regional public authority) for commenting[83].

[81] FRMP chapter 7.
[82] www.wisa.bmlfuw.gv.at
[83] FRMP chapters 5.6 and 7.

7.3 Active involvement of Stakeholders

The table below shows the groups of **stakeholders** that have been actively involved in the development of the FRMP:

Table 12 Groups of stakeholders

	All UoMs assessed
Civil Protection Authorities such as Government Departments responsible for emergency planning and coordination of response actions[84]	
Flood Warning / Defence Authorities [85]	
Drainage Authorities	✓
Emergency services [86]	
Water supply and sanitation	✓
Agriculture / farmers	✓
Energy / hydropower	✓
Navigation / ports [87]	
Fisheries / aquaculture	✓
Private business (Industry, Commerce, Services)	✓
NGO's including nature protection, social issues (e.g. children, housing)	✓
Consumer Groups	
Local / Regional authorities	✓
Academia / Research Institutions [88]	
General public (via online questionnaires)	✓

Source: FRMP

At the two main dialogue platforms - the al "Round Table on Water" and "*Flussdialog*"/River Dialogue - a large number of stakeholders as well as the general populace participated. The organisations listed in the table above are the ones explicitly named in the FRMP, but the list is not exhaustive, as the dialogues were open to any interested party. No information on the number of stakeholders participating in the meetings of the Round Table is provided in the FRMP. Some numbers are provided regarding for the *Flussdialog*, however: it is stated in the FRMP that around 240 stakeholders provided feedback and 11 238 private persons

[84] Austria subsequently informed that the Federal Ministry of the Interior as well as the Federal Provinces were involved and are the Competent Authorities for emergency management and legislation.

[85] Austria subsequently clarified that the Federal Provinces are also the Competent Authorities for flood warning and defence and were hence involved in the development of the FRMP.

[86] Austria subsequently clarified that emergency services such as the fire brigade and the Red Cross were involved.

[87] Austria subsequently clarified that the Federal Ministry of Transport, Innovation and Technology, which handles ports and navigation, was involved in the development of the FRMP.

[88] Austria subsequently clarified that research/academia was involved in the development of the FRMP through tendering of pilot projects.

participated in the online questionnaires. It is not clarified, however, if the feedback mentioned is with regards to the FD or the WFD, as both Directives are covered by the *Flussdialog*, and the statement is formulated in a very general way[89].

No specific **mechanisms for the active involvement of stakeholders** that go beyond the meetings described above, the provision of information and procedures for written consultation on drafts have been reported in the Austrian FRMP (chapter 7).

7.4 Effects of consultation

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

Table 13 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	
Comments and results of the consultation "were considered in the formulation of the plan"	✓

Source: FRMP

It is not reported in the FRMP how the comments and results of the consultation (including transboundary consultations) and the environmental assessment report (SEA) influenced the formulation of the plan, i.e. whether there were changes to the selection of planned measures, adaptations of specific measures, or of methodologies used etc. Instead, it is simply stated in the FRMP that the comments and results of the consultation "were considered in the formulation of the plan". However, all received comments including a "summary regarding the consideration" were published on the internet[90].

[89] FRMP 5.6 and 7.
[90] FRMP chapter 7.

7.5 Strategic Environmental Assessment

The Austrian FRMP has undergone a SEA procedure. The FRMP does not provide a description of the procedure followed, but does provide links to the respective EU Directive (2001/42/EC). It provides a hyperlink to the environmental report (which, however, is not working) and describes briefly the reported effects of the planned measures on the protected assets (human health and life, the environment, cultural heritage, economic activity and infrastructure)[91].

7.6 Good practices and areas for further development regarding Governance

The following **good practices** were identified:

- A broad public information and consultation strategy was being followed for the consultation on the FRMP.
- An SEA has been carried out for the FRMP.

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

- The concrete effects of the consultation are not summarised in the FRMP.

[91] FRMP chapter 10.

Annex A: Supplementary tables and charts on measures

This annex gives an overview of the data on measures provided by Austria 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 FRMPs. The tables and charts below are a summary of the data reported on measures by the Member States, and were used by the Member State assessors to complete the questions on the Flood measures. The data are extracted from the XMLs (reporting sheets) reported by Member States for each FRMP, and are split into the following sections:

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

On the basis of the reporting guidance (which in turn is based on the FD)[92], 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;

[92] 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 Authorities above), are categorised as "no information".

Types of measures used in reporting

The following table 93 is used in the reporting on the types of measures. Each type of measures is coded as an M-number. Measures are grouped in an 'aspect'.

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

[93] 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 A1: Total number of measures

Number of individual measures	0
Number of individual measures including measures which have been allocated to more than one measure type	0
Number of aggregated measures	9 775
Number of aggregated measures including measures which have been allocated to more than one measure type	15 249
Total number of measures	9 775
Total number of measures including measures which have been allocated to more than one measure type	15 249
Range of number of measures between UoMs (Min-Max)	14 741
Average number of measures across UoMs including measures which have been allocated to more than one measure type	7 625

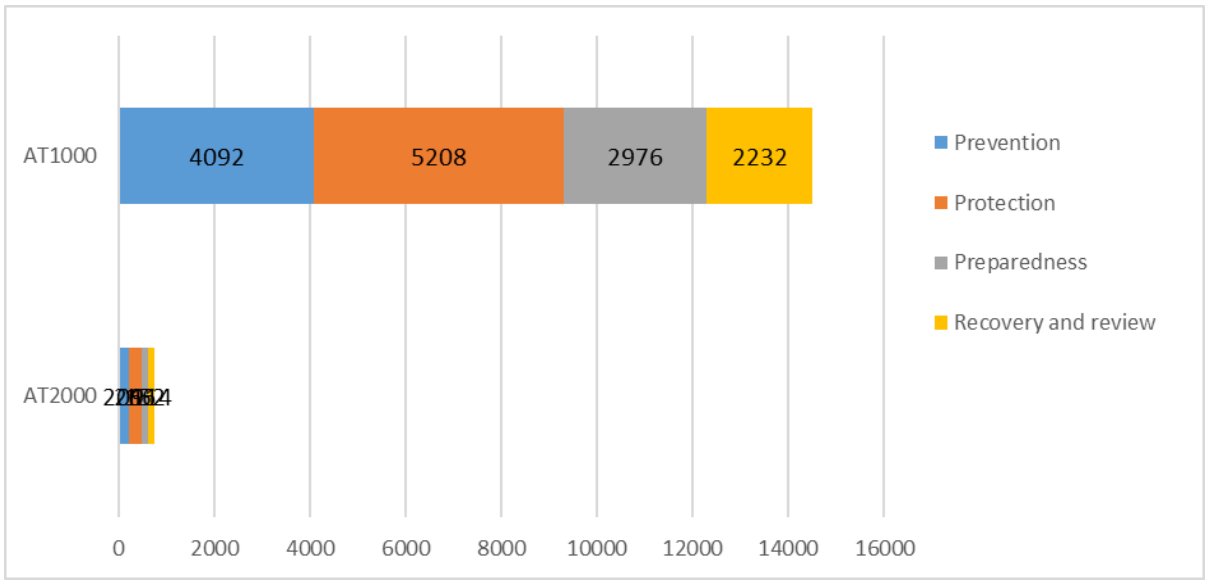
Table A2: Number of measures per measure type and UoM

	Prevention				**Total**	**Protection**					**Total**	**Preparedness**				**Total**	**Recovery and review**			**Total**	**Other**	**Grand Total**
	M21	**M22**	**M23**	**M24**		**M31**	**M32**	**M33**	**M34**	**M35**		**M41**	**M42**	**M43**	**M44**		**M51**	**M52**	**M53**		**M61**	
AT2000	76	19	57	57	**209**	38	76	95	19	38	**266**	19	38	76	19	**152**	38	38	38	**114**		**741**
AT1000	1488	372	1116	1116	**4092**	744	1488	1860	372	744	**5 208**	372	744	1 488	372	**2 976**	744	744	744	**2 232**		**14 508**
Grand Total	**1564**	**391**	**1173**	**1173**	**4301**	**782**	**1564**	**1955**	**391**	**782**	**5 474**	**391**	**782**	**1 564**	**391**	**3 128**	**782**	**782**	**782**	**2 346**	**0**	**15 249**
Average per UoM	**782**	**196**	**587**	**587**	**2151**	**391**	**782**	**978**	**196**	**391**	**2 737**	**196**	**391**	**782**	**196**	**1 564**	**391**	**391**	**391**	**1 173**	**0**	**7 625**

Notes: All Measures are aggregated (rather than individual). The codes used are explained in the previous section. The total includes measures assigned to more than one measure type.

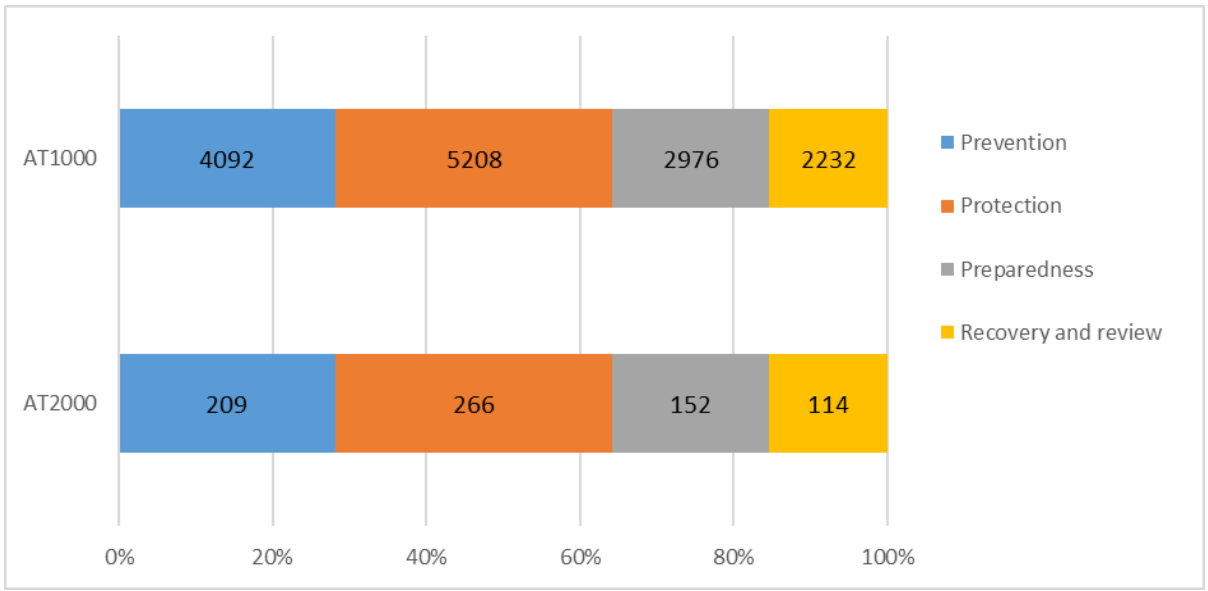
The information in Table A2 is visualised in Figures A1 and A2 below:

Figure A1: Number of total measures by measure aspect



Notes: All Measures are aggregated (Austria did not report individual measures). The total includes measures assigned to more than one measure type.

Figure A2: Share of total measures by measure aspect



Notes: All Measures are aggregated (Austria did not report individual measures). 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)

Information on cost was not provided for any of the measures in the reporting sheets.

Measure details: name & location

Member States were requested to reported information on the following:

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

Location of measures

Each measure reported by Austria has been designated a single ASPFR. Thus, the location of all measures is at APSFR level.

Geographic coverage

No information on the geographic coverage of expected effects was given for any measures in Austria in the reporting sheets.

Measure details: objectives

Member States were requested to report information on:

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

Objectives

Information about the objectives linking to measures was not provided about any of the measures in the reporting sheets for Austria.

Category of priority

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

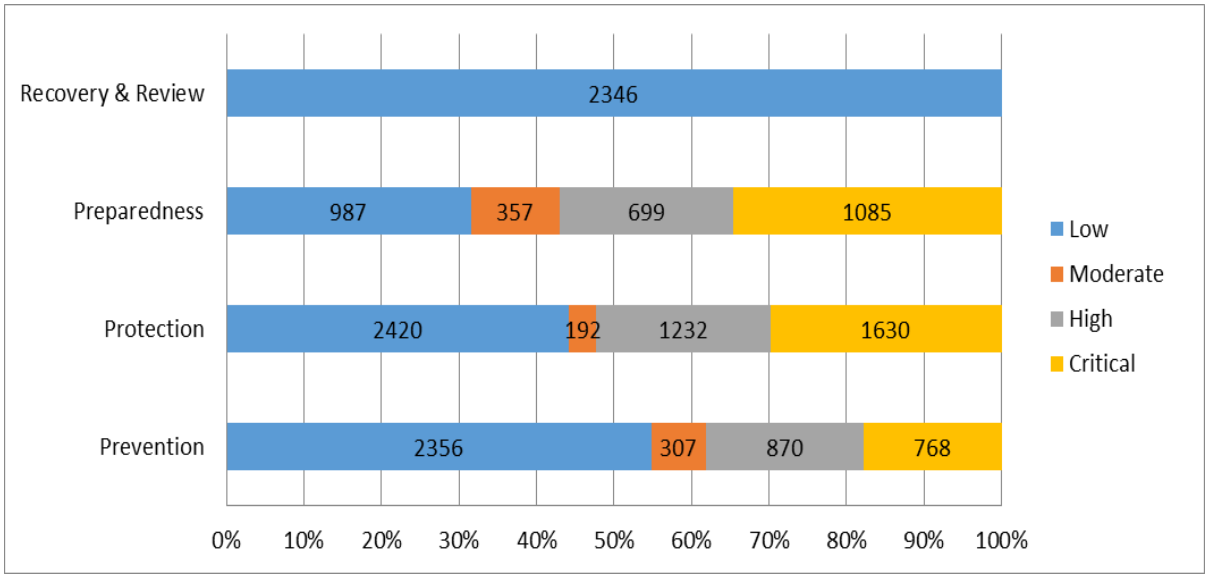
- Critical
- Very high
- High
- Moderate
- Low

Table A3: Category of Priority by measure aspect

	Low	Moderate	High	Critical	Grand Total
Prevention	2 356	307	870	768	4 301
Protection	2 420	192	1 232	1 630	5 474
Preparedness	987	357	699	1 085	3 128
Recovery& Review	2 346				2 346
Grand Total	**8 109**	**856**	**2 801**	**3 483**	**15 249**

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

Figure A3: Visualisation of Table A3: Category of Priority by measure aspect



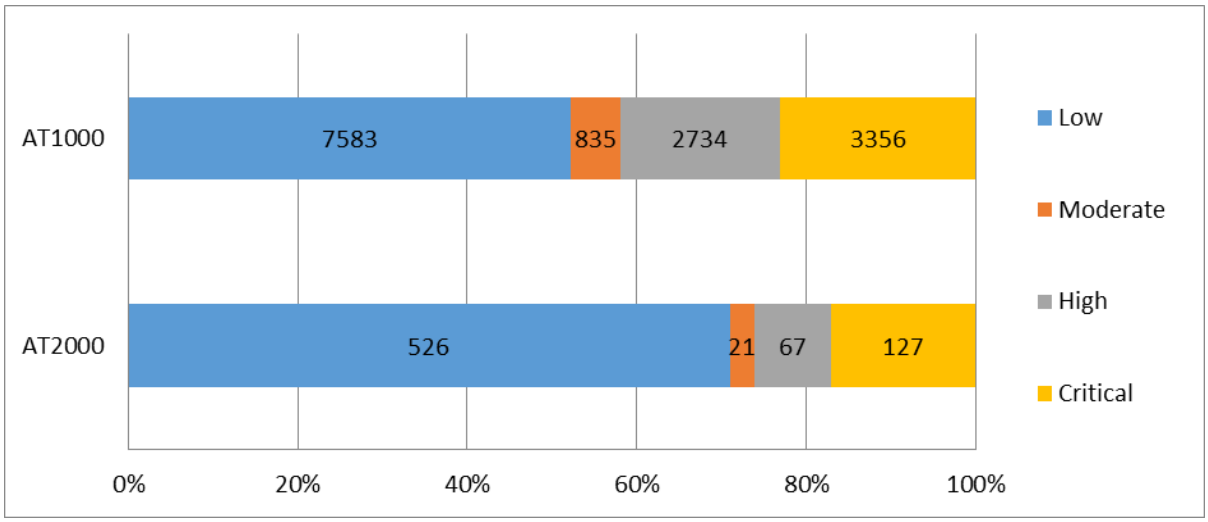
Notes: The total includes measures assigned to more than one measure type.

Table A4: Category of Priority by UoM

	Low	Moderate	High	Critical	Grand Total
AT2000	526	21	67	127	741
AT1000	7 583	835	2 734	3 356	14 508
Grand Total	**8 109**	**856**	**2 801**	**3 483**	**15 249**
Average per UoM	**4 055**	**428**	**1 401**	**1 742**	**7 625**

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

Figure A4: Visualisation of Table A4: Category of Priority by UoM



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

Timetable

No information was provided on the timeline for measures in the reporting sheets.

Measure details: authorities

Member States were requested to report information on:

- Name of the responsible authority
- Level of responsibility

Information about the name of the responsible authority was provided for all measures. It needs to be noted that measures often had more than one responsible authority reported, A high number of different entries were provided for this open field, so an overview table has not been prepared.

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 whose answers are not analysed here.

The progress of implementation was reported as[94]:

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

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

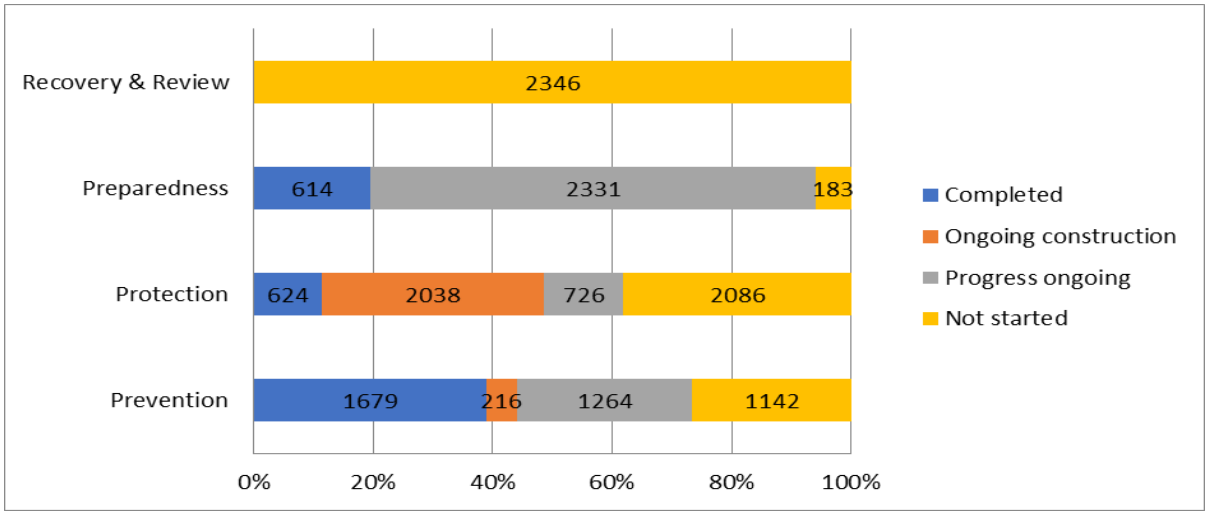
Table A5: Progress of implementation by measure aspect

	Completed	Ongoing construction	Progress ongoing	Not started	Grand Total
Prevention	1 679	216	1 264	1 142	4 301
Protection	624	2038	726	2 086	5 474
Preparedness	614		2 331	183	3 128
Recovery& Review				2 346	2 346
Grand Total	**2 917**	**2 254**	**4 321**	**5 757**	**15 249**

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

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

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



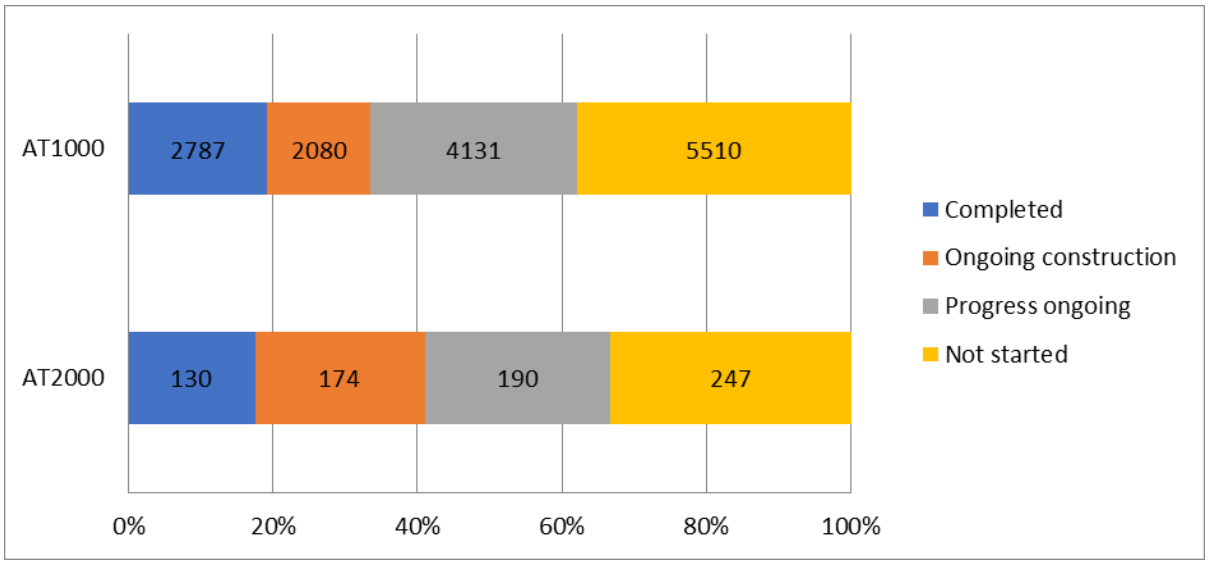
Notes: The total includes measures assigned to more than one measure type.

Table A6: Progress of implementation by UoM

	Completed	Ongoing construction	Progress ongoing	Not started	Grand Total
AT2000	130	174	190	247	741
AT1000	2 787	2 080	4 131	5 510	14 508
Grand Total	**2 917**	**2 254**	**4 321**	**5 757**	**15 249**
Average per UoM	**1 459**	**1 127**	**2 161**	**2 879**	**7 625**

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

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



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

The categories describing the progress of measures are defined in the EU Reporting Guidance Document on the 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 finalized.
- Completed (COM) means the works have been finalised and the facilities are operational (maybe only in testing period in case e.g. a waste water treatment plant).

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

- Not started (NS) means the advisory services are not yet operational and have not provided any advisory session yet.
- Progress on-going (POG) means the advisory services are operational and are being used. This is expected to be the situation for all multi- annual long/mid-term advisory services that are expected to be operational during the whole or most of RBMP cycle.
- On-going construction (OGC): Not applicable
- Completed (COM) means an advisory service that has been implemented and has been finalised, i.e. is no longer operational. This is expected only for advisory services that are relatively short term or one-off, and which duration is time limited in relation to the whole RBMP cycle.

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

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

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

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

been concluded.

Measure details: other

Member States were requested to provide information on:

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

No measures have information for ‘any other information’ or for the field ‘Other Community Acts’ in the reporting sheets.

Annex B: Definitions of measure types

Table B1 Types of flood risk management measures[95]

	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

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

	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 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; other measures, or similar measures called by a different name, could also be classified as NWRM.

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

Table B2 List of NWRM

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

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

Source: www.nwrm.eu