EUROPEAN
COMMISSION

Brussels, 26.2.2019
SWD(2019) 61 final

COMMISSION STAFF WORKING DOCUMENT

First Flood Risk Management Plans - Member State: Cyprus

Accompanying the document

REPORT FROM THE COMMISSSION 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

{COM(2019) 95 final} - {SWD(2019) 30 final} - {SWD(2019) 31 final} - {SWD(2019) 32 final} - {SWD(2019) 33 final} - {SWD(2019) 34 final} - {SWD(2019) 35 final} - {SWD(2019) 36 final} - {SWD(2019) 37 final} - {SWD(2019) 38 final} - {SWD(2019) 39 final} - {SWD(2019) 40 final} - {SWD(2019) 41 final} - {SWD(2019) 42 final} - {SWD(2019) 43 final} - {SWD(2019) 44 final} - {SWD(2019) 45 final} - {SWD(2019) 46 final} - {SWD(2019) 47 final} - {SWD(2019) 48 final} - {SWD(2019) 49 final} - {SWD(2019) 50 final} - {SWD(2019) 51 final} - {SWD(2019) 52 final} - {SWD(2019) 53 final} - {SWD(2019) 54 final} - {SWD(2019) 55 final} - {SWD(2019) 56 final} - {SWD(2019) 57 final} - {SWD(2019) 58 final} - {SWD(2019) 59 final} - {SWD(2019) 60 final} - {SWD(2019) 62 final} - {SWD(2019) 63 final} - {SWD(2019) 64 final} - {SWD(2019) 65 final} - {SWD(2019) 66 final} - {SWD(2019) 67 final} - {SWD(2019) 68 final} - {SWD(2019) 69 final} - {SWD(2019) 70 final} - {SWD(2019) 71 final} - {SWD(2019) 72 final} - {SWD(2019) 73 final} - {SWD(2019) 74 final} - {SWD(2019) 75 final} - {SWD(2019) 76 final} - {SWD(2019) 77 final} - {SWD(2019) 78 final} - {SWD(2019) 79 final} - {SWD(2019) 80 final} - {SWD(2019) 81 final} - {SWD(2019) 82 final} - {SWD(2019) 83 final} - {SWD(2019) 84 final}

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Acronyms

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

Introduction

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

This report assesses the FRMP for Cyprus[1]. It assesses the FRMP and Member States reporting to the European Commission in 2016. Its structure follows a common assessment template used for all Member States. The report draws on two main sources:

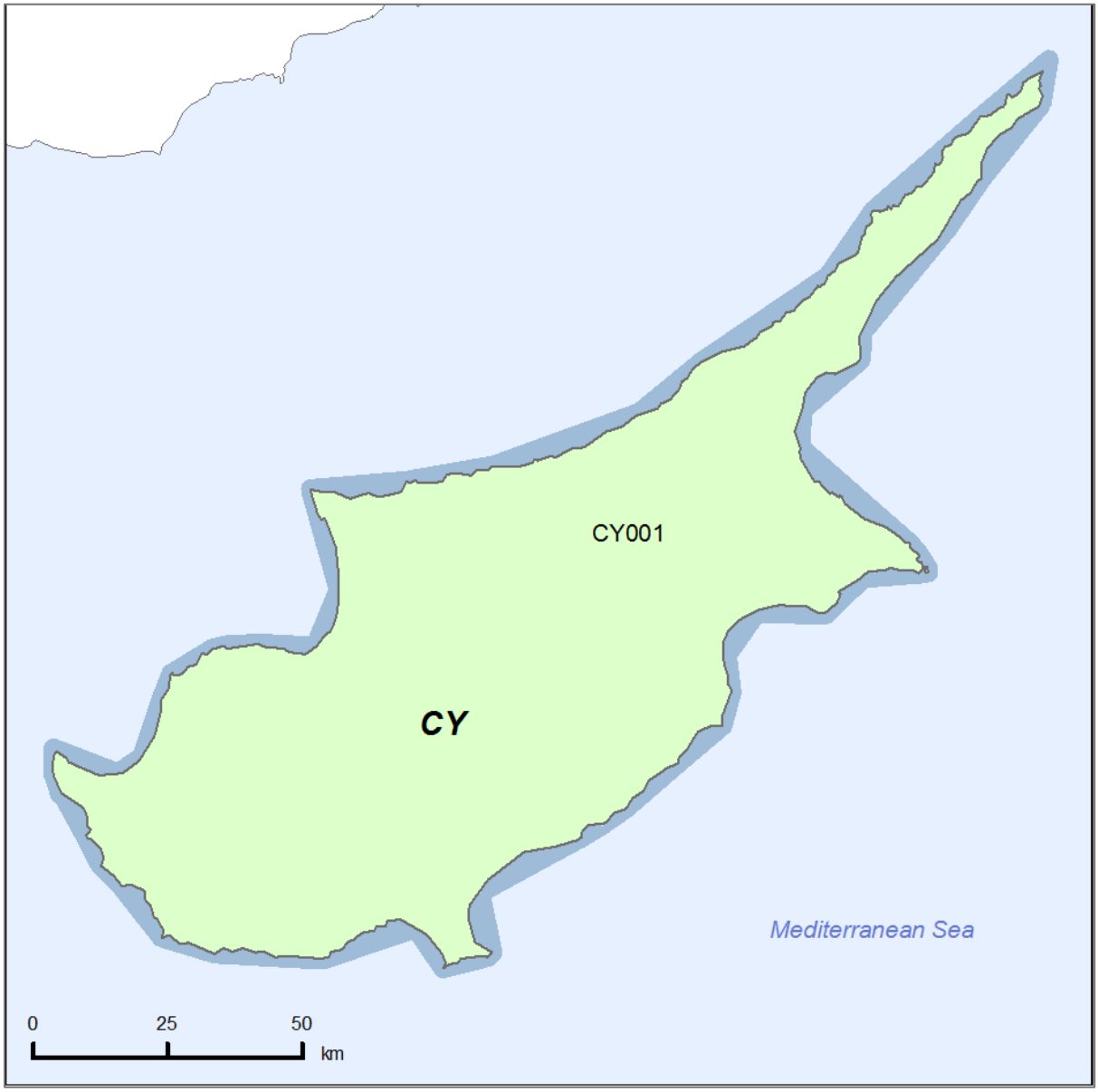
- Member State reporting[2] to the European Commission on the FRMPs as per Articles 7 and 15 of the FD: this reporting provides an overview of the plans and details on their measures;
- The FRMP: one Flood Risk Management Plan has been prepared in Cyprus, covering the entire Member State and its sole River Basin District (RBD).

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

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

Overview

Figure 1 Map of Units of Management/River Basin Districts



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

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

Cyprus has one Unit of Management (UoM) covering the whole country. A single FRMP has been developed and reported for this UoM at national level. The FRMP consists of a main document and seven supplementary documents.

The Cypriot FRMP was approved by the Competent Authority, the Water Development Department of the Ministry of Agriculture, Rural Development and Environment, on 20 December 2016.

The table below gives an overview of the UoM in Cyprus, including the code, name and number of APSFRs reported. It also shows if all documents required were submitted to European Environment Agency's (EEA) Water Information System for Europe (WISE)[3] – the FRMP as a PDF and the reporting sheet as an XML.

Table 1 Overview of UoM in Cyprus

UoM	Name	Number of APSFRs	XML reported	PDF Reported
CY001	CYPRUS	19	Yes	Yes

The FRMP can be downloaded from the following web page:

- http://www.moa.gov.cy/moa/wdd/wdd.nsf/all/23FC10198BC67AC5C2257FB70019986A?opendocument

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.

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

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

Criterion	Evidence	Comments
Flood risk management objectives have been established	Strong evidence	Cyprus has set a strategic objective – the reduction of flood-related risk– and three general objectives, which are further broken down into several priority action fields[4].
Flood risk management objectives relate to...		
...the reduction of potential adverse consequences	Strong evidence	The strategic objective is to reduce flood-related risks. The FRMP sets out three general objectives: one calls for reducing exposure to floods, the second calls for reducing vulnerability to floods and the third general objective calls for reducing flood related hazards. Consequently, Flood risk management objectives relate to the reduction of potential adverse consequences.
...to the reduction of the likelihood of flooding	Strong evidence	Cyprus has set a strategic objective for reducing risk (which includes the likelihood of flooding), including via the containment of flood waters.
...to non-structural initiatives	Some evidence	While not specifically stated in the general objectives, this aspect is included in several priority action fields, including actions for spatial development and for strengthening knowledge.
Flood risk management objectives consider relevant potential adverse consequences to...		
...human health	Some evidence	The strategic objective refers to reduction of flood related risks to achieve the best possible benefits (in a cost-effective manner) for the man-made environment, encompassing human health, cultural heritage and economic activities. Consequently, the objectives refer to human health.
...economic activity	Some evidence	As for human health (see above), the strategic objective makes a reference to economic activities.
...environment	Some evidence	The strategic objective refers to the reduction of flood-related risks to achieve the best possible

[4] FRMP 2016-2021, chapter 8, pp.117-118.

Criterion	Evidence	Comments
		benefits for the natural environment.
...cultural heritage	Some evidence	The strategic objective refers to cultural heritage as part of the man-made environment (see above under human health).
Measures have been...		
...identified	Strong evidence	The FRMP presents a set of 38 planned or ongoing measures at UoM and APSFR level. In its reporting, Cyprus indicates that these are made up of 33 individual and five aggregated measures. The majority of measures (26 of the 38,68 %) are for protection, including all five aggregated measures.
...prioritised	Some evidence	The FRMP describes (a) the criteria for the selection of measures and (b) those for the prioritisation of selected measures. A prioritisation of the selected measures was done in the context of the CEA/CBA analysis, but its effect is not clear, since all selected measures have a deadline of 2021.
Relevant aspects of Article 7 have been taken into account such as...		
...costs & benefits	Some evidence	Cost-effectiveness and cost-benefit have been mentioned briefly as criteria during the initial evaluation/assessment of measures. The methodology for CEA/CBA analysis is provided in a document annexed to the FRMP. Nonetheless, it does not appear that a CEA/CBA was employed for the selection of measures, but only for their prioritisation.
...flood extent	Strong evidence	The flood extent is depicted for each APSFR in the corresponding flood hazard map and was taken into account in the development of measures.
...flood conveyance	Strong evidence	The FRMP states that flood conveyance routes were among the factors taken into account in its preparation. The reporting sheet moreover states that the importance of preserving watercourses and flood conveyance routes was recognized during the flood risk assessment stage.

Criterion	Evidence	Comments
...water retention	Strong evidence	Several measures are related to water retention; however, there is not an explicit focus on natural water retention measures (NWRM). Five specific measures may contain elements of NWRM.
...environmental objectives of the WFD	Strong evidence	Links and synergies between the FRMP and the River Basin Management Plan (RBMP) have been analysed. Specific FRMP measures that provide synergies with RBMP measures and that support WFD objectives have been identified. An assessment of adverse environmental impacts, in particular in terms of WFD objectives, has been carried out to identify potential impacts and undertake remedial actions.
...spatial planning/land use	Strong evidence	With regard to spatial planning/land use measures, four measures are included in the national FRMP. These include incorporating floor risk assessment results into spatial and urban plans, protecting watercourses when licensing new construction and requiring new properties to manage rainwater so that run-off does not increase.
...nature conservation	Some evidence	One measure refers to nature conservation, while another one might have a nature conservation effect.
...navigation/port infrastructure	No evidence	Port infrastructure and navigation are not considered in the FRMP's measures[5].
...likely impact of climate change	Strong evidence	All measures in the FRMP have been assessed for their effectiveness with regard to addressing adverse impacts of climate change and impacts of climate change were considered in the previous implementation steps of the FD.
Coordination with other countries ensured in the RBD/UoM	No evidence	Not relevant: there is only one UoM for Cyprus that covers the entire area of the island over which the Republic of Cyprus exercises

[5] Cyprus subsequently noted that there are no navigable rivers in Cyprus, and no port infrastructure connected to rivers. All APSFRS in Cyprus concern fluvial flash floods and there are no effects of floods on navigation/port infrastructure.

Criterion	Evidence	Comments
		effective control.
Coordination ensured with WFD	Strong evidence	A specific chapter in the FRMP presents the links and synergies between the two Directives.
Active involvement of interested parties	Strong evidence	Four public and stakeholder meetings were organised during the consultation period as well as a national conference for the presentation of the finalised FRMP. An internet portal was provided for the consultation, containing an online questionnaire, accessible to everyone. The views of local authorities as well as the opinion of government departments were taken into account in the drafting of the Plan before the public consultation procedure.

Good Practices

The assessment identified the following good practices in the Cypriot FRMP assessed.

Table 3 Good practices in the Cypriot FRMP

Topic area	Good practices identified
Integration of previously reported information in the FRMPs.	The FRMP comprehensively describes the PFRA and FHRM processes; the information provided regarding the FHRM results for each APSFR can be directly linked to the measures proposed.
Setting of objectives for the management of flood risk.	The FRMP starts from a strategic objective, which is then elaborated in three general objectives and in specific priority action fields. The objectives are for the most part specific and measurable; moreover, the approach used provides clear links from the strategic objective through to the measures proposed.
Planning/implementing of measures and their prioritization for the achievement of objectives.	For each measure planned, a detailed fiche is presented containing key information, including the objective it contributes to, its adaptability to climate change conditions, synergy with the objectives and measures of the RBMP, estimated implementation cost and financing source. The measures described in the Cypriot FRMP can be considered specific and measurable at both national and APSFR level. The measures and the FRMP as a whole have been coordinated with the RBMP's measures and the WFD's objectives. The FRMP includes land use and spatial planning measures, for example, modifying land use plans to address flooding issues. The FRMP includes two measures for the promotion of insurance for protection against flooding.

Topic area	Good practices identified
Consideration of climate change in the FRMPs assessed.	The FRMP considered potential climate impacts (as did the prior stages), and the FRMP summarises the findings of the draft national Climate Change Adaptation Strategy and indicates that these findings were considered in the development of the measures. All measures proposed were assessed for their effectiveness in addressing adverse impacts of climate: those that remain effective in severe weather events, which may be caused by climate change, were evaluated more positively.
Use of CBA in the FRMPs assessed.	Cost-effectiveness and cost-benefit assessment, including the consideration of multi-benefits (specifically for WFD objectives) were conducted for the measures.
Public consultation	The FRMP clearly describes the updates made in response to the consultation.
Flood risk governance.	The FRMP and its measures were coordinated with Cyprus's RBMP. The preparation of the FRMP was coordinated with local authorities and with ministerial departments.

Areas for further development

The assessment identified the following areas for further development in the Cypriot FRMP assessed.

Table 4 Areas for further development in the Cypriot FRMP

Topic area	Areas for further development identified
Planning/implementation of measures and their prioritization for the achievement of objectives.	Whereas the process of monitoring the progress of implementation of the measures has generally been defined, the FRMP does not provide indicators to monitor the progress of measures[6], nor a baseline for this. While the objectives have specific and measurable elements, it is unclear if they will be achieved if all measures are completed[7]. The FRMP describes the criteria for the selection of measures and those for the prioritisation of measures, but not the specific methodology used for their selection. In addition, the prioritisation practically did not appear to have an effect, since all measures analysed are taken up and all have a deadline of 2021. There is limited use of NWRM (as opposed to technical water

[6] Cyprus subsequently informed that the main indicators for monitoring the implementation of each measure will be defined at the stage of implementation of the FRMP by each competent authority according to the nature of the measure and the implementation procedure.

[7] Cyprus subsequently noted that in the first[t] FRMP a large part of the measures concerns institutional arrangements related to flood risk management issues, whose effect is not direct, nor tangible and measurable. Construction measures are related to concrete results and measurable targets. These results will be evaluated during the revision of the FRMP at the stage of FHRM update.

Topic area	Areas for further development identified
	retention), while various measures are planned concerning dredging and river bank, river bed and pond modifications that potentially could negatively affect the hydromorphological conditions of streams and rivers.
Consideration of climate change in the FRMPs assessed.	While measures that remain effective in severe weather events, which may be caused by climate change, were evaluated more positively, it is unclear how in practice measures were assessed on the basis of their resilience to climate change, as well as the approach used to consider adaptation in the prioritisation of the measures.
Use of CBA in the FRMPs assessed.	The CEA and the CBA analysis did not affect the selection of measures. In the CBA method for construction measures, the potential costs of negative environmental impacts were not considered.[8]

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):

- The FRMP should specify the criteria for the selection of measures, providing a clear methodology that shows how the different factors (including CBA and climate change) are considered and weighed for the selection of measures.
- The contribution of the measures to the achievement of the objectives should be presented, through the establishment of a baseline and of relevant indicators, to ascertain if the objectives will be reached once all measures are implemented.
- Cyprus should make a systematic consideration of opportunities to implement nature based solutions (including NWRM), as alternatives, where possible, to dredging and 'grey infrastructure' modifications of river banks and river beds, the latter approaches should only be considered as second option or in combination with nature based solutions.
- The coordination between the national climate change adaptation strategy and the FRMP should be ensured once the former is adopted (and even before since it is still under development).

[8] Subsequently Cyprus clarified that structural measures are subject to environmental legislation: EIAs have been conducted and remedial actions for negative environmental impacts have been adopted. The cost of these actions is included in the investment cost that has been taken into account for CB analysis. In this way, according to Cyprus, the cost of negative environmental impacts was considered.

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

1.1 Reporting of the FRMPs

Cyprus has reported one FRMP covering the one UoM in the country. In addition, seven supplementary documents have been reported.

Cyprus did not make use of Article 13.3 of the FD, which allowed Member States to make use of previous FRMP for the first cycle (provided their content is equivalent to the requirements set out in the Directive).

1.2 Assessment of the FRMPs

For Cyprus, the single FRMP has been assessed:

Table 5 UoM assessed in Cyprus

UoM code	UoM Name
CY001	CYPRUS

2. Integration of previously reported information

2.1 Conclusions drawn from the preliminary flood risk assessment

The conclusions of the PRFA are presented in the Cypriot FRMP: this includes a summary map showing APSFRs, as well as individual maps for each APSFR, and a textual description, including the methodology employed and tables listing the APSFRs.

A link to the PFRA document is provided in the FRMP. The plan also provides a link to maps of the APSFRs: this link leads to a webpage of the Cypriot Department for Water Development, where the summary map as well as the APSFR maps can be accessed, both in interactive and image versions[9]: www.flood.wdd.moa.gov.cy.

Flood conveyance routes are explicitly mentioned in the Cypriot FRMP among the factors taken into account in the drafting of the plan, but not specifically in regard to the PFRA. However, Cyprus's reporting sheet states that the importance to preserve watercourses and flood conveyance routes has been recognised during flood hazard assessment stage.[10]

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

The FRMP and the reporting sheets explain that the PFRA created a database of valuable information about past flooding events, their gravity, extent, location, frequency and the subsequent impacts on the population, the economy and the environment. The PFRA process contributed to the identification of existing drainage and flood-relief mechanisms and provided a detailed depiction of current land uses in Cyprus, particularly in relation to sources of flood. The codification and examination of these data, in combination with climate change considerations, was used in the identification of APSFRs. The PFRA and APSFRs were then used as the basis for developing the flood hazard and flood risk (FHR) maps.[11]

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

Flood hazard maps have been presented in the FRMP: the plan includes maps for each APSFR. However, only small-scale flood hazard maps (and no flood risk maps) are included, incorporating all three flooding scenarios (return periods of 20, 100 and 500 years). Due to their scale and low resolution these maps do not provide a great degree of detail.[12] The FRMP

[9] The image versions are JPG files. FRMP 2016-2021, chapter 5, p.38.
[10] FRMP 2016-2021, chapter 1, p.4; FRMP 2016-2021, chapter 2, p.16; FRMP 2016-2021, chapter 8, p.121; Reporting sheet, "Summary of the Flood Extent".
[11] FRMP 2016-2021, chapter 2.3, p.15; FRMP 2016-2021, chapter 5.1, p35-36; Reporting sheet, "Summary of the Flood Extent".
[12] FRMP 2016-2021, chapters 7.1-7.20.

also provides information regarding the methodology used and factors considered for drawing up the Cypriot FHRMs.[13]

The FRMP also provides a link to interactive online versions of the flood hazard and flood risk maps[14]: www.flood.wdd.moa.gov.cy. The interactive FHRMs are very detailed.

The FHRMs present fluvial floods. They do not cover pluvial floods, groundwater floods, seawater floods, floods from artificial water bearing structures or floods from no specific sources or more than one source of flooding.

The FRMP reports that in Cyprus, urban and fluvial floods are the main sources of floods, but only fluvial floods are considered to be significant[15]. Hence, all areas designated as APSFRs are situated around or close to a river or lake and FHRMs were produced only for this type of floods. The FRMP also notes that between 1945 and 2010, in the area controlled by the Cypriot Republic, 84 dams and extra-capacity reservoirs were built for irrigation, water supply and enrichment of ground waters. These projects, depending on their capacity and location, could help to retain water and reduce flooding in downstream areas; however, it is noted that most of these dams, especially the large ones, are not aimed at flood protection and their reservoirs may be full and unavailable to halt water flows in flood events.

2.2.1 Conclusions drawn from the flood hazard and flood risk maps

The FRMP and the reporting sheets indicate that the FHRMs were considered in the development of objectives and served as a tool for assessing and developing possible measures, including measure types and locations.

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[13] FRMP 2016-2021, chapter 2.3, p.15; FRMP 2016-2021, chapter 6.1, p.61-65, chapter 6.2 p. 65 and 67-68; Reporting sheet, "Summary of the Flood Extent".

[14] FRMP 2016-2021, chapter 6.1, p. 66-67, chapter 6.2, p.69-70.

[15] The report on the PFRA for Cyprus indicated that fluvial, pluvial, groundwater and seawater sources of flooding, as well as flooding from artificial water-bearing infrastructure, were all considered; only fluvial and pluvial flooding (called 'urban' floods, i.e. flash flooding in urban areas) were taken forward. European Commission, Assessment of data and information reported by Member States on their PFRAs and identification of APSFR under the FD Member State Report: [CY] - [Cyprus], 2015. Available at: http://ec.europa.eu/environment/water/flood_risk/pdf/pfra_reports/PFRA%20Report%20-%20CY.pdf
The report on the FHRMs found that only fluvial flooding had been taken forward. According to information provided by Cyprus, "pluvial floods have been recognised as relevant but not as significant". European Commission, Assessment of Flood Hazard and Flood Risk Maps – Member State Report: CY – Cyprus, 2015. Available at:
http://ec.europa.eu/environment/water/flood_risk/pdf/fhrm_reports/CY%20FHRM%20Report.pdf

Equally developed is the presentation of their findings and conclusions. Based on the information and knowledge acquired, an appropriate program of measures was developed to achieve the objectives set.[16]

2.3 Changes to the APSFRs or other Flood Risk Areas

The FRMP assessment looked for information on changes in the identification of APSFRs since December 2011, or in the FHRMs since December 2013, indicated in the FRMP. No changes are mentioned in the FRMP.[17]

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

The FHRM assessment identified the following area for further development for Cyprus:

- Regarding flood sources and artificial water bearing infrastructure: Cyprus informed that a preliminary study was done to assess flooding from artificial water-bearing infrastructure (dam failure) with the result that detailed studies for three dams would be carried out in the future.

Neither the FRMP nor Cyprus's reporting sheet refer to this issue.[18]

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 FRMP comprehensively describes the PFRA and FHRMs processes; the information provided regarding the FHRM results for each APSFR can be directly linked to the measures proposed.

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

- The FRMP should be based on all potentially significant flood sources.

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16 FRMP 2016-2021, chapter 2.3, p.15; FRMP 2016-2021; Reporting sheet, "Summary of the Flood Extent".

17 FRMP 2016-2021, chapter 2.1, p.11; FRMP 2016-2021, chapter 2.4, p.17.

18 Cyprus subsequently clarified that in the PFRA, flood risk from dam failures has been assessed and three areas were recognised as vulnerable. These three areas were identified as APSFRs: (a) Germasogia dam in APSFR14; (b) Polemidia dam in APSFR16; and (c) Tamasos dam in APSFR01. The detailed studies that were mentioned consisted of dam break modelling for flood inundation hazard and risk mapping. This mapping activity was not completed due to lack of resources in the 1^{s} cycle of flood hazard and risk mapping and will be completed in the 2nd cycle of flood hazard and risk mapping. Nevertheless, flood hazard and risk mapping for the three APSFRs for fluvial flooding (without dam break) makes the conservative assumption that the reservoirs are full and overspill during the design flood event. The three reservoirs were also included in the FRMP and PoM. (Related measures are PREP-C14_01 and PRO-CY_01.) Furthermore, the dam break hazard and risk maps and the evacuation plans are considered sensitive information and will not be available to the public, but just to emergency response authorities so most likely they will not be included in the next FRMP.

3. Setting of Objectives

3.1 Focus of objectives

The Cypriot FRMP has determined objectives for the management of flood risk in the APSFRs as well as in whole River Basin of Cyprus[19]. In the FRMP, it is clearly stated that the strategic objective of Flood Risk Management is the reduction of flood-related risks to achieve the best possible benefits for the man-made environment (encompassing human health, cultural heritage, economic activities) and for the natural environment in a cost-effective manner.

Taking into account the main factors that determine flood risk – the probability of flooding, the degree of exposure and the vulnerability of flood recipients – the FRMP sets out three general objectives in these three areas. These general flood risk management objectives were developed taking into account the flooding risks on the island as well as the characteristics of the APSFRs. The FRMP notes that:

- the main causes of floods in Cyprus are river and stream overflows (fluvial floods) due to the elimination of riverbeds, reductions on drainage capacity and partial coverage of streams;
- water shortage is the determining factor for the island's water management policy;
- land use restrictions and land values often pose pressures on natural watercourses;
- residential areas and limited commercial activities are the ones mainly affected by floods.

In this light, the three objectives were specified and then analysed to identify specific priority action fields that address the flooding risks of the UoM as well as consider the particular characteristics of the APSFRs identified:

- Objective A: Reducing hazard to ensure, where possible, protection against floods with a 20-year chance of occurrence in already developed areas or in new (under development) areas. This detailed objective has two priority action fields:
    - A1: Water retention where possible, at upstream or within APSFRs (construction of buffer pits and reservoirs, reservoir management).
    - A2: Protection, rehabilitation of the natural functioning of watercourses, where and to the extent possible, and increase of drainage capacity in watercourses and conveyance routes (flood defences, clean-up and restoration of the river beds, upgrading of road passes and ensuring the continuity of watercourses).

[19] Reporting sheet “Summary of the Objective”; FRMP, Chapter 8, pp.117-123.

- Objective B: Reducing flood exposure, in new urban development areas within the 20-year flood area, and of sensitive and polluting uses within the 100-year flood area. This detailed objective has two priority action fields:
    - B1: Spatial development for reducing flood exposure of social infrastructures and polluting uses within the 100-year flood area.
    - B2: Reducing flood exposure in new urban development areas, within the 20-year flood area, during spatial planning stage.
- Objective C: Reducing flood vulnerability of all activities within the APFSRs. This detailed objective has four priority action fields:
    - C1: Adaptation of new construction within the 20-year flood area to make them more resistant and less vulnerable to floods.
    - C2: Improve knowledge of flood risk and flood mechanisms for all possible floods.
    - C3: Increase preparedness to protect existing vulnerable social infrastructures and polluting activities within the 100-year flood area to deal with flood conditions.
    - C4: Enhancement of the preparedness of operators, services and residents for effective flood response.

Consequently[20]:

- The objectives aim to reduce the adverse consequences of floods
- The objectives aim to reduce the likelihood of flooding[21]
- The objectives refer to measures that will be implemented
- The objectives refer to non-structural measures[22]

3.2 Specific and measurable objectives

The flood risk management objectives and their priority action fields together provide specific and measurable elements. The objectives themselves set out "what" and "where": Objective A aims to reduce the hazard of floods with a 20-year chance of occurrence in already developed areas and new areas under development. The priority action fields describe "how" each objective is to be achieved: Priority field A1 refers to water retention. Thus, the objectives are, for the most part, specific and measurable.

The FRMP provides information regarding the locations where the objective will be achieved and how it will be achieved: priority action field A1 is to be carried out upstream of or in

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

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

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

APSFRs via specific actions such as reservoirs. In addition, every objective is associated with the measures to be implemented in each APSFR[23]. Moreover, for each measure the corresponding objective and flood risk management aspect (protection, prevention, preparedness and recovery) is specified[24].

Neither the objectives nor the priority action fields, however, indicate the time frame for their achievement[25]. Moreover, indicators have not been defined for the objectives or their priority action fields.

3.3 Objectives to reduce adverse consequences from floods

The reduction of the adverse consequences of flooding is part of the FRMP's strategic objective.

3.4 Objectives to address the reduction of the likelihood of flooding

Objective A (Reducing Flood Risk) addresses the reduction of the likelihood of flooding. Moreover, the action fields as well as specific measures related to this objective focus on the reduction of flood risk.

3.5 Process for setting the objectives

For the development of the FRMP, the Department for Water Development set up a Steering Committee with representatives of other key government departments and ministries (see section 7). The public consultation covered the FRMP including the objectives – however, there is no evidence that stakeholders, other than those forming the Steering Committee, were involved in the development of the objectives[26].

The results of the PFRA and FHRM stages were taken into account in developing the objectives. As potential climate impacts were considered in those stages, this aspect was also considered at least indirectly.

[23] FRMP 2016-2021, table 9.2, p.124-127.
[24] FRMP 2016-2021, Tables 9.4.1 to 9.4.4 and 9.5.1 to 9.5.8, p.135-164.
[25] Cyprus subsequently informed that the time frame for the achievement of objectives and priority action fields expands beyond 2021.
[26] Cyprus informed subsequently that the objectives, as formulated in the draft FRMP, were presented during the public consultation. No changes or comments were derived from this process.

3.6 Good practices and areas for further development regarding setting objectives

The following **good practice** was identified:

- The FRMP starts from a strategic objective, which is then elaborated in three general objectives and in action fields. The objectives are for the most part specific and measurable; moreover, this approach provides clear links from the strategic objective through to the measures proposed.

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

- Timelines and indicators have not been defined for the objectives or their priority action fields. This may create hindrance when assessing progress made towards the achievement of the objectives.

4. Planned measures for the achievement of objectives

Cyprus has reported 33 individual measures and five aggregated[27] measures, making a total of 38 measures[28]. Neither the FRMP nor the reporting sheet explain how individual and aggregated measures are defined.

Cyprus has reported measures across the four aspects of flood risk management[29] (please see Tables A1 to A4 and Figures A1 and A2 in Annex A for further details):

- The greatest number, 26 of the 38 measures (68 %), are for protection, including all five aggregated measures;
- There are five measures for preparedness (13 % of the total);
- four measures for prevention (11 % of the total), and
- three measures for recovery and review (8 %).

The FRMP and a supplementary document to the plan present the 38 measures in terms of these aspects[30]. The FRMP, however, also presents measures using different national categories. One approach divides measures into the following two groups:

- Horizontal measures, which concern the whole UoM and apply to all APSFRs or the whole country: there are a total of 28 horizontal measures according to the FRMP and supporting documents[31];
- Measures for specific APSFRs: 10 measures, according to the FRMP and supporting documents, that mainly involve construction works[32].

[27] 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.

[28] 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.

[29] Annex B provides an overview of the measure aspects and the measure types identified for each.

[30] Reporting sheet "Summary of the Aspects" and Supplementary document to FRMP 2016-2021, Tables and Charts concerning measures, chapter 7.

[31] The reporting sheet, however, indicates the whole UoM as the location and coverage for only 26 measures. Cyprus clarified subsequently that two measures (PRO-CY_01 and PRO-CY_02) are characterised as horizontal even if in the field "geographic coverage" of the reporting sheet to WISE, specific APSFRs are reported. This is the case because:

For measure PRO-CY_01, by nature the measure is applied to APSFRs with constructed reservoirs, so only these APSFRs are mentioned in the field "geographic coverage" of the reporting sheet to WISE;

For measure PRO-CY_02, the APSFRs reported in the field "geographic coverage" of the reporting sheet to WISE concern indicative areas where this measure may be applied.

The FRMP moreover categorises the 38 measures into the following types of action:

- Legislative / Administrative set up: one measure
- Measures of an economic nature (including taxation): four measures
- Education / information measures: three measures
- Non-structural interventions (e.g. Urban / Spatial Planning): eight measures
- Measures for research, information development, implementation of best practices: six measures
- Environmental measures (green infrastructure): six measures
- Technical Flood Protection Works: 10 measures

In a section on timetable and costs[33], the FRMP further categorises the 38 measures in five groups based on costing and budgeting:

- Legislative / Administrative Measures (most of these do not additionally burden the annual budget): 18 measures
- Studies (including the supply of supporting equipment): 12 measures
- Education / information actions: one measure
- Supply of equipment / materials: one measure
- Construction (including related studies or update of studies, if required): six measures

4.1 Cost of measures

Table 6Estimated overall budget for the measures in the assessed FRMP

UoM	Estimated overall budget of planned measures (2015-2021) in EUR
CY001	19 197 400

Summary tables in both the Programme of Measures (PoM)[34] and the FRMP[35] provide the total cost of all measures. In addition, in each measure description, costs are given if available. Cyprus also provided this information in its reporting sheet.

These sources indicate that:

- €18 000 has been allocated for one prevention measure (out of four);
- €19 023 400 has been allocated for 16 (out of 26) protection measures;

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[32] The reporting sheet, however, indicates 12 measures located at APSFR level. See the clarification in the previous footnote.

[33] FRMP 2016-2021, chapter 9.6 (Timetable and Cost of Implementation Program of Measures), table 9-4, p.165-166.

[34] PoM, Table 4-2, p.95.

[35] FRMP 2016-2021, Table 9-5, p.166.

- €120 000 for one (out of five) preparedness measure;
- €36 000 for two (out of three) recovery measures.

The FRMP and the PoM explain that the cost of each measure includes the estimated cost for its implementation and the "annual operating/maintenance cost", when relevant. For some measures, the cost estimate has been divided into "implementation cost" and in "annual operating/maintenance cost".

On the basis of this information, the overall estimated cost for 20 measures totals €19 197 400. As noted above, 18 measures have no cost estimate. The vast majority of these measures are administrative/legislative actions and for most of them there is apparently no need for financing.

4.2 Funding of measures

The FRMP states that the main source of funding for the proposed PoM is the state, i.e. authorities at national level. It is also mentioned that the measures may be co-financed by the EU Cohesion Fund and the European Regional Development Fund (i.e. structural funds). The PoM indicates, in each measure description, the main source of funding for the measure. As noted above, measures for administrative and legislative actions mostly do not need additional financing.[36]

Table 7 Funding of measures

	CY001
Distribution of costs among those groups affected by flooding	
Use of public budget (national level)	✓
Use of public budget (regional level)	✓
Use of public budget (local level)	
Private investment	
EU funds (generic)	
EU Structural funds	✓
EU Solidarity Fund	
EU Cohesion funds	✓
EU CAP funds	
International funds	

Source: FRMP

4.3 Measurable and specific (including location) measures

The FRMP assessed includes a clear and explicit description of the measures with regard to:

[36] FRMP 2016-2021, chapter 9.6, p.165 ; PoM, chapter 4, p.29-95.

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

For all 38 measures, the PoM indicates "what", "where", "how" and "when" for each measure[37]: there is a detailed description of what each measure is aiming to achieve, where exactly, when and how is going to be implemented: the area and target year of implementation, the processes/technical methods to be used and the competent authorities in charge. Information about the progress of implementation of each measure is also provided in the PoM.

The following table lists all the locations indicated for the measures:

Table 8 Location of measures

	CY001
International	
National	✓
RBD/UoM	✓
Sub-basin	
APSFR or other specific risk area	✓
Water body level	
More detailed than water body	

Source: FRMP

The measures are either at national level (which is the same as RBD/UoMlevel) or at APSFR level.[38]

4.4 Measures and objectives

In its reporting sheet, Cyprus has linked each measure to an objective:

- 24 measures, all for protection, are linked to hazard reduction (63 % of the total 38 measures);
- 11 measures (two prevention, one protection, five preparedness and three recovery and review) are linked to vulnerability reduction (29 % of measures);
- three measures (two prevention and one protection) are linked to the limitation of exposure to floods (8 %);

[37] PoM, Chapter 4.4.
[38] FRMP 2016-2021, chapters 9.4 and 9.6, p136-164; PoM, chapter 4, p29-95.

In the FRMP, it is clear how the measures will contribute to the achievement of objectives; however, it is not clear by how much they will do so[39], nor whether the objectives will be achieved when all measures are completed[40]. Each measure is linked to one of the FRMP's 3 general objectives (see section 3). In addition, in a summary table[41], the FRMP indicates for each APSFR, the way Objective A ("risk reduction") is achieved.

4.5 Geographic coverage/scale of measures

Cyprus reported information on the location and geographical coverage for all 38 measures. The responses provided for the two categories were the same: for the majority of the measures (26 out of 38, 68 %) the location and geographic coverage was indicated as the UoM, while for the remaining 12 measures, APSFRs were listed.

The four prevention and the three recovery and review measures are all at UoM level, while protection and preparedness measures are split between the two levels (see Table A6 in Annex A for details).

As noted above, the FRMP divides measures into 28 horizontal measures targeting the entire UoM and 10 specific measures that focus on APSFRs. The effects of horizontal measures are presented at national level in the specific fiches. The FRMP does not, however, present a discussion of the downstream effects of APSFR-level measures (e.g. how measures taken upstream can affect flooding further downstream, beyond the APSFRs).

4.6 Prioritisation of measures

In the reporting sheet, Cyprus did not report the category of priority of any of the measures (though Cyprus provided information on their timetable – see the following page). The FRMP and PoM also do not provide information regarding priorities among the different measures.[42] [43]

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[39] It can be noted that in a supporting document on "measures assessment" (which evaluates and ranks the selected measures on the basis of their cost-effectiveness), each measure is assessed regarding its efficiency. Therein, the measure contribution to the achievement of the objectives is generally linked to the degree of inherent efficiency, which yields the extent to which the measure achieves a significant result. At the same time, the contribution to the objectives of each measure is not specified; only the expected achievement of the results of a measure is rated on a "high-medium-low" scale. FRMP 2016-2021, chapter 9; Reporting sheets, "Summary of the Objectives"; Measures_Assessment_FRM_CY_2016, chapter 4, pp.21-84, and esp. chapter 4.2, p.25.

[40] Cyprus subsequently noted that in the first FRMP, a large part of the measures concern institutional arrangements related to flood risk management issues, whose effect is not direct nor tangible and measurable. Construction measures are related to concrete results and measurable targets. These results will be evaluated during the revision of the FRMP at the stage of FHRM update.

[41] FRMP 2016-2021, chapter 8, p.125-126.

[42] Supplementary document to FRMP 2016-2021, chapter 7, Tables and Charts on measures.

[43] Cyprus subsequently noted that according to the FD's Reporting Guidance prioritisation is covered either as a timetable for implementation or as a category of priority. The second option has been applied in the case of Cyprus.

The PoM[44] indicates that an initial assessment of measures was based on several criteria, such as:

- efficiency of a measure towards the FRM objectives;
- degree of influence;
- adaptation to climate change;
- cost-effectiveness;
- synergy with the environmental objectives of the WFD and
- impacts on human life and the economy.

In addition, for the prioritisation and estimation of the implementation time of measures, additional factors were considered, e.g.:

- available resources;
- the results of consultation with all affected local authorities;
- bodies;
- organisations;
- social groups,
- legal permits, licenses and studies required.

The reporting sheet summarises all criteria and factors considered for the establishment of the PoM. However, no specific methodology is provided in the reporting sheet or the FRMP and the PoM on how these factors were considered and weighed to select the measures.

Regarding the prioritisation of measures that had been already selected, a detailed assessment linked to the CEA/CBA is presented in the reporting sheet and in a supplementary document on "Measures Assessment FRM_CY"; see also section 6).[45] In practice, this prioritisation of measures does not appear to play a major role however, since all selected measures are planned with a deadline of 2021.

Cyprus reported as the timetable for all measures: 'Start 2016 – end 2021'. In the PoM document attached to the FRMP, a small difference is provided for the timetable: 37 out of 38 measures are to be implemented until 2021 and one construction measure was to be implemented by 2016.

[44] PoM 2016-2021, chapter 4.2, p24-25; see also reporting sheets, "Summary of the Objectives".
[45] Supplementary document "Measures Assessment FRM_CY"; Reporting sheets, "Summary of the Objectives".

4.7 Authorities responsible for implementation of measures

Cyprus reported the authorities responsible for measures. National authorities are responsible for the lion's share, 33 of the 38 measures (87 %). Regional authorities are responsible for four protection measures (11 % of all measures) and an inter-municipal authority for one measure (3 % of the total).

In the FRMP, further detail is provided: in particular, many measures have more than one responsible authority reported, with a total of 27 different authorities. For each measure, one authority has the main responsibility while the other bodies have an advisory role. The leading authority has the responsibility to ensure the funds required and, if needed, to coordinate the other bodies in implementation.[46]

4.8 Progress of implementation of measures

Cyprus reported the progress of implementation for its measures:

- 32 measures – including all prevention, preparedness and recovery and review measures – were reported as not started (84 %);
- five measures (also for protection) were reported as progress ongoing (13 % of the total);
- one measure (for protection) was reported in ongoing construction (3 % of the 38 total measures).

The FRMP (in the specific information per measure) provides a more detailed breakdown:

- for 32 measures, the implementing authority was defined and it had secured financing (the term used to describe the implementation status of these measures is "proposed", thus "not started" according to the reporting);
- for four measures, a preparatory study had been completed and for one measure, a pre-study had been completed;
- and for one measure, construction was ongoing.[47]

4.9. Measures taken under other Community Acts

Member States were asked to report on other Community Acts under which each measure has been implemented. Cyprus reported that 19 measures are associated with the WFD and with measures under the national RBMP[48]. Other Directives are not identified.

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[46] Supplementary document to FRMP 2016-2021, chapter 8, Tables and Charts on measures; PoM, chapter 3 and chapter 4.

[47] Supplementary document to FRMP 2016-2021, chapter 9, Tables and Charts on measures, Table 8; PoM, chapter 3 and chapter 4.

The FRMP mentions that the EIA Directive, Seveso Directive and the Civil Protection Mechanism are "linked" to the Flood Directive implementation; however, further details are not provided. The FRMP also refers to other EU Directives, policies and initiatives:

- European Union Solidarity Fund (EUSF);
- Decision n.2001/792/EC for a common mechanism to facilitate enhanced cooperation in civil protection assistance interventions;
- Commission activity for disaster prevention;
- Directive 96/61/EC for the integrated prevention and control of pollution;
- The Aarhus Convention and related Community legislation (Directive 2003/105/EC) to address the risks of major accidents involving dangerous substances;
- The EU Green Infrastructure Strategy. Green Infrastructure has been associated with 6 protection measures[49];
- The EU Adaptation Strategy. Climate change adaptation has been considered in the assessment of measures; there is a specific chapter (3.3) in the FRMP briefly presenting the estimated effects of climate change and how these were taken into account in the design of measures. Moreover, a degree of "high" or "medium" association with climate change has been assigned to each measure depending on its effectiveness towards changing weather phenomena;
- The Global Monitoring for Environment and Security program (GMES);
- The Shared Environmental Information systems (SEIS);
- The INSPIRE-Directive (2007/2/EC) is mentioned in measure PREV-CY_03 with regard to the processing and presentation of data and information on risk to the general public (interactive FHRMs are available to the public on the webpage of the Department of Water Development).

4.10 Specific groups of measures

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

- PREV-CY_01: Incorporating flood risk assessment results into spatial and urban planning through Development Plans (Local Plans, Area Plans, Statement of Rural Policy);[50]

[48] Cyprus reporting sheet; FRMP 2016-2021, chapter 2 and chapter 10.
[49] PoM, chapter 4, Biodiversity information.
[50] 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.

- PREV-CY_02: Ensuring a protection zone along watercourses when licensing new construction and development;
- PRO-CY_04: Inclusion of special terms in planning and building permits for the management of rainwater within private properties being developed, in such a way that the peak of the run-off remains at the levels before the new construction;[51]
- PRO-CY_18: Establishment of a process for the elaboration of Strategic Water Management Plans (Master Plans) when planning new areas within development zones.[52]

Whereas the FRMP does not report on the national framework for land use and spatial planning or its evolution since 2000, the FRMP[53] (and in more detail, the supplementary document: "FRM Stakeholder identification") presents all relevant authorities involved (and their legislative obligations linked to floods), including those responsible for spatial and urban planning.

The FRMP and the reporting sheet indicates the difficulties regarding the use of **NWRM**. Specifically, the reporting sheet states that:

> "The 19 APSFRs identified in Cyprus are located in downstream areas with significant residential development. It is also very important that land property has very high value in Cyprus and that there are significant limitations regarding land use changes".

At the same time, it is stated that:

> "When assessing the flood risk, the need to protect the watercourses and the drainage routes was recognised and measures have been adopted in this direction. Measures have also been taken with regard to spatial planning and land uses within flooded areas in a way that limits flood risk. Finally, measures have been taken for the exploitation of existing reservoirs and for the construction of new retention ponds for the retention of flood waters and hazard reduction."

While 10 out of 38 measures are related to water retention, the actual use of NWRM is limited or is not presented in an explicit way. A number of measures are linked to the promotion and awareness raising for NWRM and feasibility studies (e.g. PRO-CY_04, PRO-CY_05, PRO-CY_06, PRO-CY_07). In addition, five measures may contain NWRM elements:

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[51] 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).

[52] M35. Protection, Other Protection, Other measure to enhance protection against flooding, which may include flood defence asset maintenance programmes or policies.

[53] Chapter 11.

- Measure PRO-CY_03: “Use of absorption puts for rainwater retention in properties”;
- Measure PRO-CY_13, "Remediation of the continuity of important streams”, which will investigate locations were activities are taking place (mainly agriculture) within flood plains and assess possibilities of remediation (e.g. buying of land, creation of parks/protected areas).
- Measure PRO-CY_02, “Projects for groundwater enrichment and for reducing water flow in river beds upstream of APSFRs” might have NWRM elements, depending on its specification and location.
- Measure PRO-CY_14, “Restoration and improvement of hydrological features in watercourses/streams (that entails the execution of necessary works to form the riverbed (central and flood) in order to improve flow conditions and control the deposition of sediment)”. Here, water retention ponds upstream of the APSFRs for flood retention might be considered NWRM depending on their design/specification;
- Measure PRO-C11_1, “Restoration and increase of discharge capacity of Kamares river and river management aiming to flood protection”. This water retention measure might have NWRM elements, depending on its design/specification.

Measures that specifically consider nature conservation.[54] One measure specifically considers nature conservation: measure PREV-CY_02 ensures a protection zone along watercourses when licensing new developments, in order to achieve the smooth flow of surface water and environmental protection. In addition, the measure PRO-CY_08 “Development of a national regulation for river bed annual cleaning operations and management of riparian streams vegetation” might have a nature conservation effect. Yet, the specific content of the regulation will determine in how far nature conservation will be a focus of this measure.

The Cypriot reporting sheet and other relevant documents indicate that none of the measures consider **ports and navigation**.[55]

The **dredging** of rivers/ponds to increase the river channel capacity and its ability to convey water for flood alleviation purposes as well as bank modifications/river bed/pond modifications are specifically planned in/as part of (at least) four protection measures:

- PRO-CY_14: Restoration and improvement of hydrological features in watercourses/streams (that entails the execution of necessary works to form the riverbed (central and flood) in order to improve flow conditions and control the deposition of

[54] PoM, chapter 4, p.31.
[55] FRMP 2016-2021; PoM; Reporting Sheets.

sediment). River bed and river bank modifications are considered for 16 locations in 11 APSFRs[56, 57].

- PRO-C10_01: Upgrading of Aradippou river's road crossings that, among other actions, includes the formation of the riverbed;
- PRO- C15_02: Protection and formation of the Vathia River's bed. This measure includes among others the installation of gabions at the river banks and introducing horizontal "steps" of gabions or rocks in the river bed;
- PRO-C15_01: Flood retention upstream of the Parapotamos: This measure contains engineering measures in existing natural retention pond of Ag. Athanasios[58] through installing gabions and dredging of the pond in order to increase its capacity.

Overall, a high number of dredging and river bank and river bed modifications are therefore planned, potentially affecting the hydromorphological characteristics of streams and rivers. Nonetheless, the description of the first measure listed above underlines the need for synergy with the WFD's objectives and states that "modifications have to take place in a way that the hydromorphological modifications are minimised and the continuity of the streams is ensured". As noted below, Cyprus reports that the provisions of Article 4(7) of the WFD were taken into account for the projects included in the FRMP PoM.

4.11 Recovery from and resilience to flooding

While the main report of the Cypriot FRMP does not provide an overview of the role of insurance policies in relation to flood risk management, in the supplementary document "Flood Risk Management Stakeholder identification"[59], the role of the Agricultural Insurance Organisation of Cyprus and (briefly) the insurance policy related to agricultural products is presented, as well as the compensation policy applicable to flood damages in Cyprus.

The FRMP contains two measures aimed at increasing the role of insurance:

- PREP-CY_03: Raising awareness in Local Authorities and communities of flood risk and the importance of property insurance;
- RECOV-CY_03: Promotion of insurance (of persons and property) against floods.[60]

[56] PoM, p 4-70 to 4-72.
[57] Cyprus subsequently informed that this measure is not limited to river dredging. In some cases (i.e. APSFR C02), it includes water retention ponds upstream of the APSFR for peak discharge attenuation.
[58] Cyprus subsequently stated that this measure concerns the enlargement of an artificial pond.
[59] Supplementary document to FRMP 2016-2021, chapter 5, pp. 29 and 44.
[60] FRMP 2016-2021, chapter 9, p.158.

4.12 Monitoring progress in implementing the FRMP

The FRMP states that to successfully implement the Program of Measures, an implementation monitoring mechanism is needed. Therefore, a Monitoring Plan for overseeing the implementation of all measures will be established by the Ministry of the Interior. The following information will be monitored for each measure via a dedicated implementation/control sheet by the competent authority of each measure:

- The actions required to implement the measure by the implementing body;
- The timetable of actions (in quarters or semesters as appropriate);
- Any risks that may delay their implementation;
- Progress of implementation, recording the actions that have been taken.

While the process of monitoring the progress of implementation of the measures has generally been defined, the FRMP does not identify indicators to support the monitoring process[61] [62], nor does it refer to a baseline against which progress will be monitored and assessed.

4.13 Coordination with the WFD

The table below shows how the development of the FRMP has been coordinated with the development of the second RBMP of the WFD[63].

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

	CY001
Integration of FRMP and RBMP	
Joint consultation of draft FRMP and RBMP	✓
Coordination between authorities responsible for developing FRMP and RBMP	✓
Coordination with the environmental objectives in Art. 4 of the WFD	✓
The objectives of the FD were considered in the preparation of the RBMPs [a]	✓
Planning of win-win and no-regret measures in the FRMP	✓
The RBMP PoM includes win-win measures in terms of achieving the objectives of the WFD and FD, drought management and 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	✓

[61] FRMP 2016-2021, chapter 13; Reporting sheets, "summary of the progress".
[62] Cyprus subsequently clarified that the main indicators for monitoring the implementation of each measure will be defined at the stage of implementation of the FRMP by each competent authority according to the nature of the measure and the implementation procedure.
[63] FRMP 2016-2021, chapter 10; Reporting sheets, "summary of the progress".

	CY001
Consistent and compliant application of WFD Article 4(7) and designation of heavily modified water bodies with measures taken under the FD e.g. flood defence infrastructure	✓
The design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, have been adapted to take into account WFD Environmental Objectives [a]	✓
The use of sustainable drainage systems, such as the construction of wetland and porous pavements, have been considered to reduce urban flooding and also to contribute to the achievement of WFD Environmental Objectives[64]	✓

Notes: [a] based on reporting under the WFD

The first FRMP states that it was drafted by the Department of Water Development (DWD) alongside the second RBMP to achieve the greatest possible synergy between the two plans, which are the main water management tools in Cyprus. The coordination of implementation and the reinforcement of synergy between Directives 2000/60/EC and 2007/60/EC included the following:

- A joint consultation procedure;
- Measures that reinforce or support objectives and actions of both Management Plans have been promoted. The FRMP complements the RBMP, and the FRMP and the arrangements foreseen for the implementation of the Flood Directive were incorporated into the second RBMP;
- In the preparation of the measures for both plans, potential negative interactions between objectives and measures of the two plans were identified and guidance was developed to address them;
- An assessment of significant adverse environmental impacts that may be caused by the implementation of the FRMP was made at an early stage to identify the remedial actions.

To promote synergies between the two plans, the following actions took place:

- Correlations between the APSFRs, water bodies and protected areas under the WFD were identified;
- Six measures of the RBMP aiming to address negative impacts on water status were identified as directly related to 13 measures of the FRMP (10 “protection” measures and 3 “prevention” measures);
- Measures of the FRMP that strengthen or support the objectives of the RBMP and WFD were also identified: certain FRMP measures can support the creation of an appropriate framework for the protection of hydrological and hydraulic characteristics of

[64] Four measures related to Sustainable Drainage Systems in urban areas have been included in the PoM (PRO-CY_04, PRO-CY_05, PRO-CY_06, PRO-CY_07).

watercourses. These include practices proposed for the utilisation and management of rainwater in urban areas. In particular, five protection measures have been included in the FRMP that contribute to reducing hydro-morphological pressures on surface water bodies, one protection measure that contributes to water efficiency and water reuse and one protection measure that can support ecological flows from dams;

- Measures of the RBMP that may affect the design and implementation of FRMP measures were identified;
- Within the framework of the RBMP, the provisions of Article 4.7 of the WFD were taken into account for the projects included in the FRMP.

Finally, the contribution of certain FRMP measures to the achievement of the WFD objectives was considered as a criterion of higher effectiveness when assessing these measures.

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

The following **good practices** were identified:

- For each measure planned, a detailed fiche is presented containing key information, including (among other elements) the objective it contributes to, its adaptability to climate change conditions, synergy with the objectives and measures of the RBMP, the authority or authorities responsible for implementation, estimated implementation cost and financing source;
- The measures described in the Cypriot FRMP can be considered specific and measurable at both national and APSFR level;
- The measures and the FRMP as a whole have been coordinated with the RBMP's measures and the WFD's objectives.
- The FRMP includes land use and spatial planning measures, for example, modifying land use plans to address flood issue.
- The FRMP includes two measures for the promotion of insurance for protection against flooding.

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

- While the process of monitoring the progress of implementation of the measures has generally been defined, the FRMP does not provide indicators to monitor the progress of measures, nor a baseline for this.
- While the objectives have specific and measurable elements, it is unclear if they will be achieved if all measures are completed;

- The FRMP describes the criteria for the selection of measures and those for the prioritisation of measures; no account of a specific methodology was found that was used for their selection. In addition, the prioritisation practically did not appear to have an effect, since all measures analysed are retained and all have a deadline of 2021.
- There is limited (and mostly only potential) use of NWRM described in the FRMP, while various measures are planned concerning river bank, river bed and pond modifications that could negatively affect the hydromorphological conditions of streams and rivers.

5. Consideration of climate change

The FRMP states that all measures proposed were assessed for their effectiveness in addressing adverse impacts of climate change. Measures that remain effective to more severe weather events, which are probably caused by climate change, such as an increase in the intensity and possibly the frequency of extreme floods in relation to the past, were evaluated more positively. The FRMP also states that all measures will contribute to addressing the impacts of climate change to either a high or medium degree.[65] Furthermore, the FRMP will be reviewed periodically and updated if necessary, taking into account the likely effects of climate change in relation to the appearance of floods.[66]

The FRMP refers to the proposal for a national Climate Change Adaptation Strategy, developed in 2014 but not yet adopted[67]. The FRMPs indicates that the preparation of all measures in the FRMP have considered the recommendations provided in the Strategy.[68] The FRMP summaries information in the Strategy regarding changes in the intensity and average precipitation levels during the period 1970-2007. As a general conclusion, the FRMP anticipates an increase in the occurrence of extreme flooding events and a decrease in annual precipitation levels (mostly based on historical data). The FRMP does not refer to changes in the main sources of flooding under long-term climate change scenarios.[69]

The FRMP moreover explains that changes in the occurrence of flooding events due to climate change were taken into account when considering flood recurrence. These projected trends (increase of floods in number of events, duration and effects), combined with changes in land use, were used as qualitative criteria in assessing the potential impacts of future floods in order to identify the APSFRs. The FHRMs for the 19 APSFRs were drawn up for three scenarios with a return period of 500, 100 and 20 years. The impact of climate change on the intensity of rainfall was considered in these scenarios by taking into account precipitation data for the period 1970-2007. These data have indicated a significant increase (44 %) in precipitation levels for various rain durations, from five minutes to six hours, and in the maximum amount of rainfall (31 %) for return periods of T50 and T100 years, in comparison to the period 1930-

[65] FRMP 2016-2021, chapter 9; PoM, chapter 4, p29-70.
[66] FRMP 2016-2021, chapter 2, p11; FRMP 2016-2021, chapter 3, p.31, FRMP 2016-2021, chapter 9, p.134-164.
[67] European Environment Agency, Climate-ADAPT – Sharing adaptation information across Europe, Cyprus: https://climate-adapt.eea.europa.eu/countries-regions/countries/cyprus (visited November 2018)
[68] FRMP 2016-2021, chapter 3, p.29-31, FRMP 2016-2021, chapter 9, p.134; http://climate-adapt.eea.europa.eu/countries-regions/countries/cyprus (Status of information: 11.1.2017).
[69] FRMP 2016-2021, chapter 6 and chapter 9.

70.[70] The FRMP also highlights uncertainties in the projections and in the role of climate change in historical trends.[71]

A broad range of individual measures address climate change, according to the descriptions in the FRMP. The Cyprus FRMP mentions climate change in the description of non-structural measures, including spatial planning.

A reference to climate change is also found in the description of measures using economic instruments, according to the FRMP assessed and the reporting sheet: these include two instruments for insurance (see section 4) as well as instruments providing incentives to private owners to reduce storm water runoff, install rainwater utilisation systems and undertake flood protection measures.[72]

Furthermore, consideration of climate change is included in the description of protection measures to reduce runoff from public spaces, implement and maintain flood defence projects and for a preparatory measure to improve the warning mechanism for exceptional weather events and floods.

5.1 Good practices and areas for further development concerning climate change

The following **good practices** were identified:

- The FRMP summarises the findings of the draft national Climate Change Adaptation Strategy and indicates that these findings were considered in the development of the measures;
- All measures proposed were assessed for their effectiveness in addressing adverse impacts of climate: those that remain effective in severe weather events, which may be caused by climate change, were evaluated more positively.

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

- While measures that remain effective in severe weather events, which may be caused by climate change, were evaluated more favourably, it is unclear (1) how the climate change adaptation potential of each measure was considered in the prioritisation of the measures and (2) according to which criteria some measures were assessed more positively due to their resilience.
- The FRMP should be coordinated with the national climate change adaptation strategy once the latter is adopted.

[70] FRMP 2016-2021, chapter 3, p29, p.36 ; FRMP 2016-2021, chapter 6, p.63.
[71] FRMP 2016-2021, chapter 3, p29-30 ; FRMP 2016-2021, chapter 6, p.63.
[72] FRMP 2016-2021, chapter 9, p.144, p.145, p.151, p.154, p.156.

6. Cost-benefit analysis

Cyprus carried out a cost-effectiveness assessment (CEA) for all measures; a CBA was undertaken for construction measures. It appears that these assessments did not affect the selection of measures, as the measures considered in the CEA/CBA are all presented in the final set of measures (i.e. no measures were considered and then not taken up due to the CEA/CBA). The results of this work shows a prioritisation of measures, but which practically did not have an effect, since all measures are taken up and all have a deadline of 2021.

The cost-effectiveness assessment was identified the effect/cost ratio for measures. Costs were estimated for the implementation and operational costs of measures (in a timeframe of 30 years). Regarding the assessment of effects, the following parameters were taken into consideration:

- the importance of the measure (the greater the importance, the larger the effect or benefit);
- the efficiency of the measure, which depends on: if the measure has a significant effect or result; the efficiency of the measure under Climate Change conditions; the extent of the area which is affected by the measure;
- the temporal efficiency of the measure (i.e. a measure having a fast effect is more beneficial than one with slower impact time).

Overall, the measures that reduce significantly vulnerability and exposure to floods were assigned a higher effectiveness scoring.

The reporting sheet states that a CBA was conducted for construction works measures. The benefit is assessed in terms of the damage reducing effect, (calculated through an assessment of the risk before and after the intervention), while the costs were assessed as the sum of the investment and operational/maintenance costs (over a 30 year period)[73].

Multi-benefits have been considered: specifically, for each measure assessed through a CEA, the "links to the aims and measures of the RBMP/the WFD" are assessed. A benefit here increases the value assigned to the importance of the measure.

6.1 Good practices and areas for further development

The following **good practice** was identified:

[73] This work is described in detail in a supplementary document to the FRMP, submitted to the CDR: Assessment of the proposed measures of the FRMP.

- Cost-effectiveness and cost-benefit assessment, including the consideration of multi-benefits (specifically for WFD objectives) were conducted for the measures.

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

- The CEA and CBA analysis did not appear to affect the selection of measures.
- In the CBA method applied for construction measures, the potential costs of negative environmental impacts were not considered[74].

[74] Subsequently Cyprus informed that construction works are subject to environmental legislation: EIAs have been conducted and remedial actions for negative environmental impacts have been adopted. The cost of these actions is included in the investment cost that has been taken into account for CB analysis. In this way, according to Cyprus, the cost of negative environmental impacts was considered.

7. Governance including administrative arrangements, public information and consultation

7.1 Competent authorities

Based on the FRMPs and the information provided in the reported sheets, the Competent Authorities and the Units of Management identified for the FD have not changed.[75] Cyprus has not reported new information to WISE since 2011.

7.2 Public information and consultation

For the development of the FRMP, the Department for Water Development set up a Steering Committee with representatives of other key government departments and ministries (see below for further details). The participants were constantly informed and actively involved in the FRMP preparation.[76]

The table below shows how the public and interested parties were **informed** in the UoM assessed. Information on how the consultation was actually carried out and which stakeholders participated is presented in the rest of the section[77]:

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

	CY001
Media (papers, TV, radio)	
Internet	✓
Digital social networking	
Printed material	
Direct mailing [78]	
Invitations to stakeholders [79]	
Local Authorities	
Meetings	✓

Source: FRMP

Neither the FRMP nor the reporting sheet specify how the public and interested parties were informed about the consultation process or the meetings. The FRMP indicates, however, that the webpage for the plan was used throughout the entire consultation process (before and after

[75] FRMP 2016-2021, chapter 11, p.182-191.
[76] FRMP 206-2021, chapter 12.3, pp. 197-199; Reporting Sheets, "summary of the consultation".
[77] Cyprus informed subsequently that analytical information on public consultation activities is presented in an annex document of the FRMP "Public consultation report", which was mistakenly not uploaded to WISE.
[78] Cyprus indicated subsequently that the participants of the Steering Committee were informed about all intermediate reports via e-mail.
[79] Cyprus informed subsequently that all relevant stakeholders were invited to the consultation events.

the open consultation period): in order to inform the public and obtain the views of stakeholders and members of the public, Cyprus used an internet portal[80] where the draft FRMP and accompanying documentation were accessible to everyone (an active hyperlink to the portal is provided in the FRMP).[81]

In addition to information on the draft FRMP for consultation, a presentation of the final FRMP and RBMP was made in a national public conference organised by the competent authority.[82]

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

Table 11 Methods used for the actual consultation

	CY001
Via Internet	✓
Digital social networking	
Direct invitation	
Exhibitions	
Workshops, seminars or conferences	✓
Telephone surveys	✓
Direct involvement in drafting FRMP	✓
Postal written comments	

Source: FRMP

The actual consultation period lasted almost two months, from 30 December 2015 to 20 February 2016. As noted above, Cyprus used an internet portal for the consultation. This included an online questionnaire (no information was provided, however, on the number of responses). An evaluation of the consultation procedure is presented in the FRMP.[83]

Four regional meetings were organised during that period; two were addressed to the general public while the other two were targeted to the identified stakeholders. In addition, a national conference took place for presentation of the finalised FRMP and RBMP.

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

[80] www.flood.wdd.moa.gov.cy
[81] FRMP 2016-2021, chapter 5.6 and 7.
[82] FRMP 2016-2021, chapter 12, p.196-197; Reporting sheets, "Summary of the Consultation".
[83] FRMP 2016-2021, chapter 12.4, pp. 200-201.

Table 12 Methods used to provide the documents for the consultation

	CY001
Downloadable	✓
Direct mailing (e-mail)	
Direct mailing (post)	
Paper copies distributed at exhibitions [84]	
Paper copies available in municipal buildings (town hall, library etc.)	
Paper copies at the main office of the competent authority	

Source: FRMP

As noted above, the FRMP indicates that all relevant documents were available online at the dedicated internet portal[85]; no other information about their distribution or availability is provided in the FRMP or the reporting sheet.[86]

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 assessed:

Table 13 Groups of stakeholders

	CY001
Civil Protection Authorities such as Government Departments responsible for emergency planning and coordination of response actions	✓
Flood Warning / Defence Authorities	
Drainage Authorities	✓
Emergency services	✓
Water supply and sanitation	✓
Agriculture / farmers	✓
Energy / hydropower	
Navigation / ports	
Fisheries / aquaculture	
Private business (Industry, Commerce, Services)	✓
NGOs including nature protection, social issues (e.g. children, housing)	✓
Consumer Groups	✓
Local / Regional authorities	✓
Academia / Research Institutions	
Ministerial Departments of Environment, Forests, Meteorology, Civil Construction, Urban Planning, Public Revenues, Industrial Development and Archaeology	✓
The general public via online questionnaires	✓

Source: FRMP

[84] Cyprus informed subsequently that paper copies of the non-technical summary of the draft FRMP and the consultation questionnaire were distributed at the open meetings and the conferences held during the consultation.

[85] www.flood.wdd.moa.gov.cy

[86] FRMP 2016-2021, chapter 12, p.196-197.

The organisations listed in the table above are the ones explicitly named in the FRMP, but the list is not exhaustive, as public meetings were open to all interested parties; however, no information on the number of stakeholders participating in the meetings is provided in the FRMP. The FRMP underlines that the views of a broad range of organisations – including local authorities as well as government departments, public law bodies and social groups whose interests are affected or put at risk from the decision-making process and the management of flood risks – were taken into account for the drafting of the Plan. Environmental organisations were recognised as stakeholders and are specifically mentioned in the FRMP.[87]

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

Table 14 Mechanisms used to ensure the active involvement of stakeholders

	CY001
Regular exhibitions	
Establishment of advisory groups	✓
Involvement in drafting[88]	
Workshops and technical meetings	✓
Formation of alliances	
Information days	
Workshops	✓

Source: FRMP

In order to increase the active participation of principal public authorities responsible for water management and conservation (considered as stakeholders in the FRMP), the Department for Water Development set up a Steering Committee with representatives of other key departments and ministries. This Steering Committee was actively involved in the formulation and preparation of the Management Plans (FRMP and RBMP). Its members were constantly informed about the progress of the preparation of the plans and other relevant issues.

In addition to the consultation meetings and conferences for the public and the stakeholders as noted above, five technical meetings were organised before and after the consultation period for consultation with the relevant public stakeholders.[89]

7.4 Effects of consultation

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

[87] FRMP 2016-2021, chapter 11, Table 11.2, 11-3 p.186-194 ; FRMP 2016-2021, chapter 12, p.196-197.
[88] Cyprus informed subsequently that via the Steering Committee, public authorities involved in FRM were directly involved in drafting the FRMP.
[89] FRMP 2016-2021, chapter 12.3, p.197-198; Reporting sheets, "Summary of the Consultation".

Table 15 Effects of consultation

	CY001
Changes to selection of measures	✓
Adjustment to specific measures	✓
Addition of new information	
Changes to the methodology used	
Commitment to further research	✓
Commitment to action in the next FRMP cycle	

Source: FRMP

A detailed description of the changes, adjustments and additions to the proposed measures, as a result of the consultation process, is included in the Cypriot FRMP. In particular:

- Objective B, Reducing Flood Exposure, was adapted to avoid delays and difficulties in the planning process of building permits;
- The description of priority action fields of the FRMP's objectives for the 19 APSFR was supplemented;
- Changes in the executing bodies of the measures for more effective implementation;
- Changes in the classification of certain measures in terms of the four aspects of flood risk management (prevention, protection, preparedness, and recovery and review);
- Clarification of the content of measures;
- Several changes were made to measures:
    - Measure PRO-C05_01 "Reconstruction of culverts and bridges in/over the main river bed of the Merika river in order to ensure the flood protection of the area" was added;
    - An extension was agreed for measure PREP-CY_03 "Community awareness campaigns against flood risk" to involve local actors and to measure PR0-CY_14 to include the APSFR C16 "P. Garyllis";
    - Proposals for measures to construct absorption pits along the watercourses will be assessed in the context of the implementation of measure PR0-CY_14 "Rehabilitation and improvement of hydrological characteristics of watercourses";
    - A measure for the developing specifications of road side inlet drainage structures was dropped from the final FRMP, as it was considered to be a subject of urban drainage design studies;
    - Measure PRO-C15_02 "Canalisation of 'Vathia' tributary (central branch)" was dropped from the final FRMP.[90]

[90] FRMP 2016-2021, chapter 12.5, p.201-202.

7.5 Strategic Environmental Assessment (SEA)

The FRMP has undergone an SEA procedure in order to assess its environmental impacts. The procedure includes four main steps:

1. Exploring environmental issues through an assessment study of the proposed Plan;
2. Consultation with citizens;
3. Incorporating the results of investigation and consultation into the Plan;
4. Monitoring the future impact of the implementation of the Plan;

The FRMP indicates that it has incorporated recommendations set out in SEA Environmental Report. These are outlined in the FRMP; while the plan does not provide a link to the SEA report, it is available on the website of the Water Development Department (WDD).[91]

7.6 Good practices and areas for further development regarding Governance

The following **good practice** was identified:

- The FRMP clearly describes the updates made in response to the consultation.

[91] FRMP 2016-2021, chapter 12.5, p.201-202; Reporting sheets, "Summary of the Consultation". The SEA report is available from the following web page: http://www.moa.gov.cy/moa/wdd/Wdd.nsf/all/ADD616573A0E0F0DC2257FA8002748D1?opendocument

Annex A: Supplementary tables and charts on measures

This Annex gives an overview of the data on measures provided by Cyprus in the reporting sheet. 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 assessor to complete the questions on the Flood measures. The data are extracted from the XMLs (reporting sheets) reported by Member States for each FRMP, and are split into the following sections:

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

On the basis of the reporting guidance (which in turn is based on the FD)[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.
- If a manageable number of answers are given, obvious categories are identified, and raw data sorted.

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

- Measures missing information may be assigned categories based on other fields (for example, if the level of Responsibility Authority is missing, the information may be obvious from the field "name of Responsible Authority").
- Measures where obvious categories cannot be defined based on other available information (as in the example above on the name of the Responsible Authority), 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	33
Number of individual measures including measures which have been allocated to more than one measure type	33
Number of aggregated measures	5
Number of aggregated measures including measures which have been allocated to more than one measure type	5
Total number of measures	38
Total number of measures including measures which have been allocated to more than one measure type	38
Range of number of measures between UoMs including measures which have been allocated to more than one measure type (Min-Max)	N/A
Average number of measures across UoMs including measures which have been allocated to more than one measure type	N/A

Table A2 - Number of individual measures per measure type and UoM

	Prevention		**Protection**				**Preparedness**			**Recovery & review**	**Other**	**Grand Total**
	M21	**M24**	**M32**	**M33**	**M34**	**M35**	**M41**	**M42**	**M43**	**M53**		
CY001	2	2	1	5	5	10	3	1	1	3		33
Grand Total	**2**	**2**	**1**	**5**	**5**	**10**	**3**	**1**	**1**	**3**	**0**	**33**

Note: Cyprus has one UoM. The Measure codes are listed at the beginning of this Annex.

Table A3 - Number of aggregated measures per measure type and UoM

	Prevention	Protection		Preparedness	Recovery & Review	Other	Grand Total
		M32	M33				
CY001		3	2				5
Grand Total	**0**	**3**	**2**	**0**	**0**	**0**	**5**

Note: Cyprus has one UoM. The Measure codes are listed at the beginning of this Annex.

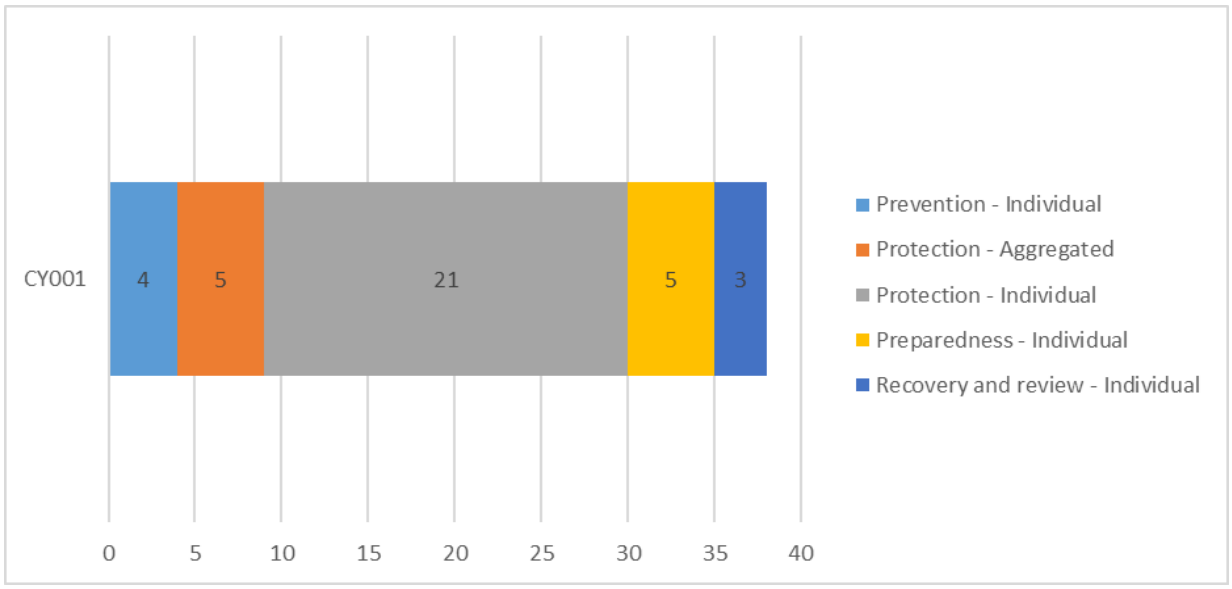
Table A4 - Total number of measures (aggregated and individual) per measure type and UoM, including duplicates

	Prevention	Total	Protection		Total	Preparedness	Total	Recovery & review	Total	Other	Grand Total
	Individual		Aggregated	Individual		Individual		Individual			
CY001	4	4	5	21	26	5	5	3	3		38
Grand Total	**4**	**4**	**5**	**21**	**26**	**5**	**5**	**3**	**3**	**0**	**38**

Note: Cyprus has one UoM. The Measure codes are explained at the beginning of this Annex.

The information in Table A4 is visualised in Figures A1 and A2 below:

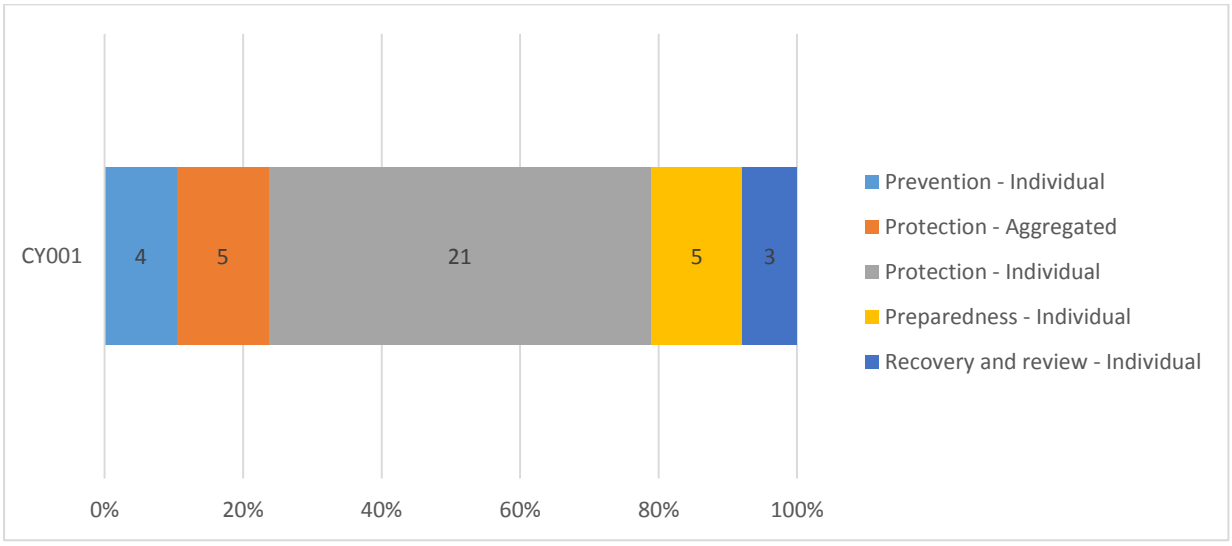
Figure A1 - Number of total measures (individual and aggregate) by measure aspect



Note: Cyprus only has one UoM

The Measure codes are explained at the beginning of this Annex.

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



Note: Cyprus only has one UoM

The Measure codes are explained at the beginning of this Annex.

Measure details: cost

Member States were requested to report information on:

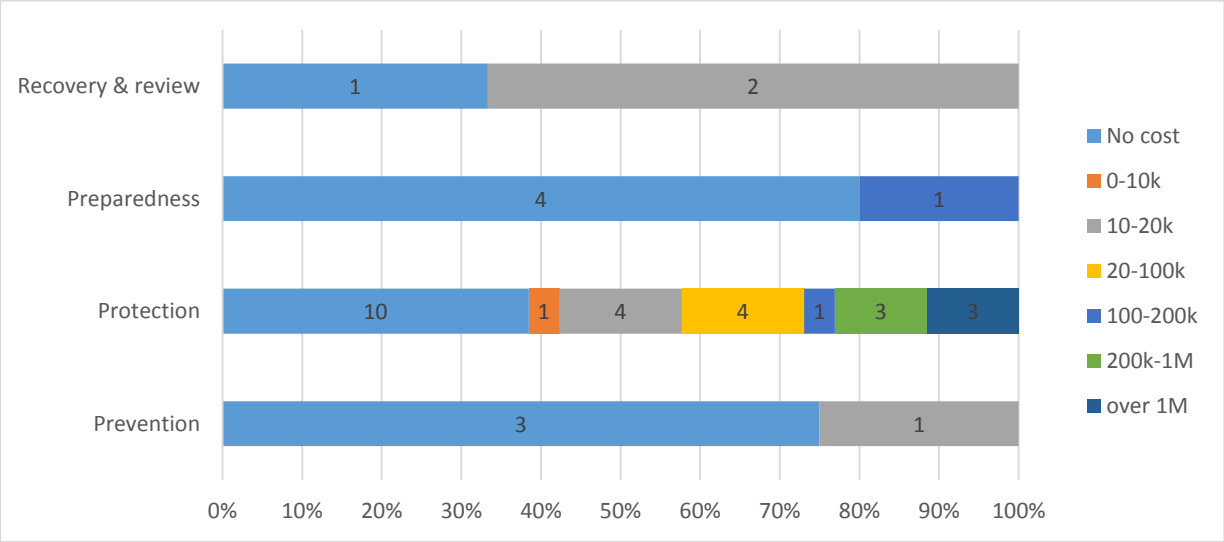
- Cost (optional field);
- Cost explanation (optional field).

Cyprus provided information in the reporting sheet about the cost of all measures, as summarised in the following table. Information was also provided for cost explanation, however as this was the open question the responses given varied greatly and a method to aggregate the information was not found.

Table A5: Cost by measure aspect (EUR)

	No cost	0-10k	10-20k	20-100k	100-200k	200k-1M	over 1M	Grand Total
Prevention	3		1					4
Protection	10	1	4	4	1	3	3	26
Preparedness	4				1			5
Recovery & review	1		2					3
Grand Total	**18**	**1**	**7**	**4**	**2**	**3**	**3**	**38**

Figure A3: Visualisation of Table A5: Cost by measure aspect (EUR)



Measure details: name & location

Member States were requested to report information on the following:

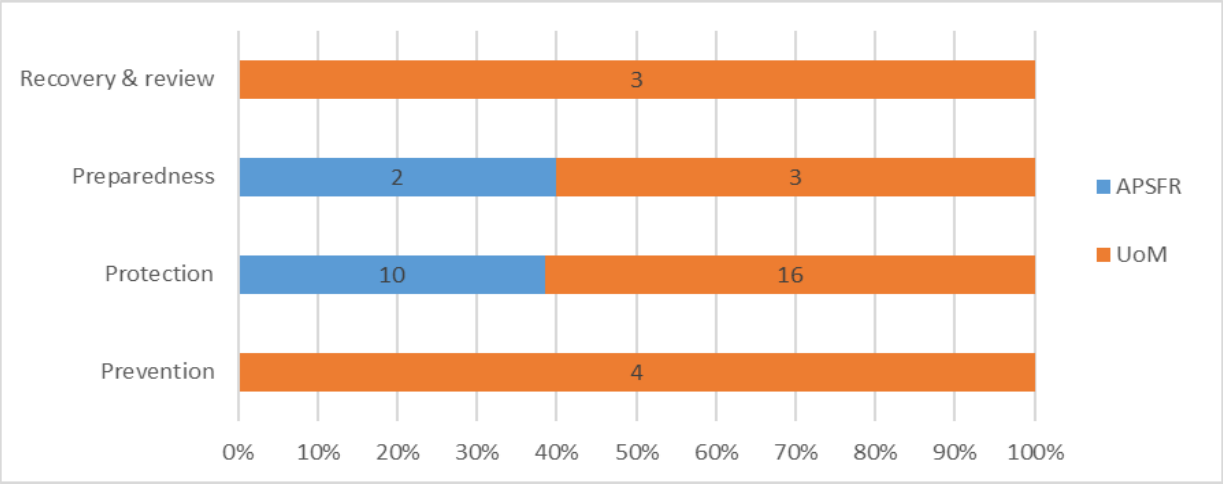
- Location of implementation of measures (mandatory field);
- Geographic coverage of the impact of measures (optional field).

Cyprus completed these fields for all measures. The responses provided for location of measures and geographic coverage of the measures were identical. For the majority of the measures (26 measures) the location and geographic coverage was indicated as the UoM, while for the remaining 12 measures different APSFRs were listed.

Table A6 -Location of implementation by measure aspect

	APSFR	UoM	Grand Total
Prevention		4	4
Protection	10	16	26
Preparedness	2	3	5
Recovery & review		3	3
Grand Total	**12**	**26**	**38**

Figure A4 - Visualisation of Table A6: Location of implementation by measure aspect



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).

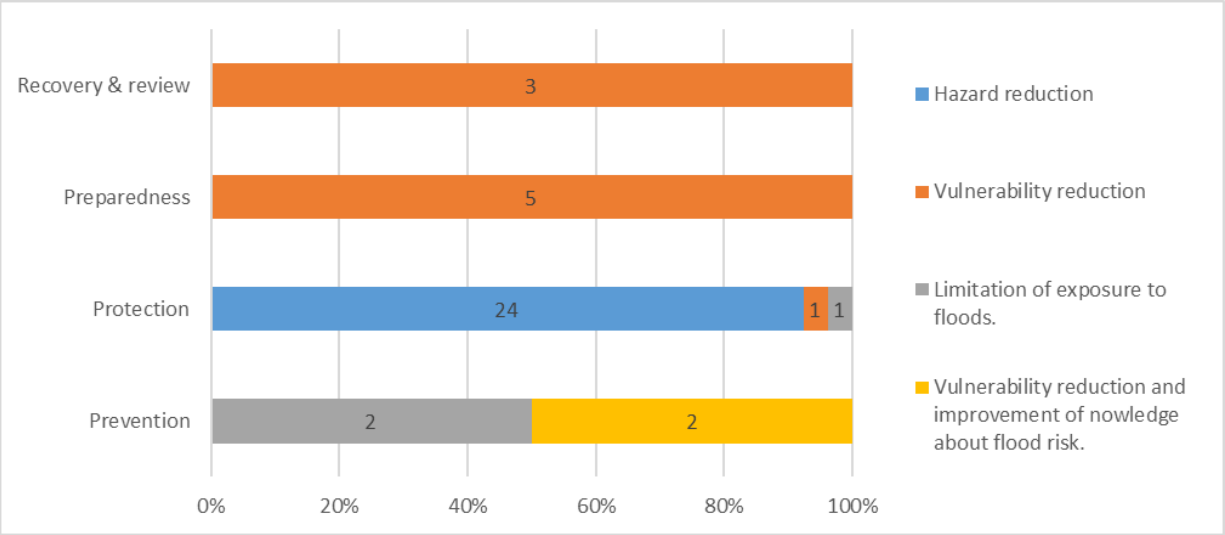
Objectives

Cyprus provided information about the objectives of all measures. Four types of objectives were indicated as summarised in the following table.

Table A7: Objectives of the measures by measure aspect

	Hazard reduction	Vulnerability reduction	Limitation of exposure to floods	Vulnerability reduction and improvement of knowledge about flood risk	Grand Total
Prevention			2	2	4
Protection	24	1	1		26
Preparedness		5			5
Recovery & review		3			3
Grand Total	**24**	**9**	**3**	**2**	**38**

Figure A5 - Visualisation of Table A7: Objectives of the measures by measure aspect



Category of priority

Cyprus did not report the category of priority of any of the measures in the reporting sheet.

Timetable

Cyprus reported the timetable for all measures: ‘Start 2016 – end 2021’.

Measure details: authorities

Member States were requested to report information on:

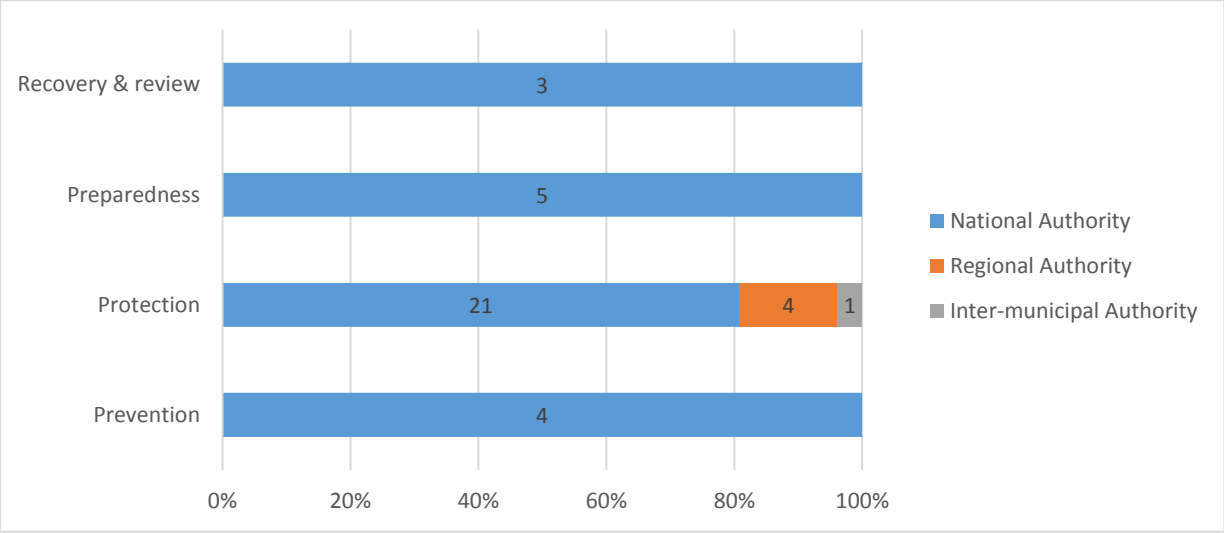
- Name of the responsible authority(optional if 'level of responsibility' is reported);
- Level of responsibility(optional if 'name of the responsible authority' is reported).

Cyprus provided information about the responsible authority and level of responsibility for all measures. However, as these were open questions the responses provided for 'name of the responsible authority' varied greatly and it was not practical to aggregate the information. Please refer to the WISE electronic reporting for more details about the responsible authority for each measure.

Table A8 - Level of responsibility by measure aspect

	National Authority	Regional Authority	Inter-municipal Authority	Grand Total
Prevention	4			4
Protection	21	4	1	26
Preparedness	5			5
Recovery & review	3			3
Grand Total	**33**	**4**	**1**	**38**

Figure A6 - Visualisation of Table A8: Level of responsibility by measure aspect



Measure details: progress

Member States were requested to report information on:

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

Cyprus reported information about the progress of implementation of the measures. 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.

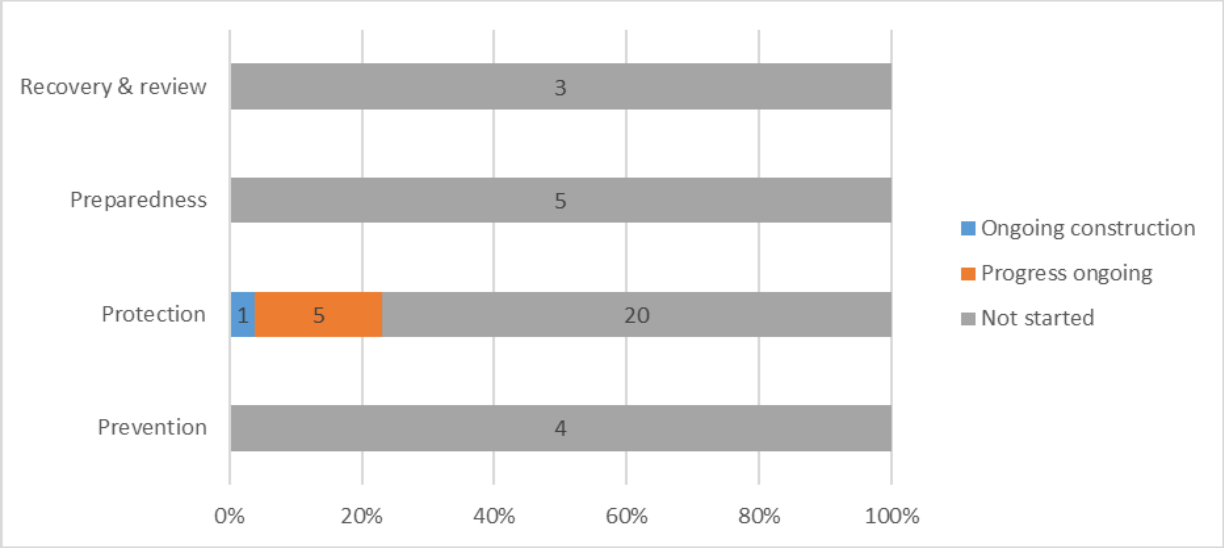
Table A9 – Progress of implementation by measure aspect

	Ongoing construction	**Progress ongoing**	**Not started**	**Grand Total**
Prevention			4	4
Protection	1	5	20	26
Preparedness			5	5
Recovery & review			3	3
Grand Total	**1**	**5**	**32**	**38**

Notes: No measures were reported as completed.

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

Figure A7 - Visualisation of Table A9: Progress of implementation by measure aspect



Notes: No measures were reported as completed.

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).

Cyprus did not report 'any other information' for the measures in the reporting sheet.

The WFD was reported as an associated 'other Community Act' for 19 of the measures. For the remaining measures no other Community Acts were reported.

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)

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, that could also be classified as NWRM.

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

Table B2 List of NWRMs

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

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