EUROPEAN
COMMISSION

Brussels, 26.2.2019
SWD(2019) 72 final

COMMISSION STAFF WORKING DOCUMENT

First Flood Risk Management Plans - Member State: Malta

Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC)
Second River Basin Management Plans
First Flood Risk Management Plans

{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) 61 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) 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}

Table of contents

Acronyms

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

Introduction

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

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

- Member State reporting to the European Commission on the FRMPs[2]: as per Articles 7 and 15 of the FD this reporting provides an overview of the plans and details on their measures;
- Selected FRMPs: One single FRMP was assessed, covering Malta's one Unit of Management (UoM)[3].

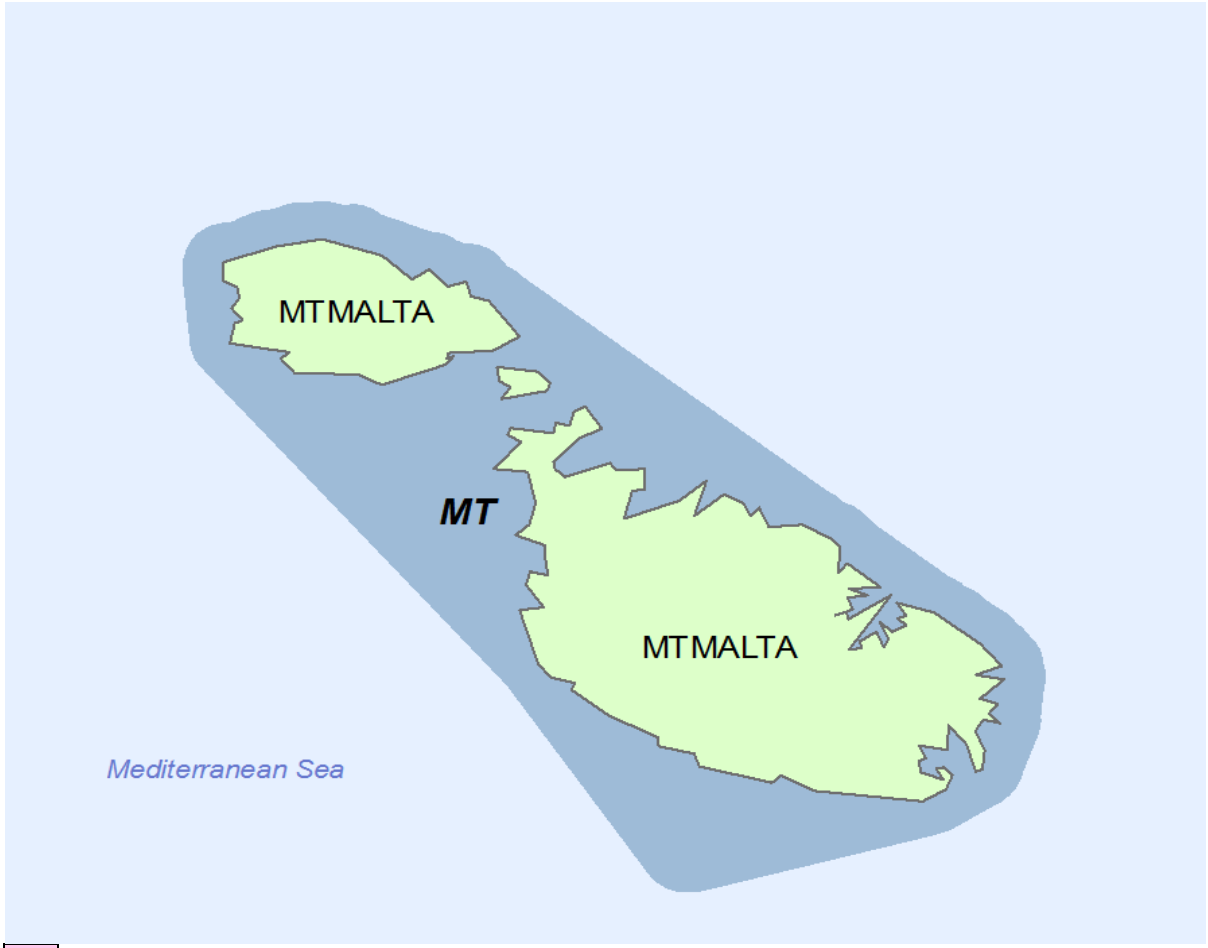
[1] The present Member State assessment reports reflect the situation as reported by each Member State to the Commission in 2016 or 2017 and with reference to FRMPs prepared earlier. The situation in the MSs may have altered since then.

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

[3] http://cdr.eionet.europa.eu/mt/eu/frmp/mtmalta

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

Malta has designated a single unit of management (UoM) under the Floods Directive, covering the whole country. Malta's UoM corresponds to its single river basin district (RBD) designated under the Water Framework Directive (WFD).

For its Flood Risk Management Plan (FRMP), Malta reported a single document covering the whole UoM: this document is Malta's Second Water Catchment Management Plan, which provides the second river basin management plan (RBMP) under the WFD and contains the FRMP. While this plan focuses on the requirements of the WFD, several passages in the main text of the Second Water Catchment Management Plan mention floods, and flood measures are included in the programme of measures; the main text on floods, however, is part of a short

Annex[4] to the main document[5]. In this report, the Annex in the Water Catchment Management Plan related to floods is nonetheless referred to as Malta's FRMP and also as the Plan, whereas passages in the main text of the Water Catchment Management Plan relevant for the Floods Directive are referred to as 'the main sections of the Water Catchment Management Plan' or as a specific chapter of the Water Catchment Management Plan.

Information on the approval and legal status of the Water Catchment Plan was not found in the Plan itself or the web sites where the Plan can be downloaded (see below)[6].

The table below gives an overview of the UoM in Malta, including the UoM code, the name, and the number of APSFRs reported. It also shows if all documents required for the UoM were submitted to European Environment Agency's (EEA) WISE[7] – the FRMP as a PDF and the reporting sheet as an XML.

Table 1 Overview of UoM in Malta

UoM	Name	Number of APSFRs	XML Reported	PDF Reported
MTMALTA	Malta	4	Yes	Yes
TOTAL		4		

The Water Catchment Management Plan and the FRMP can be downloaded from the following web pages:

- http://www.energywateragency.gov.mt/water-framework-directive/
- https://era.org.mt/en/Pages/Water-Catchment-Management-Plan.aspx

Overview of the assessment

The table below gives an overview of the evidence found during the assessment of the FRMP. 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.

[4] The Annex is titled, *Management Plans for Extreme Events*, and covers floods as well as water scarcity and droughts.

[5] Malta subsequently informed that the first Flood Risk Management Plan has also been reproduced as a separate document and is publicly available on the Agency's website: https://www.energywateragency.gov.mt/water-framework-directive/

[6] Malta informed subsequently that the first FRMP, together with the second River Basin Management Plan, were formally adopted on 16 February 2016.

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

- **No evidence**: No information found to indicate that the criterion was met.
- **Some evidence**: Reference to the criterion is brief and vague, without a clear indication of the approach used for the criterion. Depending on the comment in the adjacent column, "some evidence" could also be construed as "weak evidence".
- **Strong evidence**: Clear information provided, describing an approach followed in the FRMP to address the criterion.

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

Criterion	Evidence	Comments
FRM objectives have been established	Strong evidence	Malta's Plan sets out three objectives, which are in turn closely related to undertake specific activities – for example, to develop water level monitoring facilities.
FRM objectives relate to...		
...the reduction of potential adverse consequences	No evidence	The objectives do not refer to a reduction in potential adverse consequences, though this appears to be an unstated goal (the Maltese FRMP is partly based on the National Floods Relief Project, which had the objective "to avert increases in risks to life and property and control damages caused by uncontrolled surface water runoff")[8].
...to the reduction of the likelihood of flooding	Strong evidence	One of the three objectives is to reduce the likelihood of flooding in 'at risk' catchments.
...to non-structural initiatives	Strong evidence	The objectives include the development of modelling and monitoring.
FRM objectives consider relevant potential adverse consequences[9] to...		
...human health	No evidence	The objectives do not refer to the reduction of potential adverse consequences.
...economic activity	No evidence	*See above under human health*

[8] Malta subsequently informed that measures related to the reduction of adverse consequences from flood risk were the focus of the National Flood Relief Project (NFRP). Malta explained that the implementation of this project led to the successful reduction of adverse consequences through a number of infrastructural measures in the lower parts of the catchments. The first FRMP complements and builds upon the objectives of the NFRP and focuses on the implementation of upstream measures to reduce the occurrence of storm water runoff further downstream. Therefore, the objectives of the NFRP, of averting increases in risks to life and property and control damages caused by uncontrolled surface water runoff, are inherent in the first FRMP.

[9] Malta subsequently informed that the measures within the first FRMP, both directly and indirectly, aim to address the objectives of the Floods Directive to reduce potential adverse consequences to human health, economic activity, environment and cultural heritage. It was also confirmed that the primary objective for the development of the first FRMP was to reduce such potential adverse consequences.

Criterion	Evidence	Comments
...environment	No evidence	*See above under human health*
...cultural heritage	No evidence	*See above under human health*
Measures have been...		
...identified	Strong evidence	The Plan includes 10 measures to address flood risk, including both ongoing and new measures.
...prioritised	Some evidence	Malta has reported to WISE the priorities of its 10 measures. However, the FRMP itself does not provide information on priorities, nor an indication how they were set, though it does set out a timetable for the 10 measures[10].
Relevant aspects of Article 7 have been taken into account such as...		
...costs & benefits	Some evidence	It is mentioned that a cost benefit assessment has been performed, but no details on the method or its role regarding floods measures are provided[11].
...flood extent	Some evidence	It is mentioned that the FRMP is based on a modelling exercise, taking into account conveyance routes as well as the extent and depth of the floods[12].
...flood conveyance	Some evidence	It is mentioned that the FRMP is based on a modelling exercise, taking into account conveyance routes as well as the extent and depth of the floods.

[10] Malta subsequently informed that the comprehensive approach to the reduction of flood risk adopted in the first FRMP considers all 10 measures proposed in the plan to be equally important for the successful achievement of its objectives. Nonetheless, the measures proposed in the first FRMP are prioritised in terms of order of implementation, given that some measures build upon the implementation of other supporting measures.

[11] Malta subsequently informed that the economic assessment of the measures proposed in the first FRMP was carried out in conjunction with the measures proposed under the second RBMP. This since the measures in the first FRMP are complimentary to the measures within the second RBMP, and therefore a holistic economic assessment was considered to be more relevant.

[12] Malta subsequently informed that the modelling exercise referred to in the first FRMP was developed as part of the NFRP. Flood modelling within the NFRP was specifically developed for the context of the Maltese islands, which are characterised by short term (less than two hours) urban flooding resulting from uncontrolled storm water runoff (primarily occurring within built-up sections of the river beds of dry rivers). Within this context, the modelling exercise identified those streets (conveyance routes) where the depth of the storm water runoff could pose an adverse risk to human health, the environment, cultural heritage and economic activity. It is noted that the identification of the flood risk areas was based on the water level derived from the modelling exercise produced as part of the NFRP. Areas with a water depth above 30cm were considered as significant flood risk areas. In this regard the modelling exercise carried out as part of the NFRP considers the objectives for the management of flood risk as outlined in Article 7.

Criterion	Evidence	Comments
...water retention	Strong evidence	The Plan includes a measure for the assessment of sustainable urban drainage systems (SuDs) and natural water retention measures (NWRMs) and a follow-up measure for their implementation.
...environmental objectives of the WFD	Strong evidence	Malta's FRMP is integrated into its RBMP, and it is stated that work on floods was developed in parallel and are closely coordinated with work on the WFD. It is stated in the reporting sheets that the floods occurring in Malta do not affect the environmental objectives of the WFD.
...spatial planning/land use	Some evidence	The Plan does not explicitly refer to spatial planning or land use as a measure in relation to floods, though the integration of a measure on sustainable urban drainage systems into planning is mentioned.
...nature conservation	No evidence	The Plan does not refer to nature conservation in relation to floods[13].
...navigation/port infrastructure	No evidence	While Malta's overall plan refers to shipping in several sections, this is not in relation to floods.[14]
...likely impact of climate change	Some evidence	The Water Catchment Management Plan includes a section on climate change that briefly discusses potential impacts in terms of seawater flooding and pluvial flooding (heavy rainfall events). A climate check of all measures, including those in the FRMP, is presented. It is indicated that four of the 10 FRMP measures are "aimed at reducing climate change impacts on the occurrence of flooding".
Coordination with other countries ensured in the	Not relevant	No other countries are bordering Malta's UoM/RBD.

[13] Malta subsequently informed that in the context of floods in Malta, nature conservation is not relevant, given that all flooding occurs in urban areas. Nonetheless, the first FRMP includes measure RWH6 which focuses on the rehabilitation of existing rainwater harvesting structures in valleys not only for the augmentation of natural water resource retention but also for the conservation and protection of ecosystems which thrive in these areas.

[14] There are no navigable rivers on the islands.

Criterion	Evidence	Comments
RBD/UoM		
Coordination ensured with WFD	Strong evidence	Both the FRMP and the 2nd RBMP were developed in parallel and closely coordinated. Some measures are listed under both the FRMP and the RBMP Programme of Measures.
Active involvement of interested parties	Some evidence	The FRMP provides little information on mechanisms for the active involvement of interested parties specifically regarding floods, though it does note that meetings were held with stakeholders regarding one measure on sustainable urban drainage systems. General information about the involvement of stakeholders in the common process for the RBMP and FRMP is provided in the main sections of the Water Catchment Management Plan.

Good Practices

The following **good practices** were identified:

Table 3 Good practices in the Maltese FRMP

Topic area	Good practices identified
Setting of objectives for the management of flood risk	One of Malta's objectives sets a specific target (for upstream storage and infiltration capacity).
Planning/implementation of measures and their prioritisation for the achievement of objectives.	The description of measures includes an identification of stakeholders that will be involved in the implementation of measures.
Consideration of climate change in the FRMPs assessed.	Identified measures that support climate change adaptation and reference to Malta's national Climate Change Adaptation Strategy (not in the FRMP though).
Flood risk governance	Malta prepared a single Plan that integrates its RBMP and FRMP, including measures for floods management in the overall programme of measures.

Areas for further development

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

Table 4 Areas for further development in the Maltese FRMP

Topic area	Areas identified for further development
The integration of previously reported information in the FRMPs.	The FRMP does not describe how the PFRA was used in the development of the FHRMs, nor how these maps were used for the preparation of the plan itself, including its objectives and measures[15]. It is not clear if the map of catchments that previously experienced flooding, provided in the FRMP, shows the APSFRs. Links to FHRMs are not provided in the Plan[16].
The setting of objectives for the management of flood risk.	Malta's objectives do not specify the reduction in adverse consequences of flooding (the reduction of likelihood of flooding is specified). For none of the objectives is there an explicit timeframe.[17]
Planning/implementation of measures and their prioritization for the achievement of objectives.	The FRMP does not contain information on the cost of flood risk mitigation measures: Information on the costs of some but not all of these measures is included in chapter 11 of the Water Catchment Management Plan. While the institutional body to monitor implementation of measures is identified, the FRMP does not contain information on the methodology or indicators for monitoring[18]. The FRMP does not provide a methodology to explain the prioritisation of measures reported by Malta to WISE. While the FRMP provides some specific information on measures,

[15] Malta subsequently informed that the development of the PFRA and FHRM was based on previously existing information. The National Flood Relief Project (NFRP) provided the basis for the preliminary assessment of the areas with a potentially significant flood risk and also the development of the flood hazard and flood risk maps. Infrastructure measures to address the specific flooding problems within each of the flood risk areas identified in the FHRM were carried out as part of the NFRP. These measures were not included in the first FRMP given that all planned measures were completed prior to the completion of the FRMP. Subsequently, the first FRMP adopted a catchment-based approach where the flood management measures proposed in the plan are applicable for all of the Maltese islands. The plan also includes measure FLD1 on the modelling of the impact of the infrastructure measures carried out as part of the NFRP on the flood hazard and risk areas to identify the residual flood risk impact in these catchments.

[16] Malta informed subsequently that links to the FHRMs are provided on the Agency's website. https://www.energywateragency.gov.mt/water-framework-directive/

[17] Malta subsequently informed that the timeframe is the implementation of the second RBMP, hence up to 2021.

[18] Malta subsequently informed that the implementation of the measures proposed in the first FRMP is monitored through the Inter-Ministerial committee on water, which oversees the implementation of the water related Directives and ensures the integration of the measures with WFD principles and objectives. Progress on the implementation of the measures is evaluated through specific indicators developed during the meetings of the Inter-Ministerial committee on water.

Topic area	Areas identified for further development
	for the most part this is not sufficient to measure their implementation and results. The location and coverage of all measures is given as the catchment, including for measures that will need to be carried out in specific locations.
The use of cost-benefit analysis in the FRMPs assessed.	An analysis of costs and benefits of measures with regard to their flood mitigation/risk reduction potential was not used in the selection or planning of FRMP measures.
Public consultation.	The public consultation is only briefly described in the Maltese FRMP, which refers to the consultation for the Water Catchment Management Plan as a whole; although the overall consultation for the Water Catchment Management Plan also covered floods, the detailed information on consultation and active involvement of stakeholders in the main document only refers to WFD issues. Consequently, information is not provided on which groups were actively involved regarding floods measures, nor the effects of the consultation on the FRMP.[19]
Flood risk governance	The single Plan, i.e. the Water Catchment Management Plan, mainly targets the requirements of the WFD; although it also addresses obligations under the Floods Directive, its dual role is nevertheless not clearly articulated.

Recommendations

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

- To be able to assess progress, objectives should have an explicit timeframe. What appear to be now implicit links between measures and objectives should become explicit in the second cycle.
- Objectives should explicitly include reducing the adverse consequences of floods.
- The FRMP/Water Catchment Management Plan should provide information on the estimated cost of all flood risk mitigation measures, their prioritisation and the methods for prioritisation; the mechanisms and indicators for monitoring their implementation.
- The methodology for assessing of flood risk mitigation measures in terms of costs and benefits should be presented in the FRMP/the Water Catchment Management Plan..

[19] Malta informed subsequently that because the first FRMP and second RBMP were developed in parallel and both plans contain complimentary measures, the public consultation process of the first FRMP was carried out jointly with that of the second RBMP. Moreover, from a public and stakeholder perspective, flooding in the context of the Maltese islands is a marginal issue (given that the Directive is being applied to a context where storm water temporarily flows in major roads which were built along dry valley beds) and stakeholders are more interested in more pressing issues such as water scarcity and drought.

- The FRMP/Water Catchment Management Plan. should provide more detailed information on the active involvement of stakeholders. It is important to ensure that FRMPs, PFRAs/APSFRs and FHRMs refer to each other as appropriate and that they are continuously available to all concerned and the public in an accessible format, including digitally.

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

1.1 Reporting of the FRMPs

There is one single UoM in Malta, covering the whole country.

Malta did not make use of Article 13.3 of the Floods Directive, which allowed Member States to make use of previous flood risk management plans for the first (provided their content is equivalent to the requirements set out in the Directive).

1.2 Assessment of the FRMPs

Malta reported one FRMP (UoM Code: MTMALTA, UoM Name: Malta), which is integrated as a part of Malta's Second Water Catchment Management Plan[20]: this plan was assessed.

Table 5 UoM assessed in Malta

UoM code	UoM Name
MTMALTA	Malta

[20] The FRMP is part of an annex to the Second Water Catchment Management Plan, titled Management Plans for Extreme Events.

2. Integration of previously reported information

2.1 Conclusions drawn from the preliminary flood risk assessment

The conclusions of the PRFA are briefly presented in the FRMP[21]. This includes a summary map showing 'catchments that experienced previous surface water flooding'. It is not explicitly stated if the map shows areas of potential significant flood risk (APSFRs).[22] The FRMP provides a textual description of the methodology employed and the results of previous steps.

No links to web-based maps of the APSFRs were provided, however.

While the FRMP does not refer explicitly to conveyance routes, it explains that floods in Malta are the result of storm events during which the dry valley channels adopt their natural function as a storm water 'culvert', conveying '…uncontrolled surface water for a very short period (less than 2 hours)… throughout the urban areas… for eventual discharge at the coastal zone'.

2.1.1 Coordination with neighbouring Member States on shared RBDs/UoMs

As an island country, Malta does not have any neighbouring Member States.

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

The FRMP explains that a modelling exercise carried out as part of the National Flood Relief Project (NFRP) provided the basis for the preparation of flood risk and hazard maps[23]. The objective of this project was to avert increases in risks to life and property and control damages caused by uncontrolled surface water runoff in the four priority catchment basins of Msida, Gzira, Qormi and Marsaskala. The modelling exercise provided information on the extent and depth of the floods based upon a one in five-year event storm scenario and this provides the basis for the information presented in the Flood Hazard Maps.

---

[21] Management Plans for Extreme Events, Section 3.2.

[22] Malta subsequently informed that the map shown in Section 3.2 of the first FRMP illustrates the extent of catchments which had previously experienced temporary flooding from uncontrolled storm water runoff but does not distinguish whether flooding within these catchments was significant or not. The catchments which contain areas with a potential significant flood risk are: Marsa Catchment, Birkirkara-Msida Catchment, Gzira Catchment and Marsaskala Catchment. It is noted that the identification of the flood risk areas within these four catchments was based on the water level derived from the modelling exercise carried out as part of the NFRP. Areas with a water depth above 30cm were considered as significant flood risk areas.

[23] Management Plans for Extreme Events Section 3.3.

The FRMP does not, however, explicitly describe how the PFRA was used in the development of the FHRMs.[24]

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

The FRMP presents an example map of a 'Flood Risk Area', but otherwise does not provide a presentation of flood hazard and flood risk maps[25] [26].

While the FRMP does not provide links to the FHRMs, these can be found on one of the web pages providing the Plan: https://www.energywateragency.gov.mt/water-framework-directive/.

2.2.1 Maps for shared flood risk areas

There are no shared flood risk areas with other Member States.

2.2.2 Conclusions drawn from the flood hazard and flood risk maps

The FRMP does not indicate how the FHRM were used for the development of flood management objectives, measures or other elements of the FRMP.[27]

2.3 Changes to the APSFRs or other Flood Risk Areas

The assessment looked for information on changes in the identification of APSFRs or since December 2011, or in the FHRMs since December 2013, indicated in the FRMP. No references to changes were found in Malta's Plan.

---

[24] Malta subsequently informed that the development of the PFRA and FHRM was based on previously existing information. The NFRP provided the basis for the preliminary assessment of the areas with a potentially significant flood risk and also the development of the flood hazard and flood risk maps.

[25] Management Plans for Extreme Events, Fig. 7.

[26] Malta subsequently informed that the existing information made available through the NFRP was utilised in order to develop the FHRMs. A re-evaluation of the existing FHRMs is currently being undertaken as part of the PFRA.

[27] Malta subsequently informed that the development of the FHRM was based on the already existing information provided through the NFRP. The NFRP included an extensive hydrological modelling exercise to identify the best suite of infrastructure measures which needed to be adopted to mitigate flood risk in a number of flood prone areas. These measures were implemented through the NFRP prior to the completion of the FRMP and therefore were not included in the first FRMP.
The measures proposed in the first FRMP continue to build on the infrastructure measures implemented through the NFRP and also adopt a wider approach to flood management in Malta. Whereas the focus of the NFRP was to avert the immediate risk of storm water runoff in the low lying urban areas through infrastructural measures, the first FRMP adopts a catchment scale approach where the management of storm water runoff is considered at the catchment scale, whilst also considering the potential utilisation of these waters. The flood management objectives of the measures proposed in the first FRMP are specified in Section 3.4 of the Plan.

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

There is no information about Malta in the earlier assessment as the country was late with the reporting of the FHRMs.

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

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

- The FRMP does not describe how the PFRA was used in the development of the FHRMs, nor how these maps were used for the preparation of the plan itself, including its objectives and measures.
- It is not clear if the map of catchments that previously experienced flooding, provided in the FRMP, shows the APSFRs. Links to FHRMs are not provided in the Plan.

3. Setting of Objectives

3.1 Focus of objectives

The Maltese flood risk objectives[28] refer to:

- The development of a modelling framework;
- Focus on the reduction of the likelihood of flooding in identified 'at risk' catchments through the adoption of upstream water management measures such as Rainwater Harvesting and Sustainable Urban Drainage Systems;
- The introduction of water level monitoring facilities.

These objectives apply to the FRMPs assessed. Consequently, in the FRMPs assessed[29]:

- The objectives aim to reduce the likelihood of flooding[30]
- The objectives refer to measures that will be implemented
- The objectives refer to non-structural measures[31]

3.2 Specific and measurable objectives

Malta's FRMP sets a target related to its second objective: the development of 1.5 m cubic metres of upstream storage and infiltration capacity[32]. The other two objectives refer to specific activities. Consequently, all three objectives are measurable. None of the objectives, however, set a timeframe.[33]

3.3 Objectives to reduce adverse consequences from floods

The objectives do not refer to the reduction in adverse consequences from floods, though it appears to be an unstated goal as the Maltese FRMP refers to the National Floods Relief Project[34], which had the objective "to avert increases in risks to life and property and control damages caused by uncontrolled surface water runoff"[35]. There is no reference, however, to the

---

[28] Management Plans for Extreme Events, Section 3.4.
[29] These categories are included in Art. 7 of the Floods Directive.
[30] 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.
[31] Non-structural measures include measures such as flood forecasting and raising awareness of flooding as well as land use planning, economic instruments and insurance.
[32] Management Plans for Extreme Events, Section 3.4.
[33] Malta subsequently informed that the achievement of the objectives of the first FRMP is inherently tied to the implementation of the Water Catchment Management Plan and its measures. The implementation timetable for the measures is that of the Plan (i.e. until 2021).
[34] https://mtip.gov.mt/en/Pages/WASD/PROJECTS/Rainwater-Flood-Relief-Project.aspx
[35] Malta subsequently informed that the measures within the first FRMP, both directly and indirectly, address the objectives of the Floods Directive to reduce potential adverse consequences to human health, economic

components set out in Article 7(2) of the Floods Directive (human health, environment, cultural heritage and economic activity).

3.4 Objectives to address the reduction of the likelihood of flooding

The second objective calls for the reduction of the likelihood of flooding. Consequently, the objectives also address flood risk. [36]

3.5 Process for setting the objectives

There is no information provided on the process Malta followed to set the objectives, neither what was considered when setting the objectives nor the bodies involved.[37]

3.6 Good practices and areas for further development regarding setting objectives

The following **good practice** was identified:

- One of Malta's objectives sets a specific target (for upstream storage and infiltration capacity).

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

- Malta's objectives do not specify the reduction in adverse consequences of flooding.
- None of the objectives sets a timeframe.

---

activity, environment and cultural heritage. It was also confirmed that the primary objective for the development of the first FRMP was to reduce such potential adverse consequences.

[36] 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.

[37] Malta subsequently informed that the process followed for the establishing of flood management objectives involved a two staged process whereby in the first part the focus was to avert the immediate risk of storm water runoff in low lying urban areas through the implementation of infrastructural measures. These measures were completed through the NFRP prior to the development of the first FRMP and therefore were not included in the plan.

The second stage focused on the development of a more resilient catchment scale approach to flood risk aversion through the following objectives:

- The development of a modelling framework for the comprehensive assessment of the risk to flooding in all water catchment areas in the Maltese islands;
- The adoption of upstream water management measures such as rainwater harvesting and sustainable urban drainage systems;
- The introduction of water level monitoring facilities to optimise the monitoring of flood events
- The above objectives guided the development of the establishment of the flood management objectives of the first FRMP.

4. Planned measures for the achievement of objectives

Malta reported 10 individual measures and no aggregated[38] measures[39]. In terms of the aspects of flood risk management, Malta reported five prevention measures, all under EU measure type M24[40]; four preparedness measures (two each for EU measure types M41[41] and M44[42]); and one "no action" measure[43].

Malta's FRMP also indicates 10 measures, but these are presented in a different categorisation – direct, indirect and supporting measures – whose links with Malta's reporting is not clear for all measures.

4.1 Cost of measures

Although the FRMP does not report the costs of flood risk mitigation measures, information on the costs of some of these measures is included in chapter 11 of the Water Catchment Management Plan: this the case in particular for measures that address both the Floods Directive and the Water Framework Directive (e.g. measure GWM4, Development of managed aquifer recharge schemes).

4.2 Funding of measures

The RBMP lists funding sources for the flood management measures. These include: national resources, EU structural funds (the Cohesion Fund, ERDF and specifically the INTERREG Programme are indicated) as well as the EU LIFE Programme and the EU Horizon 2020 Programme.[44]

---

[38] 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.

[39] 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.

[40] 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...).

[41] Preparedness, Flood Forecasting and Warning, Measure to establish or enhance a flood forecasting or warning system.

[42] Preparedness, Other preparedness, Other measure to establish or enhance preparedness for flood events to reduce adverse consequences.

[43] Malta subsequently informed that the "no action" measure in the FRMP (measure FLD1), should be classified as measure type 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...), it was misreported on WISE.

[44] Second Water Catchment Plan, table 11.7, pp. 514-518.

Table 6 Funding of measures

	All UoMs
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	
Other *	✓

Notes: Other in Malta includes: EU LIFE Programme, EU Horizon 2020 Programme.

4.3 Measurable and specific (including location) measures

Malta's FRMP provides a description of each measure[45] with brief information on:

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

For all measures, the location is indicated as the entire Water Catchment District (i.e. the whole UoM), even for measures which are expected to be carried out in specific locations (e.g. implementation of Sustainable Urban Drainage Systems and Natural Water Retention Measures).[46]

The measures in the FRMP are only partly specific or measurable.[47]

[45] Section 3.5

[46] Malta subsequently informed that Flood Management in Malta is carried out at the river basin scale and therefore all the measures are applicable for the entire Malta River Basin District. This holistic approach to flood management also ensures better integration with the implementation of the RBMP and the achievement of the WFD objectives.
For specific measures, such as FLD4 – Implementation of Sustainable Urban Drainage Systems and Natural Water Retention Measures and RWH6 – Rehabilitation of existing rainwater harvesting dam structures in valleys the actual location of where these measures shall be implemented will be determined throughout the implementation of the measures.

[47] Malta subsequently informed that measurable indicators for each of the measures (where applicable) in the first FRMP were set by the Inter-ministerial Committee on Water during the meetings on the implementation of the measures planned as part of the Water Framework and Floods Directives.

4.4 Measures and objectives

The descriptions of the measures do not provide clear links to the FRMP's objectives[48]. Nonetheless, as explained in section 3, some of Malta's objectives refer to specific initiatives, such as modelling and monitoring. Consequently, although it is not stated it can be assumed that completion of the first measure in the FRMP, on modelling, should achieve the objective to develop a modelling framework (see section 3)[49].

4.5 Geographic coverage/scale of measures

Malta reported that the location of all ten measures and their geographic coverage is at UoM/national level. As noted above, this includes measures that would appear to be carried out in more specific locations.

4.6 Prioritisation of measures

Malta has reported on the prioritisation of its measures:

- One of the ten measures (for preparedness) is indicated as critical priority.
- Five measures are indicated as high priority: two prevention measures, preparedness measures and the one no action measure.
- Four measures are indicated of moderate priority, three for prevention and one for preparedness.

While the main sections of the Water Catchment Management Plan refer briefly to the prioritisation of its WFD measures, no indication was found on the method for prioritising the floods measures.[50] The Plan does, however, set out a timetable for the implementation start

[48] Section 3.5.

[49] Malta subsequently informed that each of management objectives of the first FRMP is linked to flood management measures:
Objective 1: Development of a modelling framework for the comprehensive assessment of the risk to flooding in all water catchment areas on the Maltese islands (Measures FLD1 and FLD2).
Objective 2: Increase the adoption of upstream water management measures such as rainwater harvesting and sustainable urban drainage systems (Measures FLD3, FLD4, RWH1, RWH6, GWM4).
Objective 3: Introduce water level monitoring facilities to optimise the monitoring of flood events (Measures GVN1, RWH2, MDM1).

[50] Malta subsequently informed that the comprehensive approach to the reduction of flood risk adopted in the first FRMP considers all 10 measures proposed in the plan to be equally important for the successful achievement of its objectives. Nonetheless, Malta notes that the measures proposed in the first FRMP are prioritised in terms of order of implementation given that some measures build upon the implementation of other supporting measures.

dates of the measures (and states that the implementation of the respective measures is envisaged to be staggered over the six-year catchment management cycle)[51]:

- One measure in 2016;
- Five measures in 2017;
- Two measures in 2018;
- One measure each in 2019 and 2020.

The detailed description of the measures includes an estimation of completion dates of the measures (one each by 2017, 2018 and 2019, while for seven measures the implementation will be continued throughout the second catchment planning period).[52]

4.7 Authorities responsible for implementation of measures

In its reporting to WISE, Malta indicated the same responsible authority for all measures, i.e. the Energy and Water Agency (EWA)[53], which is an authority at the national level.

In the FRMP, in contrast, another government agency is listed for each measure as the lead entity responsible for implementation, the Sustainable Energy and Water Conservation Unit (SEWCU)[54] [55]. The FRMP also indicates for each measure stakeholders that would need to be involved in the process, without indicating their specific roles or responsibilities[56]. For example, the measure "Modelling the impact of the National Flood Relief Project on flood hazard and risk in identified catchments" has the following information regarding stakeholder participation:

- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI);
- The Environment and Resources Authority (ERA);
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz);
- The Planning Authority (PA);
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI);

---

51 Section 3.6.
52 Section 3.5.
53 https://www.energywateragency.gov.mt/water/
54 https://energy.gov.mt/mt/Pages/sewcu.aspx
55 Malta subsequently informed that the Sustainable Energy and Water Conservation Unit (SEWCU) legally changed its name to the Energy and Water Agency (EWA) as established by Subsidiary Legislation 497.08. Any reference to SEWCU should therefore be construed as a reference to the EWA. http://justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=12154&l=1
56 Section 3.5.

- Transport Malta (TM);
- The Civil Protection Department (CPD);
- Local Councils.

4.8 Progress of implementation of measures

Malta has reported on the process of implementation of all its measures. All ten measures are classified as an ongoing process.

4.9 Measures taken under other Community Acts

Member States have been asked to report on other Community Acts under which each measure has been implemented: Malta has not provided such information, however, in its reporting sheets.[57]

In Malta's Plan, all ten measures listed for floods are also found in the main sections of the Water Catchment Management Plan among the measures for the WFD[58].

The FRMP does not refer to other Community Acts, and it does not appear that any of the ten floods measures are linked to, among others, the Seveso or the EIA Directives.

4.10 Specific groups of measures[59]

None of the ten measures explicitly refers to **spatial planning** or **land use** actions for addressing flood risks. One measure (FLD3) includes spatial planning aspects: specifically, developing guidance at the national and local level for better adoption of Sustainable Urban Drainage Systems in planning[60].

The FRMP has two measures for **natural water retention**, one for an assessment of 'Sustainable Urban Drainage Systems and Natural Water Retention Measures to mitigate flood

[57] Malta subsequently informed that reporting on other Community Acts under which the measures have been implemented was optional and that it was up to the Member States to decide whether such reporting was of relevance to the measures being implemented.

[58] Second Water Catchment Plan, Table 9.3, p. 429; FRMP Annex

[59] Section 3.5

[60] Malta subsequently informed that Measure FLD3 – Comprehensive assessment for the inclusion of Sustainable Urban Drainage Systems and Natural Water Retention Measures to Mitigate Flood Hazard and Risk will seek the development of a master plan identifying the potential inclusion of Sustainable Urban Drainage Systems and Natural Water Retention Measures in the urban and rural framework of the Maltese islands. This masterplan will identify how such measures can be undertaken on a national level. Furthermore, this measure, in collaboration with the Planning Authority, will develop a planning guidance document to better guide the adoption and inclusion of Sustainable Urban Drainage Systems at the local planning scale.
Malta moreover noted that the first FRMP is also aligned with the objectives of the Strategic Plan for Environment and Development on the promotion and adoption of sustainable drainage systems to reduce the volume of rainwater runoff and the promotion of rainwater harvesting.

hazard and risk' (FLD3) and another for their implementation (FLD4). The description does not indicate, however, which types of Sustainable Urban Drainage Systems or NWRMs are to be considered[61].

None of the measures in the FRMP specifically considers **nature conservation**, and this is not indicated as an issue considered in preparing the plan.[62]

No floods measures specifically consider **ports and navigation** (the main sections of the Water Catchment Management Plan addresses shipping in its WFD measures, however there are no navigable rivers).

No reference has been found in the FRMP assessed to **dredging** to increase the river channel capacity and its ability to convey water for flood alleviation purposes: based on the description of Malta's surface waters and flood risks, this is not relevant.

4.11 Recovery from and resilience to flooding

The role of insurance policies is not discussed in the Maltese FRMP.

4.12 Monitoring progress in implementing the FRMP

In its reporting sheets, Malta states that an Inter-Ministerial Committee on Water (IMC) will be established to monitor the implementation of both WFD and floods measures. While the responsibilities of the Committee are outlined, it is not explained how the progress is measured or evaluated.[63]

The main sections of the Water Catchment Management Plan note that an initial Inter-Ministerial Committee on Water was set up for the first RBMP. For the new Plan, the

[61] Malta subsequently informed that the identification of the SUDS or NWRMs to be considered will be identified "*during the implementation of the measure*" and that different methods might be applicable depending on the location.

[62] Malta subsequently informed that the context of floods within Malta is not relevant in terms of nature conservation given that all flooding occurs in urban areas. Nonetheless the first FRMP includes measure RWH6 which focuses on the rehabilitation of existing rainwater harvesting structures in valleys not only for the augmentation of natural water resource retention but also for the conservation and protection of ecosystems which thrive in these areas.

[63] Malta subsequently informed that the implementation of the measures proposed in the first FRMP is monitored through the Inter-Ministerial committee on water, which oversees the implementation of the water related directives and ensures the integration of the measures with WFD principles and objectives. Progress on the implementation of the measures is evaluated through specific indicators developed during the meetings of the Inter-Ministerial committee on water.

Committee will establish sub-committees that will work with local entities and stakeholders; it is not specified, however, if a sub-committee will focus on floods[64] [65].

Neither the reporting sheets nor the FRMP indicate that a baseline has been established against which progress will be monitored and assessed[66].

4.13 Coordination with the Water Framework Directive

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

Table 7 Coordination of the development of the FRMP with the development of the second River Basin Management Plans of the WFD

	MTMALTA
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 Floods Directive were considered in the preparation of the RBMPs [a]	✓
Planning of win-win and no-regret measures in the FRMP	✓
The RBMP PoM includes win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and NWRMs [a]	✓
Permitting or consenting of flood risk activities (e.g. dredging, flood defence maintenance or construction) requires prior consideration of WFD objectives and RBMPs[67]	
Natural water retention and green infrastructure measures have been included	
Consistent and compliant application of WFD Article 7 and designation of heavily modified water bodies with measures taken under the FD e.g. flood defence infrastructure[68]	
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]	✓

[64] Second Water Catchment Plan, Section 14, pp. 547-8.

[65] Malta subsequently informed that for the time being, due to the marginal importance of floods in Malta, the IMC has not considered necessary to establish a sub-committee specifically focusing on floods. This is an option which however can be considered by the Committee throughout the implementation of the first FRMP depending on the challenges encountered and specific topics being considered. Tthe tasks of the IMC on water include: i) the overall review of the progress and implementation of the measures; ii) the establishment of (where relevant) of Key Performance indicators; iii) the monitoring of the progress made towards the achievement of the Key Performance Indicators and iv) Proposing administrative measures and solutions to address any issues arising during the implementation of the measures.

[66] Malta informed subsequently that everything produced as part of the implementation of the FD (i.e. PFRA, APSFR, FHRMs and FRPM) constitutes a baseline by which progress towards the achievement of the flood management objectives can be assessed.

[67] Malta subsequently informed that measures related to flood risk activities which require permitting (such as dredging) are not relevant to Malta's context.

[68] Malta subsequently informed that measures related to the application of Article 7 of the WFD are not relevant to Malta's context.

	MTMALTA
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[69]	✓

Notes: [a] based on reporting under the WFD

Malta produced a single document covering the whole UoM: This document is Malta's Second Water Catchment Management Plan, which provides the second River Basin Management Plan (RBMP) under the WFD - and the first FRMP. Several sections in the main text of the second Water Catchment Management Plan mention floods, and flood measures are included in the programme of measures for the Water Catchment Management Plan. Some measures identified in the FRMP are also relevant for the RBMP (e.g. measures for rainwater harvesting, groundwater management and governance). The main text on floods, however, is part of a short Annex to the main document. It is stated that the development of the FRMP has been closely coordinated with the implementation of the WFD.

All ten FRMP measures are part of the second RBMP/the WFD's PoM.

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

The following **good practices** were identified:

- The description of measures includes an identification of stakeholders that will be involved in their implementation of measures.
- The single Plan for the RBMP and FRMP integrates measures for floods management with measures under the WFD.

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

- The FRMP does not contain information on the cost of measures; information on the costs of some but not all flood management relevant measures is provided in chapter 11 of the Water Catchment Management Plan.
- While the institutional body to monitor implementation of measures is identified, the FRMP does not contain information on the methodology or indicators for monitoring.

[69] Malta subsequently informed that the coordinated development and implementation of the first FRMP and second RBMP will ensure that, where applicable, the use of SUDS is coordinated in such a way to favour the achievement of the environmental objectives of the WFD. The utilisation of SUDS in Malta's context needs to be considered comprehensively within the objectives of the second RBMP given that they contribute towards increased infiltration and hence contribute towards the achievement of the good quantitative status objectives of the WFD. It is also clarified that the planned adoption of SUDS will not involve the construction of wetlands.

- The FRMP does not provide a methodology to explain the prioritisation of measures reported by Malta to WISE.
- While the FRMP provides some specific information on measures, for the most part this may prove insufficient to measure their implementation and results.[70]

[70] Malta subsequently informed that the specific location where the measures will be implemented shall be identified during the implementation phase.

5. Consideration of climate change

The main text of the Second Water Catchment Management Plan discusses potential climate change impacts[71]: an increase in heavy rainfall events leading to flooding is foreseen; a change in storm surges is not anticipated[72]; sea-level rise is expected as a long-term change, though trends since 1961 have varied.

The Second Water Catchment Management Plan refers to Malta's national Climate Change Adaptation Strategy, published in May 2012[73], stating for example that the monitoring of the implementation of measures will track integration with this as well as other plans[74]. The FRMP Annex, however, does not cite this Strategy[75].

5.1 Specific measures to address expected effects of climate change

Malta's reporting sheets state that four of the ten measures are "aimed at reducing climate change impacts on the occurrence of flooding" (this information is also found in chapter 12 of the Water Catchment Management Plan, though not in the Annex/FRMP). These are:

- The implementation of Sustainable Urban Drainage Systems and Natural Water Retention Measures.[76]
- Survey of the status of existing rainwater runoff harvesting infrastructure, identification of potential users of rainwater harvested in these infrastructures, undertaking of rehabilitation works and development of a management framework to ensure the effective use of harvested rainwater runoff.[77]
- Rehabilitation of existing rainwater harvesting dam structures in valleys.[78]
- Development of Managed Aquifer Recharge schemes for aquifer management purposes.[79]

5.2 Good practices and areas for further development concerning climate change

The following **good practices** were identified:

---

[71] Section 12 of the Water Catchment Management Plan, p. 523.
[72] The Plan cites a 2013 EEA assessment that forecasts a decrease in storm surges in the Mediterranean.
[73] https://www.gov.mt/en/Government/Publications/Documents/MSDEC/National%20Adaptation%20Strategy.pdf
[74] Second Water Catchment Management Plan, p. 547.
[75] Malta subsequently informed that the National Climate Change Adaptation Strategy is by extension also applicable to the first FRMP since the first FRMP and second RBMP were developed concurrently and therefore should be considered as an integrated plan.
[76] Maltese measure number FLD4.
[77] Maltese measure number RWH1.
[78] Maltese measure number RWH6.
[79] Maltese measure number GWM4.

- Malta's overall Plan provides a brief overview of expected climate impacts for flood events.
- Malta has identified measures that support climate change adaptation (though this is specified in the reporting sheets and in chapter 12 of the Water Catchment Management Plan, not the Annex/FRMP itself).

6. Cost-benefit analysis

It is unclear whether and how a cost-benefit analysis was used in selecting, prioritising and planning of flood protection measures in Malta[80].

Malta's reporting sheets state that a "comprehensive assessment of the costs and benefits of the measures" was carried out in the frame of the second RBMP. No further details are provided the FRMP itself. As noted in section 4, information on the costs of some but not all flood measures is included in chapter 11 of the Water Catchment Management Plan (this is the case in particular for measures listed under both the FRMP and the RBMP PoM).[81] [82].

It appears that benefits of flood protection measures have not been calculated. In section 11.4 of the Water Catchment Management Plan, where the flood measures are discussed along with RBMP measures, it is stated that '...(the assessed) measures have other social and economic benefits that have not been included in this analysis, such as reducing the damage from storm water runoff and the prevention of loss of lives from flood events…'.

It is thus unclear whether and for which types of flood measures cost-benefit or cost-effectiveness analysis has been used.

6.1 Good practices and areas for further development

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

---

[80] Malta subsequently informed that the economic assessment of the measures proposed in the first FRMP was carried out in conjunction with the measures proposed under the second RBMP. Since the measures in the first FRMP are complimentary to the measures within the second RBMP, a holistic economic assessment was considered to be more relevant. The identification and prioritisation of all the measures in the RBMP and the FRMP was undertaken by means of a cost-benefit assessment covering:

- Capital expenditure;
- Operational costs;
- Potential revenues and cost savings;
- Externality elements as valued primarily through emissions and resource costs.

Malta moreover noted that it is to be appreciated that the above elements, though exhaustive from an analytical point of view, cannot capture all the potential benefits from the implementation of the measures. In effect, all measures considered in the RBMP feature positive net effects except for those having a strong innovative and demonstration value, which are however still worth implementing from a policy perspective. Finally, since the funds available were sufficient to cover the implementation of all measures assessed for the purpose for the first FRMP, the decision was taken to include all measures in the implementation programme.

[81] Second Water Catchment Management Plan, section 11.2, pp. 500-522.

[82] Malta informed subsequently that it does not have any rivers in the classical sense and therefore there are no surface waters which can contribute to the development of floods arising from fluvial flooding due to their physical characteristics: The length of the water courses ranges from 0.6km to 1.7km, whereas the depth of the channels ranges from 1cm to 25cm. These three water courses reported in the second RBMP are not significant in terms of flooding due to their very small and intermittent flows, but are considered in the Plan in terms of their ecological importance.

- It is not clear whether or how an analysis of costs and benefits was used in the selection or planning of FRMP measures.

7. Governance including administrative arrangements, public information and consultation

7.1 Competent authorities

There were no updates made to the Competent Authorities or the Unit of Management. Malta has not reported any changes to the competent authority's roles and responsibilities in WISE since 2012.

7.2 Public information and consultation

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

Table 8 Methods used to inform the public and interested parties of the FRMP

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

Source: FRMP

The public consultation process supporting the development of the first Flood Risk Management Plan was undertaken within the development framework of the second Water Catchment Management Plan, meaning the consultation on the FRMP was integrated into the consultation on the RBMP.

The draft Water Catchment Management Plan was available via Internet. While other information activities were carried out for the Plan as a whole, it is not clear if these included the FRMP[83].

The FRMP itself[84] and Malta's reporting sheets refer to information meetings on the application of Sustainable Urban Drainage Systems (SUDS): these were organised for the

[83] Malta subsequently informed that flood issues were discussed and measures were developed with the contribution of interested stakeholders, despite the specific context of floods in the case of Malta.

[84] Management Plan for Extreme Events, section 3.7.

public and stakeholders by the Local Councils Association under an EU project, E^2STORMED.

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

Table 9 Methods used for the actual consultation

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

Source: FRMP

As noted above, information meetings were held on Sustainable Urban Drainage Systems. It can be noted that the main text of the Second Water Catchment Management Plan provides a description of several consultation meetings with stakeholders on the WFD aspects of the Plan; however, issues and measures for flood management are not mentioned in these pages[85, 86].

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

Table 10 Methods used to provide the documents for the consultation

	MTMALTA
Downloadable [87]	
Direct mailing (e-mail)	✓
Direct mailing (post)	
Paper copies distributed at exhibitions	
Paper copies available in municipal buildings (town hall, library etc.)	
Paper copies at the main office of the competent authority	

Source: FRMP

[85] Second Water Catchment Management Plan, section 13, pp. 534-546.

[86] Malta subsequently added that the consultation process was further supported by the Local Councils Association through the E2STORMED project (Improvement of energy efficiency in the water cycle by the use of innovative storm water management in smart Mediterranean cities). In these consultation meetings, issues and measures for flood management were discussed in the light of water scarcity and the promotion of natural water retention measures given that water scarcity and the lack of naturally available water resources is a more pertinent topic to stakeholders.

[87] Malta subsequently informed that the first FRMP, together with the second RBMP was available for downloading on the Agency's website throughout the whole consultation process.

As noted above, a web page was created to provide documents and information for the consultation of the Second Water Catchment Management Plan. Specific information regarding the FRMP was not found at the time of the assessment.[88]

7.3 Active involvement of Stakeholders

The table below shows the groups of **stakeholders** that have been actively involved in and reported to WISE specifically for the development of the FRMP:[89]

Table 11 Groups of stakeholders

	MTMALTA
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	

[88] Malta subsequently informed that the fully integrated first FRMP and second RBMP were made available for downloading as one plan from the Agency's website throughout the public consultation process. Moreover, a separate document specifically focusing on the management of extreme events (which includes both drought and flood events) is also available for downloading from the Agency's website. This is also in view of the high relevance of Water Scarcity and Droughts to the Maltese context. It is furthermore noted that the administrative arrangements relevant to the second RBMP also apply to the FRMP.

[89] Malta subsequently informed that as part of the combined WFD-FD-consultation process, the groups of stakeholders that were involved included:

- Civil Protection Authorities such as Government department responsible for emergency planning and coordination of response actions (Civil Protection Department);
- Flood Warning / Defence Authorities (Marine, Storm Water and Valley Management Unit within the Ministry for Transport, Infrastructure and Capital Projects);
- Drainage Authorities (Environment and Resources Authority);
- Water Supply and Sanitation (Water Services Corporation and the Superintendence of Public Health);
- Agriculture / farmers (Agricultural Department within the Ministry for Sustainable Development, the Environment and Climate Change);
- Energy / Hydropower (Energy Directorate within the Energy and Water Agency);
- Navigation / ports (Transport Malta);
- Local / Regional Authorities (Local Councils Association);
- Academia / Research Institutions (University of Malta).

Source: FRMP

As noted above, meetings were held on SUDS with the Local Councils Association. The FRMP does not indicate the specific stakeholders involved, however.

While the main sections of the Water Catchment Management Plan describe detailed discussions with groups of stakeholders on key aspects of the RBMP, issues related to the FRMP are not mentioned among the topics addressed[90] [91].

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

Table 12 Mechanisms used to ensure the active involvement of stakeholders

	MTMALTA
Regular exhibitions	
Establishment of advisory groups	
Involvement in drafting	
Workshops and technical meetings	✓
Formation of alliances	
Information days	

Source: FRMP

Though, as noted above, the main sections of the Water Catchment Management Plan describe the involvement of stakeholders, the only information found in the FRMP and Malta's reporting sheets on involvement related to floods issues concerns the meetings on SUDS.

[90] Second Water Catchment Management Plan, section 13, pp. 534-546.

[91] Malta subsequently informed that flood management was included in the range of topics on which discussions with stakeholders were pursued. Discussions on flood related topics focused more on measures to improve the existing water storage infrastructure and the enabling of natural and artificial recharge. This enabled a broader integration of flood management measures in the second RBMP since most of the identified measures have a dual function – that of mitigating flood risk and also addressing water scarcity and drought through increasing water storage for eventual use and increasing infiltration to groundwater. For example, measures related to rainwater harvesting infrastructure are primarily considered in terms of water storage and its use, whilst SUDSs and NWRMs are considered in terms of increasing recharge to groundwater. Hence, consultation on flood management was undertaken within a context of Integrated Water Resource Management where the multi-beneficial impact of measures was considered. In this regard, the main emphasis of stakeholders was on water scarcity mitigation, which is understandable, given that this is the main challenge of Malta.

7.4 Effects of consultation

There is no information in the FRMP or the reporting sheets on the effects of the consultation[92].

7.5 Strategic Environmental Assessment

Malta's reporting under the WFD indicated that no SEA procedure was carried out for the Second Water Catchment Plan[93].

7.6 Good practices and areas for further development regarding Governance

The following **good practice** was identified:

- Malta organised stakeholder meetings for one of the measures to be carried out under the FRMP, Sustainable Urban Drainage Systems.

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

- Public consultation is only briefly described in the Maltese FRMP, which refers to the consultation for the Water Catchment Management Plan as a whole; although the overall consultation for the Water Catchment Management Plan covered floods, the detailed information on consultation and active involvement of stakeholders in the main document only refers to WFD issues. Consequently, information is not provided on which groups were actually actively involved regarding floods measures, nor the effects of the consultation on the FRMP.

[92] Malta subsequently explained that during the public consultation exercise stakeholders were more interested in measures alleviating the impact of water scarcity. Hence, stakeholders gave more attention to the storage capacity of water from the point of view of the eventual use of the water than from its flood mitigation function and similarly placed more emphasis on the recharge augmentation functions of SUDSs and NWRMs. As a result of the stakeholder consultation exercise it was decided to integrate the Drought Risk and the Flood Risk Management Plans.

[93] Malta subsequently informed that with regards to the SEA Directive, an SEA screening exercise on the second RBMP was undertaken in 2015. The results of this screening exercise confirmed that an SEA is not required because the second RBMP is unlikely to lead to additional significant environmental effects over and above those positive effects which were defined and assessed in the SEA which was carried out for the first RBMP. In addition, the main measures foreseen under the second RBMP were assessed under the SEA process carried out for the Operational Programme for Malta, under which all these main measures are identified. Malta further noted that the above conclusion was communicated during the public consultation process, and is publicly available: https://era.org.mt/en/Documents/SEA_Screening_second_RBMP.pdf

Annex A: Supplementary tables and charts on measures

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

Background & method

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

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

On the basis of the reporting guidance (which in turn is based on the Floods Directive)[94], 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.

[94] 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[95] 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

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

List of Annex A tables & figures

Measures overview

Table A1: Total number of measures

Number of individual measures	10
Number of individual measures including measures which have been allocated to more than one measure type	10
Number of aggregated measures	0
Number of aggregated measures including measures which have been allocated to more than one measure type	0
Total number of measures	10
Total number of measures including measures which have been allocated to more than one measure type	10
Range of number of measures between UoMs including measures which have been allocated to more than one measure type (Min-Max)	0
Average number of measures across UoMs including measures which have been allocated to more than one measure type	10

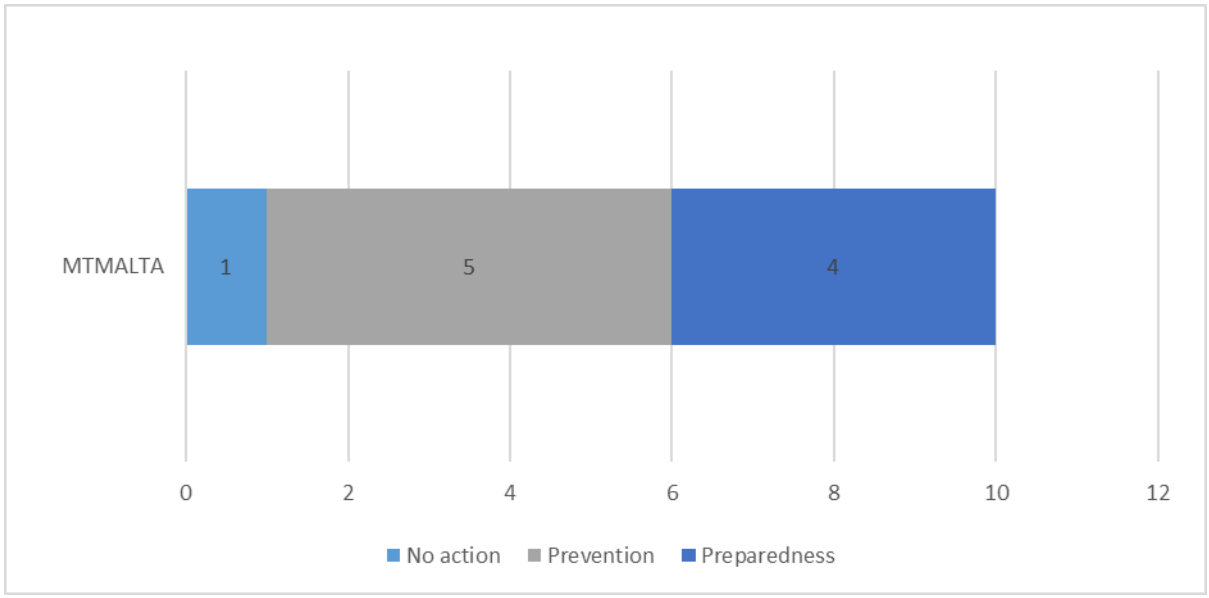
Table A2: Number of individual measures per measure type and UoM

	No action	**Total**	**Prevention**	**Total**	**Preparedness**		**Total**	**Grand Total**
	M11		**M24**		**M41**	**M44**		
MTMALTA	**1**	1	5	5	2	2	**4**	**10**
Grand Total	**1**	**1**	**5**	**5**	**2**	**2**	**4**	**10**

Notes: All measures are individual measures as Malta did not report any aggregated measures. Measure codes and aspects are described above.

The information in Table A2 is visualised in Figure A1 below:

Figure A1: Number of total measures by measure aspect



Notes: All measures are individual as Malta did not report any aggregated measures.

Measure details: cost

Member States were requested to report information on:

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

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

Measure details: name & location

Member States were requested to report information on the following:

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

Location of measures

Malta reported the same location (the entire RBD of Malta) for all measures i.e. the UoM.

Geographic coverage

Malta reported the same geographic coverage (the entire RBD of Malta) for all measures i.e. national coverage.

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

Malta did not provide information about the objectives of the measures in the reporting sheets.

Category of priority

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

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

Table A3: Category of priority by measure aspect

	Critical	High	Moderate	Grand Total
No action		1		1
Prevention		2	3	5
Preparedness	1	2	1	4
Grand Total	**1**	**5**	**4**	**10**

Figure A2: Visualisation of Table A3: Category of priority by measure aspect

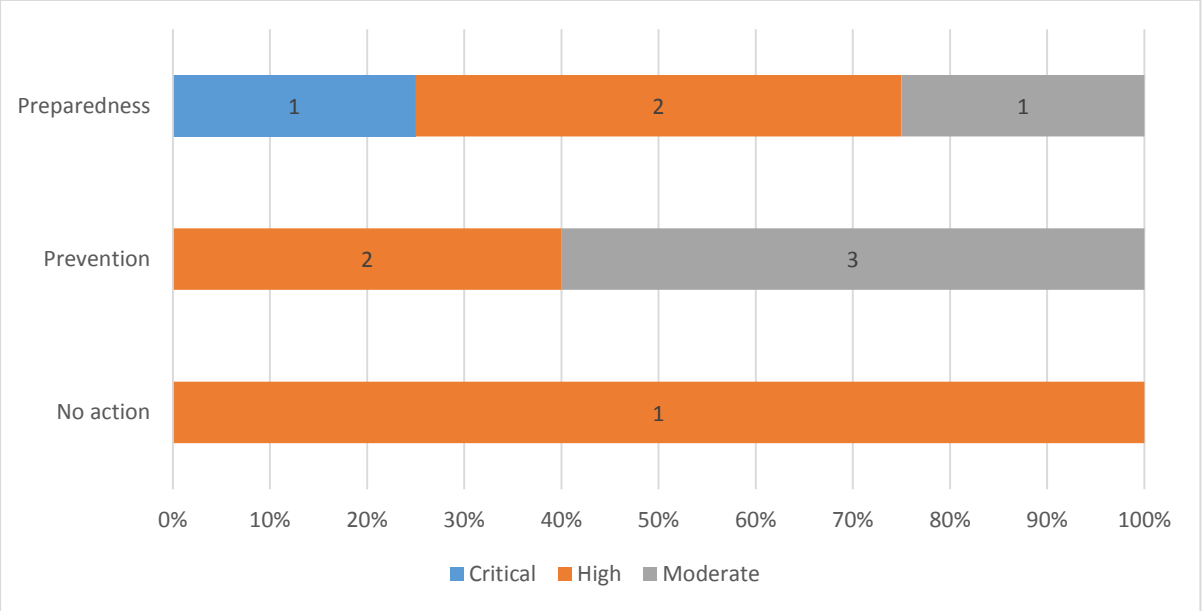
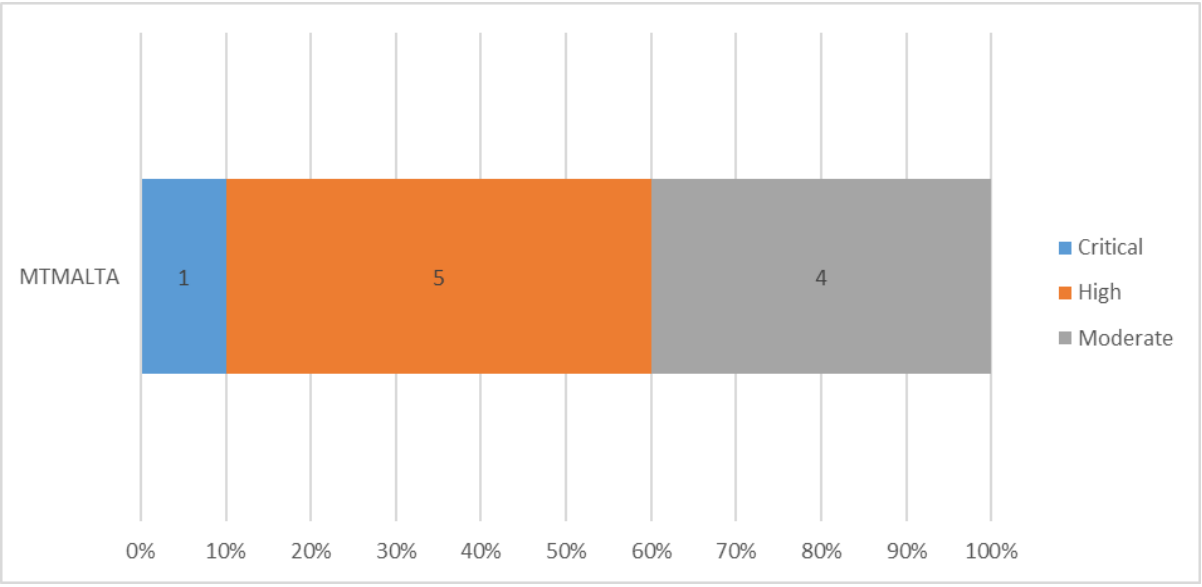


Table A4: Category of priority by UoM

	Critical	High	Moderate	Grand Total
MTMALTA	1	5	4	10
Grand Total	**1**	**5**	**4**	**10**

Figure A3: Visualisation of Table A4: Category of priority by UoM



Timetable

Malta did not report any information about the timetable of measures.

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).

Malta reported the same responsible authority for all measures, i.e. the Energy and Water Agency (EWA), which is an authority at the national level.

Measure details: progress

Member States were requested to report information on:

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

The Progress of implementation was reported as[96]:

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

Malta indicated the progress of all measures as 'progress ongoing' in the reporting sheet.

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

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

- Not started (NS) means the technical and/or administrative procedures necessary

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

for starting the construction or building works have not started.

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

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

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

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

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

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

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

Measure details: other

Member States were requested to provide information on:

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

Malta did not provide information for any of these fields in the reporting sheets.

Annex B: Definitions of measure types

***Table B1 Types of flood risk management measures*[97]**

	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

[97] Guidance for Reporting under the Floods Directive (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