MANAGEMENT PLANS FOR EXTREME EVNTS

Extract from the 2nd Water Catchment Management Plan for the Malta Water Catchment District 2015 – 2021

1 Introduction

The 2nd Water Catchment Management Plan aims to develop an integrated water management framework for the Malta Water Catchment District which takes full consideration of challenges emerging from extreme water management events such as 'water scarcity and droughts' and 'flood events'. The sections under this Annex present an outlook of how the 2nd WCMP addresses these issues, with particular reference to the implementation of the challenges outlined under the following documents:

(i) Communication from the Commission to the European Parliament and the Council addressing the challenge of water scarcity and droughts in the European Union, and

(ii) Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the Assessment and Management of Flood Risks.

2 Water Scarcity and Droughts

In 2007, the EU put forward a Communication addressing the challenge of water scarcity and droughts. Under this document, EU policy related to water scarcity and droughts is based on the principle of a 'water heirarchy' – namely that additional water supply infrastructures should be considered only when demand-side measures have been implemented.

The process leading to the development of the 2nd WCMP, considered the impact of Water Scarcity and Droughts in the context of the Malta Water Catchment District. For the purpose of this analysis the following definitions were adopted:

WATER SCARCITY – *a situation where insufficient water resources are available to satisfy long-term average requirements. It refers to long-term water imbalances, where the availability is low compared to the demand for water, and means that water demand exceeds the water resources exploitable under sustainable conditions.*

DROUGHT – *represents relevant temporary decrease of the average water availability – important deviations from the average levels of natural water availability and is considered as a natural phenomenon.*

An important consideration was made to the relativity of droughts, in particular given the Mediterranean climatic conditions prevailing in the Maltese islands. In this context, the impact of a drought in Malta is expected to be more severe than that experienced in most of the other EU Member States, given the starting benchmark of low natural water availability. It might well be that drought conditions in other Member States would, from a rainfall depth point of view, represent water availability levels well exceeding those occurring in extremely wet years in the Maltese islands. In as much, it was felt necessary to introduce in the analysis the concept of Aridity, and the following definition was adopted:

ARIDITY – *a natural permanent imbalance in the water availability consisting in low average annual precipitation, with high spatial and temporal variability resulting in overall low moisture and low carrying capacity of the ecosystem.*

In this context the following analytical framework was developed:

WATER SCARCITY = *f(Water Availability, Water Demand)*

Where:

WATER AVAILABILITY = *f(Climatic and Hydro-geological characteristics)*

WATER DEMAND = *f(Demographic and Social conditions)*

The naturally low availability of water in the Maltese islands, has always required that due consideration be given to water demand management measures. This has led to the development of an underlying 'water saving culture' which results in the Maltese islands having one of the lowest per capita water consumption rates in the European Union.

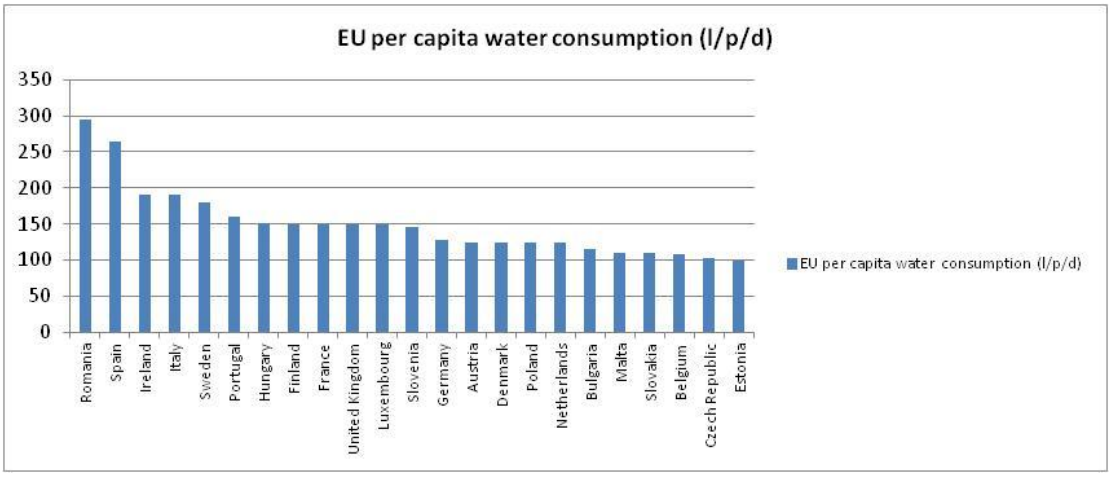

Figure 1: Water Consumption per Capita in EU Member States – Source: Waterwise

Furthermore, efficiency measures across all water using sectors, as well as the undertaking of water demand management measures on a national scale, leaves Malta with the lowest freshwater abstraction rates (per inhabitant) compared to all EU Member States. Even should, the production of water by desalination be taken into consideration, the water production rate per inhabitant would still stand on the lower end, compared to other EU Member States.

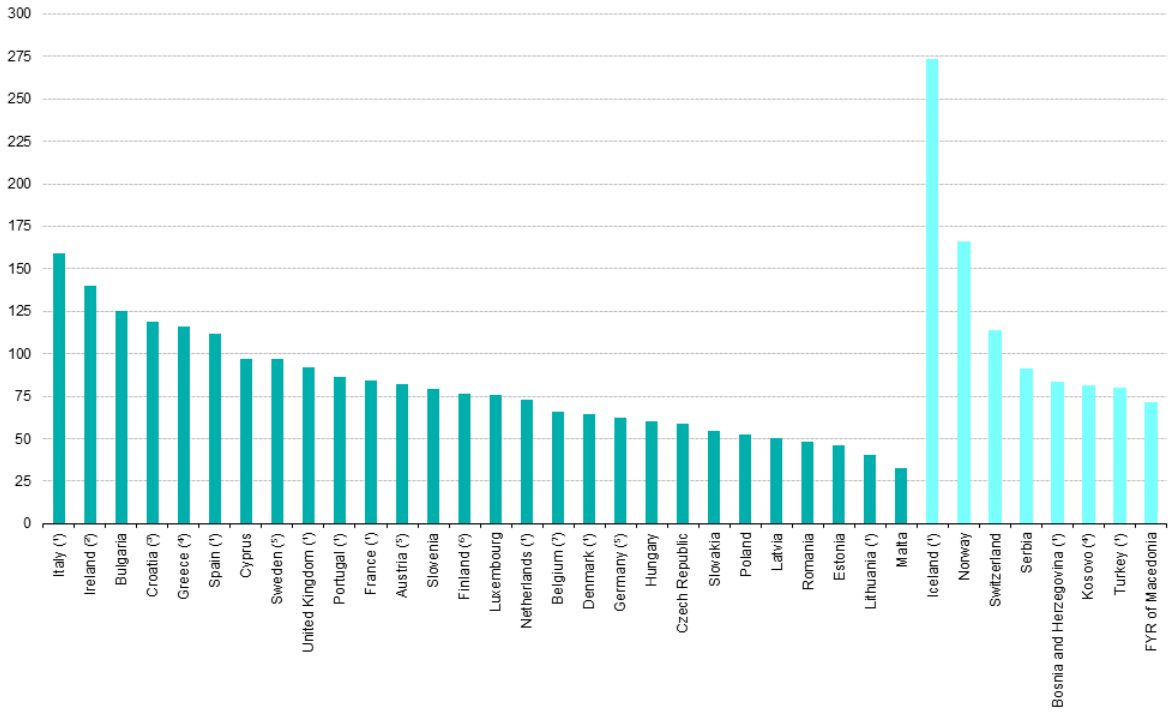

Figure 2: Total freshwater abstraction by public water supply, 2013 (m3 per inhabitant) – Source: EEA

This has been possible through the undertaking along the years of important water demand management measures, such as the National Water Leakage Management Programme. Significant efforts have been made by the Water Services Corporation to reduce real losses: leakages have been reduced from approximately 10.3 million m^3 in 2002 to only 3.5 million m^3 in 2014; that represents a 66% reduction of the volumes lost each year through leakages since 2002. Moreover, a recent study places the economically optimum levels of network leakages at 3.2 million m^3 per hour

(considering the costs of water produced offset by the additional resources required to drive the leakage further than current levels). **That being the case, current leakage levels would be nearly at optimal levels.** These efforts have particularly, allowed for sustaining an increased public water demand (approximately by 1.3% per year since 2005) while at the same time decreasing production (an average 0.2% per year since 2005). Up to 2012, this reduction in the system demand has brought down the abstraction of groundwater by approximately 7 million m^3 since 1995, or a decrease of 34.5%.

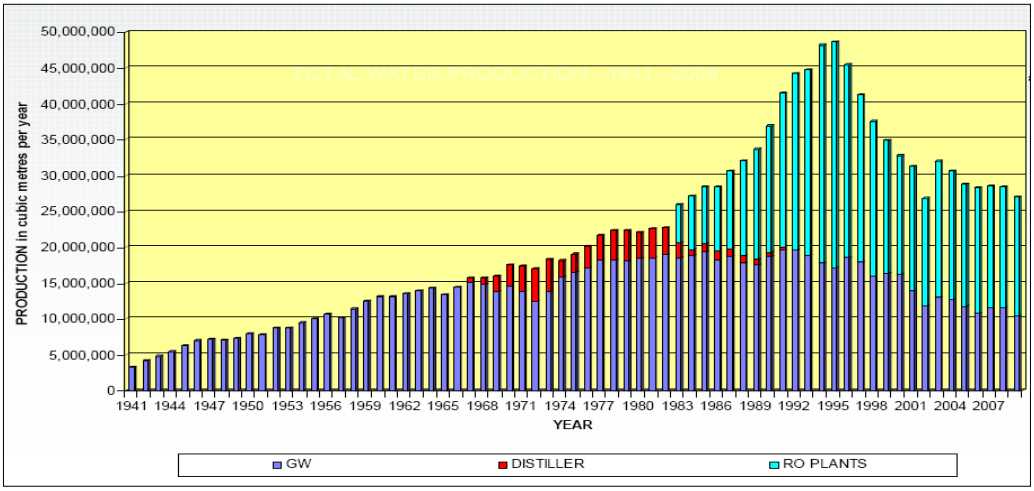

Figure 3: Reduction in the Municipal Water Demand, achieved by
Water Demand Management Measures undertaken by the Water Services Corporation

Similarly, the low availability of natural water resources, has guided the development of the arable agricultural sector, where the irrigation efficiency of agriculture in the Maltese islands is already high (78%, Plan Bleu 2008). Therefore achieving further '*efficiency gains'* presents an increased challenge. This high efficiency rate in irrigation water use is reflected in the wide use of water saving irrigation devices in almost all irrigated areas in the Maltese islands (100%, Plan Bleu 2013).

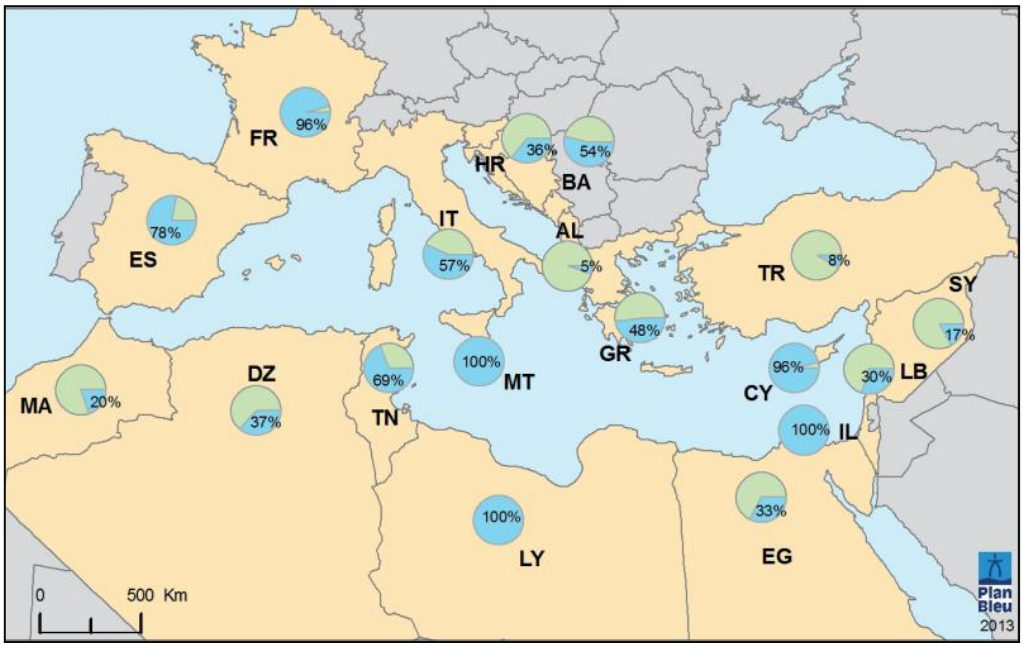

Figure 4: Proportion of irrigated surface areas fitted with water saving devices (Plan Bleu – 2013)

The 2nd WCMP takes note of the above baseline scenario, and has therefore identified a suite of measures to continue to optimise water management in the Maltese islands in view of the specific

challenges due to Water Scarcity and Droughts. This process has taken full consideration of the existing high efficiency benchmarks present in the Water Catchment District and therefore seeks the continued optimisation of water-use in the Maltese islands.

The Water Scarcity and Droughts Management framework within the 2nd WCMP thus seeks to increase the resilience of the water management framework in the Maltese islands by focusing on the optimisation of the efficiency in the use of water resources through a number of focused water demand management measures and the efficiency in the production of water resources through a number of measures focused on the recycling/re-use of water resources and the harvesting of rainwater runoff. In as much, through this two pronged approach, the measures under the 2nd WCMP will seek to reduce the pressure on Malta's naturally renewable groundwater resources, support their quantitative and qualitative re-enstatement in order to increase their resilience to support the national water supply base in periods of extended drought conditions.

The actions within the Programme of Measures addressing the achievement of the objectives of the Water Scarcity and Drought management framework are:

Integrated Analytical Framework
MDM7 - Development of a Water Scarcity and Drought monitoring and assessment platform

Water Demand Management Measures
STE1 – Development of a long-term National Water Conservation Campaign
DOM1 – Support mechanisms for water consumption audits in households
AGR1 – Support schemes for the uptake of efficient irrigation technology by the arable agricultural sector
AGR2 – Support schemes for the update of efficient water technology by the animal husbandry sector
PUB2 – Establishment of minimum technical and economic levels of leakage in the municipal distribution network, and achievement of these thresholds through the ongoing leakage management and control programme operated by the public utility
PUB3 – Establishment of a voluntary Eco-Labelling scheme for water use fixtures and appliances

Optimisation of Rainwater Runoff Harvesting Capacity
RWH1 – Survey of the status of existing rainwater 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
RWH2 – Development of the administrative capacity necessary to ensure the effective implementation of current legislative requirements in relation to the development of rainwater harvesting facilities and associated secondary water conveyance systems
RWH4 – Support schemes for the development of rainwater runoff facilities in the agricultural and commercial sectors
RWH6 – Rehabilitation of existing rainwater harvesting dam structures in valleys

Development of New Water Resources
NEW 1 – Commissioning of three polishing plants with a production capacity of 7 million m^3/year.
NEW2 – Development and implementation of a branding campaign for New Water Resources.
NEW3 – Development of demonstration sites for the application of New Water Resources.
NEW4 – Development of dedicated distribution facilities for New Water to enable its availability at the point of use.

Introduction of Innovative Water Management Technology

STE3 – Development of demonstration projects to showcase the application of innovative technology in the local water sector

PUB5 – Support mechanisms for research initiatives on grey-water recycling systems for the domestic and commercial sectors

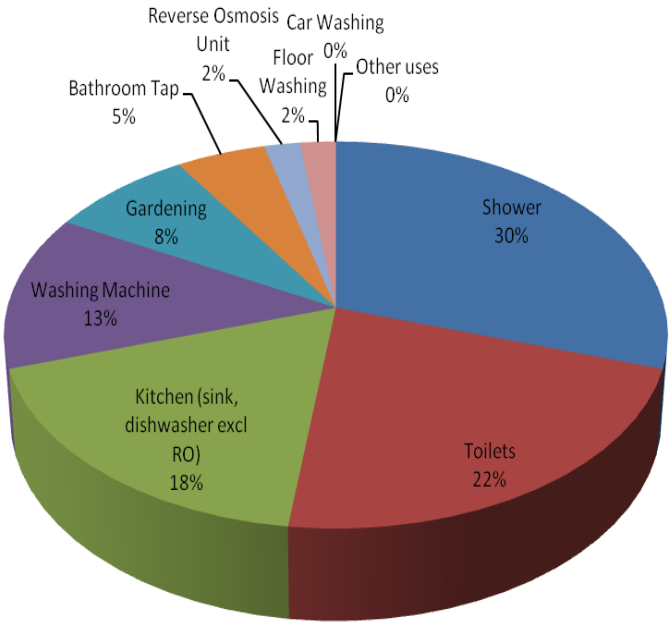

Figure 5: Classification of water use in Maltese households. Recycling of household grey-water can enable the re-use of shower water for toilet flushing purposes, thus potentially reducing the household water demand by around 22%

The implementation of the above identified measures are projected to incur a cumulative volumetric impact of around 10,000,000m^3 each year, achievable through the reduction of the national water demand and the increased efficient use of national water supply base through the introduction of recycling/reuse technologies and the optimised utilisation of rainwater runoff. It is thus envisaged that the implementation of these measures will substantially increase the resilience of the water sector in the Maltese islands to face the emerging challenges due to Water Scarcity and Droughts.

A detailed description of the measures is provided hereunder:

2.1 MDM7: Development of a water scarcity and drought monitoring and assessment platform.

(a) Why is it important?

Water scarcity and drought indices support decision makers in planning resource availability and allocation to different sectors. The development of Malta-specific indicators which take into account semi-arid conditions can lead to better understanding of the hydrological cycle at local level and possibly improve predictions on water availability

(b) What does the measure entail?

This measure will seek the development of a water scarcity and drought monitoring platform through the adoption of a suite of water stress indicators. The information generated by this platform will be publicly available and will be utilised to generate increased awareness on the significant challenges facing the Maltese water sector. Furthermore, the results of the platform will

be used to effectively demonstrate the relative importance of the natural drought conditions prevailing in the Maltese islands as compared to the baseline conditions in other European Member States.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2018, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Sustainable Development, Environment and Climate Change Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Environment and Resources Authority (ERA)
- The Water Services Corporation (WSC)
- The Malta Meteorological Office

2.2 STE1: Development of a long term National Water Conservation Campaign

(a) Why is it important?
Heightening public response towards the importance of a water-conservation philosophy fosters water-saving diligence nation-wide and encourages consumers to do more with less. The national Water Conservation Campaign will be launched with this objective. It will lead towards a net reduction in water demand and lower pressures on natural resources, groundwater in particular. Consequently, aquifers will restore faster and the environmental objectives of the Water Framework Directive will be achieved quicker. Accepting a more diligent water behaviour, nation-wide, is key to successful achievement of good resource standards, both qualitative and quantitative.

(b) What does the measure entail?
Government will seek the development of a long-term National Water Conservation Campaign to increase awareness in the public in general on water management issues. This campaign will be developed in parallel with the implementation process of the National Water Management Plan and will thus provide specific support to the implementation of the specific water management measures envisaged under the National Water Management Plan and the 2nd Water Catchment Management Plan. The National Water Conservation Campaign will include several stakeholder engagement initiatives and adopt a variety of tools to address the specific characteristics of different stakeholder groups. The campaign will serve as a focal point for all national water management and information initiatives and therefore ensure the development of a single national coordinated approach.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
This measure should be considered as an ongoing measure, and its implementation will be continued throughout the 2nd catchment management cycle.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Sustainable Development, Environment and Climate Change Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Superintendent of Public Health (SPH)
- The Regulator for Energy and Water Services (REWS)
- The Environment and Resources Authority (ERA)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Water Services Corporation (WSC)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- The Buildings Regulations Office (BRO)
- Transport Malta (TM)
- Malta Enterprise (ME)
- The University of Malta (UoM)
- The Malta College for Arts, Science and Technology (MCAST)
- Local Councils

2.3 DOM1 – Support mechanisms for water consumption audits in households

(a) Why is it important?
Household consumption forms a substantial portion of the municipal supply. Water-use efficiency in households, although already low compared to the situation in other Member States, still offers a potential for use optimisation to reach higher conservation levels. Losses from faulty appliances and plumbing installations are often the cause of high water bills. Water audits on households can therefore inform consumers on measures to take to reduce their personal consumption and identify losses within private residences.

(b) What does the measure entail?
Through the implementation of this measure, Government will seek to establish the necessary capacity for providing water consumption audits to interested households. Through these water audits households can be advised on the actions which need to be undertaken to optimise their water consumption. This measure is doubly beneficial in as much as it aims to reduce the water demand of the domestic sector and will result in lower water bills for households. The measure will also seek to establish synergies with similar measures in the energy sector due to the strong nexus between water and energy consumption in households.

This measure will subsequently be also extended to commercial enterprises.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2017, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit
The following stakeholders would need to be engaged in the process:
- The Superintendent of Public Health (SPH)
- The Regulator for Energy and Water Services (REWS)
- The Environmental Health Department (EHD)
- The Water Services Corporation (WSC)
- The Buildings Regulations Office (BRO)
- Local Councils

2.4 AGR1 – Support schemes for the uptake of efficient irrigation technology by the arable agricultural sector.

(a) Why is it important?
The agricultural sector is one of the main water consuming sectors in the Maltese islands, and therefore should be assisted to further optimise water use efficiency levels in line with the 'more crop per drop' concept. Though efficient irrigation techniques such as drip- and sprinkler- irrigation are widely applied by farmers today, options for further optimising the water-use of the sector should be actively considered. Increased efficiency, will enable the agricultural sector to reduce its dependency on natural water resources and thus contribute to the protection of its resource base.

(b) What does the measure entail?
Financial schemes to support the uptake of efficient irrigation technology by the arable agricultural sector will be included under Malta's Rural Development Programme. Financed measures will need to have a potential water saving impact of 5% of the current water usage by the respective operator. This in line with the statutory water efficiency requirements outlined under Article 36 of Regulation (EU) No 1305/2013. Furthermore, only interventions on irrigation schemes operating from a legal source of natural water will be supported.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2016, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Managing Authority, Funds and Programmes Division (FPD – MEAIM)
The following stakeholders would need to be engaged in the process:
- Sustainable Energy and Water Conservation Unit (SEWCU)
- The Sustainable Development, Environment and Climate Change Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)

- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)

2.5 AGR 2 – Support schemes for the uptake of efficient water technology by the animal husbandry sector.

(a) Why is it important?

The animal husbandry sector is a consumer of municipal water. Maintenance of good veterinary standards warrant continuous availability of a wholesome supply of good quality freshwater on the holding to maintain hygiene standards and prevent propagation of disease. Farmers should be encouraged to utilise potable water exclusively for drinking water requirements whilst other non-conventional sources like harvested rainwater should be utilised for non consumptive needs. Financial schemes under the Rural Development Programme can support such initiatives. Increased water use efficiency will reduce pressure on the municipal supply, and thus costs to the operator; whilst also reducing the impact of the sector on natural water resources.

(b) What does the measure entail?

Financial schemes to support the uptake of efficient water-use technology by the animal husbandry sector will be included under Malta's Rural Development Programme. Financed measures will need to have a potential water saving impact of 5% of the current water usage by the respective operator. This in line with the statutory water efficiency requirements outlined under Article 36 of Regulation (EU) No 1305/2013. Furthermore, only interventions on schemes operating from a legal source of water will be supported.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2016, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Managing Authority, Funds and Programmes Division (FPD – MEAIM)

The following stakeholders would need to be engaged in the process:

- Sustainable Energy and Water Conservation Unit (SEWCU)
- The Sustainable Development, Environment and Climate Change Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)

2.6 PUB2 – Establishment of minimum technical and economic levels of leakage in the municipal distribution network, and achievement of these thresholds through the ongoing leakage management and control programme operated by the public utility.

(a) Why is it important?

Demand management is needed to remove wasteful practices and instill good water behaviour. Besides being an important tool to support sustainability by reducing the pressures of water services, it reduces wastage, while doing away with unnecessary investment for supply augmentation – an approach strongly advocated by the European Commission. Malta has a strong

and successful history with demand management when municipal system demand was reduced following the modernisation of the infrastructural network, the implementation of a leakage detection programme and a meter replacement campaign. Maintaining and improving these high levels of operational standards is important to ensure the achievement of high cost-recovery levels in the operations of the public utility.

(b) What does the measure entail?

The minimum technical and economic levels of leakage achievable under the water distribution conditions prevailing in the Maltese islands will be established. The network leakage management programme undertaken by the Water Services Corporation will target the achievement of these minimum leakage objectives. This measure therefore aims at lowering the system demand of the Water Services Corporation, resulting in reducing the need for source water from the desalination plant and the groundwater abstraction network.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

This measure should be considered as an ongoing measure, and its implementation will continue throughout the 2nd catchment management cycle.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Water Services Corporation (WSC)

The following stakeholders would need to be engaged in the process:

- The Sustainable Energy and Water Conservation Unit (SEWCU)
- The Regulator for Energy and Water Services (REWS)

2.7 PUB3: Establishment of a voluntary Eco-Labelling scheme for water-use fixtures and appliances.

(a) Why is it important?

This is an important tool for water conservation. It seeks to induce a market shift from conventional water use-fixtures to those which are economical and can actually procure water saving. The scheme will give the necessary information to consumers enabling them to make correct decisions with respect to high levels of water use efficiency.

(b) What does the measure entail?

Government will seek the establishment of a national eco-labelling scheme to clearly identify efficient water-use fixtures and appliances, on the lines of existing eco-schemes for vehicle emissions and energy consumption. The development and management of this scheme will be undertaken in full consultation with representatives of importers and retailers, to ensure its acceptability by the sector. The eco-labels, once adopted, will support consumers in making an informed choice on the water consumption characteristics of any new fixtures and appliances which they intend to acquire. The scheme will provide the necessary information structure on which future fiscal incentive schemes to support the acquisition of water efficient devices can be based.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2018, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Superintendent of Public Health (SPH)
- The Water Services Corporation (WSC)
- The Buildings Regulations Office (BRO)
- The General Retailers and Traders Union (GRTU)

2.8 RWH1: Survey on the status of existing rainwater 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.

(a) Why is it important?
Several rainwater harvesting initiatives were undertaken in the past – a direct reflection of the importance given to this resource. Most of the stream channels in the major catchments were barred by shallow dams whilst open reservoir schemes were constructed to capture storm water. Underground reservoirs and cisterns, dating back to British and Knights period can be found in towns and villages where good use can be made with the harvested rainwater for landscaping and other secondary purposes. The optimum use of these facilities provides an important potential for bettering the management of rainwater runoff.

(b) What does the measure entail?
This measure will address the state of existing public rainwater harvesting infrastructure and aim to undertake a comprehensive restoration of these public assets to ensure their effective use in the management of rainwater runoff. The implementation of the measure will be undertaken in four parallel phases, namely:
a) identification of the location of existing infrastructure through assessment of existing documentation and a public engagement campaign;
b) survey of the status of these infrastructures and assessment of the rehabilitation works required;
c) identification of potential users for harvested rainwater, and development of management agreements with such users; and
d) undertaking of rehabilitation works to restore the rainwater harvesting infrastructures.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2017, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)

- The Superintendent of Public Health (SPH)
- The Environment and Resources Authority (ERA)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- Local Councils

2.9 RWH2 – Development of the administrative capacity required to ensure the effective implementation of current legislative requirements in relation to the development of rainwater harvesting facilities and associated secondary water conveyance systems.

(a) Why is it important?

Responsibilities for the implementation of rainwater capture, at urban level are today spread between several agencies. The urban sector offers potential for the use of alternative sources, in particular rainwater run-off, to broaden the sector's resource base and reduce its dependence on the municipal supply - groundwater and desalinated water. Effective implementation of the regulatory requirements outlined under Technical Guidance Document F for the Conservation of Fuel, Energy and Natural Resources is thereby required to ensure the development of a national capacity for alternative water resources and also ensure their effective use.

(b) What does the measure entail?

This measure will seek the development of the administrative capacity required to ensure the effective enforcement of legislative requirements related to the development of rainwater harvesting facilities and associated secondary water conveyance systems with all new developments.

Furthermore, in collaboration with the Planning Authority, a technical review of existing legislation will be undertaken to optimise the storage requirements for rainwater harvesting cisterns in view of existing constant-use scenarios as opposed to the needs for a carrying over capacity from the wet to dry season. It is envisaged that this review could result in lower storage requirements, and thus lower the economic impact to users related to the development of these facilities.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2017, and expected to be concluded by 2018.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Superintendent of Public Health (SPH)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Buildings Regulations Office (BRO)

2.10 RWH4 – Support schemes for the development of rainwater runoff harvesting facilities in the agricultural and commercial sectors

(a) Why is it important?

The agricultural sector is highly dependent on groundwater which is the main source for irrigation water, followed by harvested rainwater and treated sewage effluent. Promoting alternative sources for irrigation water is key to reducing groundwater abstractions for irrigation, whilst maintaining the operational capacity of the sector. There still is good potential for rain-water harvesting especially from rural roads and tracks to provide an irrigation alternative to groundwater.

(b) What does the measure entail?

This measure will seek the establishment of financial incentive schemes to support the development of rainwater runoff facilities in the agricultural and commercial sectors.

In the case of the agricultural sector, these schemes will be integrated in the Rural Development Programme under the EAFRD. Financed measures will need to have a potential water saving impact of 5% of the current water usage by the respective operator. This in line with the statutory water efficiency requirements outlined under Article 36 of Regulation (EU) No 1305/2013.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2016, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Sustainable Energy and Water Conservation Unit (SEWCU), Managing Authority, Funds and Programmes Division (FPD – MEAIM), Malta Enterprise (ME)

The following stakeholders would need to be engaged in the process:

- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Superintendent of Public Health (SPH)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Buildings Regulations Office (BRO)

2.11 RWH6: Rehabilitation of existing rainwater harvesting dam structures in valleys.

(a) Why is it important?

The importance of valley protection is undiscounted, not only for resource purposes but also for the conservation and protection of ecosystems which thrive in these areas. Valleys provide the lowest terrain of a water catchment and as such are very important for natural recharge. The restoration of dams is therefore conducive towards this aim as it will augment infiltration of harvested rainwater.

(b) What does the measure entail?
This measure will seek the development of a valley management master plan which will regulate the long-term rehabilitation of rainwater runoff storage areas behind valley dam structures whilst ensuring the necessary level of protection to the valley ecosystem. The master plan will seek to identify opportunities for the development of these valley systems into sustainable recreational areas which provide educational information about the important ecosystems sustained in the valley systems.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2017, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Sustainable Development, Environment and Climate Change Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Environment and Resources Authority (ERA)
- The Planning Authority (PA)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- Local Councils

2.12 NEW1: Commissioning of three polishing plants with a production capacity of 7 million m3/year

(a) Why is it important?
Treated wastewater in Malta has quality characteristics which constrain its utilisation by agriculture and industry. To overcome this limitation, three new polishing plants will polish secondary treated effluent by ultra-filtration and membrane processes. The resulting product will achieve high quality specifications, making its application possible for irrigation of, for industrial applications, landscaping and for artificial recharge schemes.

(b) What does the measure entail?
The Water Services Corporation will finalise the works for the development of three polishing plants, two in Malta and one in Gozo, with an annual production capacity of 7 million cubic meters of New Water Resources.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to be concluded in 2016.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Water Services Corporation (WSC)
The following stakeholders would need to be engaged in the process:
- Sustainable Energy and Water Conservation Unit (SEWCU)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Superintendent of Public Health (SPH)
- The Regulator for Energy and Water Services (REWS)
- The Environment and Resources Authority (ERA)
- The Environmental Health Department (EHD)

2.13 NEW2: Development and implementation of a branding campaign for New Water Resources

(a) Why is it important?
Branding will seek to promote New Water as a reliable alternative to more costly sources of supply. It will develop an image for New Water projecting this resource as a safe alternative to groundwater particularly for irrigation and commercial purposes.

(b) What does the measure entail?
A branding framework to support the introduction of New Water Resources will be developed by MCAST's Institute of Arts and Design. This framework will then be utilised for the development of a long-term branding campaign aimed at presenting these New Water resources as a safe and strategic resource to ensure the continued sustainable use of water resources in the Maltese islands.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2016, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Water Services Corporation (WSC)
The following stakeholders would need to be engaged in the process:
- Sustainable Energy and Water Conservation Unit (SEWCU)
- The Regulator for Energy and Water Services (REWS)

2.14 NEW3: Development of Demonstration sites for the application of New Water Resources.

(a) Why is it important?
The acceptance of New Water by users is a long process which necessitates a strong dialogue between authorities and stakeholders in order to convince the latter to switch to this alternative supply. Demonstration projects will therefore produce visibility of results and will allow stakeholders to evaluate the outcome, freely and independently. These projects will be supported by professional analytical services with the aim of transparently providing the necessary information on the safe use of this new water resource.

(b) What does the measure entail?
The Water Services Corporation will coordinate the development of pilot sites where the application of New Water Resources will be undertaken, in order to effectively demonstrate the safe application of these resources for irrigation to potential users. The development of these pilot sites will be undertaken with the engagement of MCAST and farmers, and will be ideally located within agricultural areas.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2016, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Water Services Corporation (WSC)
The following stakeholders would need to be engaged in the process:
- The Sustainable Energy and Water Conservation Unit (SEWCU)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Superintendent of Public Health (SPH)
- The Regulator for Energy and Water Services (REWS)
- The Environment and Resources Authority (ERA)
- The Environmental Health Department (EHD)
- Malta Enterprise (ME)
- The Malta College of Arts, Science and Technology (MCAST)

2.15 NEW4: Development of dedicated distribution facilities for New Water to enable its availability at the point of use.

(a) Why is it important?
New Water treatment works will be developed at existing sites located along the shoreline. These locations are rather distant from the points of use thus necessitating the development of a proper distribution network. Distribution networks will ensure availability of New Water at the point of use and facilitate uptake.

(b) What does the measure entail?
Through this measure, the Water Services Corporation will develop short and long term strategies aimed at guiding the development of dedicated distribution networks to deliver the New Water resources to agricultural and industrial users. The implementation of the measure will start with a feasibility assessment based on the results of the Water Demand Map envisaged under Measure PUB1, on which the spread of the distribution facilities will be initially assessed. Furthermore, the assessment will investigate the potential need for further localized polishing facilities to widen the consumer base for the New Water resources.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2017, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Water Services Corporation (WSC)
The following stakeholders would need to be engaged in the process:
- Sustainable Energy and Water Conservation Unit (SEWCU)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Regulator for Energy and Water Services (REWS)

2.16 STE3: Development of demonstration projects to showcase the application of innovative technology in the local water sector.

(a) Why is it important?
Research is one of the necessary tools to drive innovation. The themes of key interest include, membrane technology, re-use applications, energy efficiency, network efficiency and modelling, remotely operated control, groundwater management, and smart irrigation. Demo-projects will be developed in collaboration with the University and the MCAST and these will provide opportunity for students to further their studies and improve chances of career progression

(b) What does the measure entail?
Government will seek the development of demonstration and pilot projects to showcase the application of innovative technology in the local water sector. These demonstration actions will support the implementation of the measures envisaged under the 2nd Water Catchment Management Plan and focus on priority issues such as:
- the use of New Water resources,
- Managed Aquifer Recharge,
- Innovative Desalination Technology,
- Efficient Irrigation Technology, and
- Grey water recycling.

These pilot actions will be funded through European Research Programmes in order to ensure the direct involvement of established expertise from European research institutions. As far as possible Government will seek the involvement of higher educational institutions in the development and management of these demonstration projects in order to provide an added educational dimension to these initiatives.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
This measure should be considered as an ongoing measure, and its implementation will be continued throughout the 2nd Catchment Management cycle.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:

- The Sustainable Development, Environment and Climate Change Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Superintendent of Public Health (SPH)
- The Regulator for Energy and Water Services (REWS)
- The Environment and Resources Authority (ERA)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Water Services Corporation (WSC)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- The Buildings Regulations Office (BRO)
- Transport Malta (TM)
- Malta Enterprise (ME)
- The Malta College for Arts, Science and Technology (MCAST),
- The University of Malta (UOM),
- Local Councils

2.17 PUB5: Support mechanisms for research initiatives on grey-water recycling systems for the domestic and commercial sectors.

(a) Why is it important?

Greywaters constitute a reliable source of secondary waters, for household and commercial establishments, which effectively increase their water-use efficiency. As yet very little use is made of this resource possibly due to a lack of commercial interest to apply treatment technological on a small scale. Research initiatives directed towards the development of modular facilities on a small scale will be supported and encouraged during the period under consideration.

(b) What does the measure entail?

The in-house recycling of grey-water for secondary uses has the potential of reducing direct water use by between 20 and 30%. Unfortunately, locally adapted recycling systems which can be easily acquired by consumers do not exist. This measure will seek to incentivise the local industrial sector to initiate research activities aimed at developing local solutions for low-cost, easily installable and safe grey-water recycling solutions, by making available research grants which can support operators to undertake such initiatives.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2018, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Sustainable Energy and Water Conservation Unit (SEWCU)

The following stakeholders would need to be engaged in the process:

- The Superintendent of Public Health (SPH)
- The Regulator for Energy and Water Services (REWS)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Water Services Corporation (WSC)
- The Buildings Regulations Office (BRO)
- The Malta Council for Science and Technology (MCST)
- The Malta College for Arts, Science and Technology (MCAST)
- The University of Malta (UoM)

3 Flood Risk Management Plans

Directive 2007/60/EC on the assessment and management of flood risks aims to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods in the Community. To achieve its objectives, the Directive requires Member States to develop Flood Risk Management Plans to coordinate the implementation of flood management measures within identified flood risk areas.

The Flood Risk Management Plan for the Malta Water Catchment District has been integrated within the 2nd Water Catchment Management Plan. This section presents an outline of the measures in the 2nd WCMP intended to address the management of floods within the Catchment District.

3.1 Floods in the context of the Malta Water Catchment District

The implementation of the Floods Directive in the Malta Water Catchment District needs to consider the specific hydrological conditions of the Catchment District. During storm events, the dry valley channels adopt their natural function as a storm water culvert whereby the uncontrolled surface water runoff generated throughout the urban areas is conveyed downstream, for eventual discharge at the coastal zone. This flow of surface water runoff within the valley channel is limited to the main part of the valley channel which has been built up and this flow occurs for a very short period of time (in the order of a couple of hours) after the termination of the rainfall event. Therefore locally the term flooding is understood as the presence of uncontrolled surface water runoff which is located in urbanised valley channels which are not normally covered by water.

3.2 Identification of areas prone to flooding

The dry nature of Maltese water courses has throughout the island's history led to urban development within the actual water course. In fact, urban areas have throughout the years extended on what was once the original valley floor. The flow of uncontrolled surface water runoff occurs through these areas for a short period of time following intense rainfall events. The depth of rainwater runoff in the urbanised segments of the valley channel does not always reach the levels of significance required to pose a risk to the population and the economic activities undertaken within these risk areas. For the purpose of the implementation of the Floods Directive, risk from flooding was considered to occur only in those parts of the valley channel in which storm water runoff reaches levels exceeding 30cm in depth.

Figure 6: Catchments that experienced previous surface water flooding

3.3 Development of Flood Risk and Flood Hazard Maps

The identification of the Flood Hazard Zones undertaken for the 1st Article 6 report under the Flood Directive was based on the results of the modelling exercise carried out as part of the National Flood Relief Project (NFRP); the objective of which 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 1 in 5 year event storm scenario and this provides the basis for the information presented in the Flood Hazard Maps. In the Flood Hazard Maps, the modelled water depth was categorised according to the following depths: 0 meters to 0.10 meters, 0.10 meters to 0.25 meters, 0.25 meters to 0.50 meters, 0.50 meters to 0.75 meters, 0.75 meters to 1 meter, 1 meter to 1.50 meters and areas with a modelled flood water depth greater than 1.50 meters.

The Flood Risk Maps indicate the zones which pose a significant flood risk to the residents and commercial activities located adjacent to the modelled flood risk areas. The identification of the flood risk areas was based on the water level derived from the modelling exercise produced as part of the National Flood Relief Project. For the purpose of the implementation of the Floods Directive areas with a water depth above 30cm are considered as significant flood risk areas.

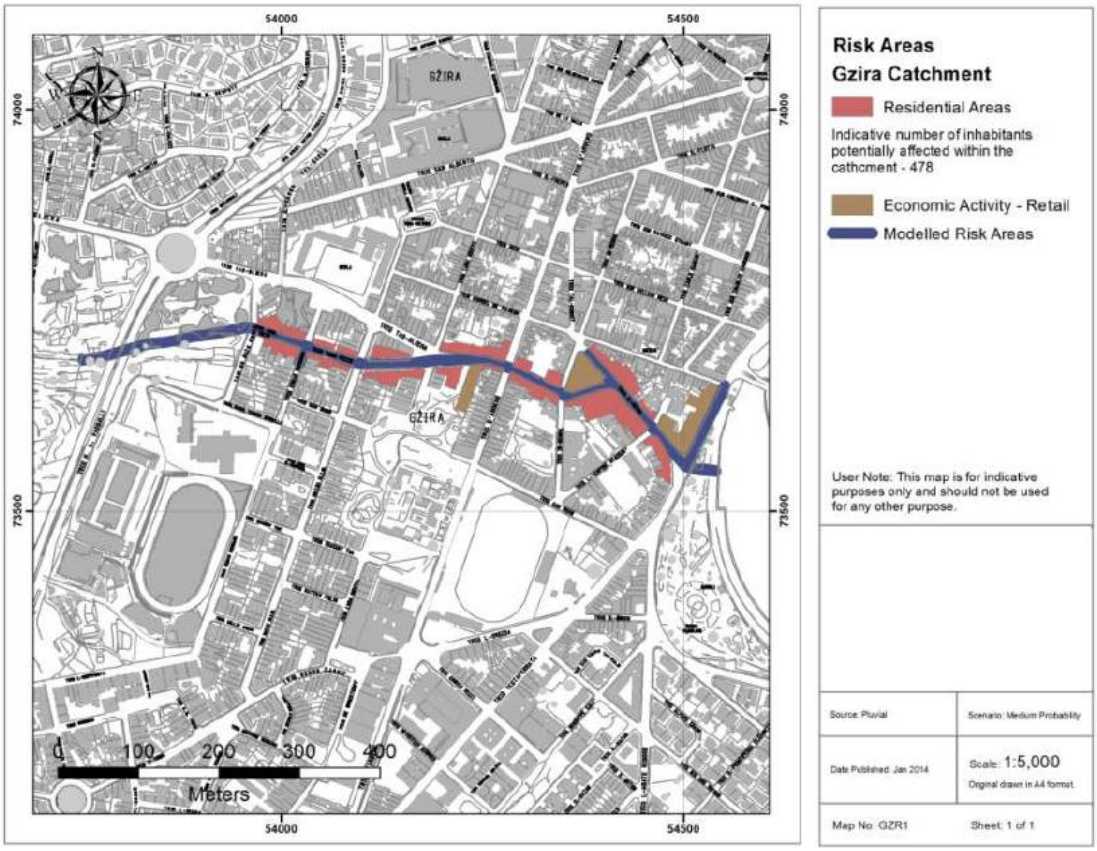

Figure 7: Flood Risk Areas in the Gzira Catchment

3.4 Establishment of Flood Management Objectives

The 1st Flood Risk Management Plan for the Malta Water Catchment District will seek to:

- develop a modeling framework the comprehensive assessment of the risk to flooding in all water catchment areas in the Maltese islands;
- 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; and
- introduce water level monitoring facilities in 'high risk' catchments to optimize the monitoring of flood events.

Through the flood risk management measures identified in the 2nd Water Catchment Management Plan, the development of 1.5 million m^3 of effective upstream storage and/or additional infiltration capacity will be sought in order to contribute to the reduction of flood risk.

3.5 Flood Management Measures

The Programme of Measures within the 2nd Water Catchment Management Plan includes a suite of Direct, Indirect and Supporting Measures aimed at achieving the objectives of the 1st Flood Risk Management Plan. The identified flood risk management measures are listed below.

Direct Measures

FLD1 – Modelling of the impact of the National Flood Relief Project on flood hazard and risk in identified catchments.

FLD2 – Flood Hazard and Risk Assessment in catchments not included in the National Flood Relief Project.

FLD3 – Comprehensive assessement for the inclusion of Sustainable Urban Drainage Systems and Natural Water Retention Measures to mitigate flood hazard and risk.

FLD4 – Implementation of Sustainable Urban Drainage Systems and Natural Water Retention Measures as identified under measure FLD3.

Indirect Measures
RWH1 – 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.
RWH6 – Rehabilitation of existing rainwater harvesting dam structures in valleys.
GWM4 – Development of Managed Aquifer Recharge schemes for aquifer management purposes.

Supporting Measures
GVN1 – Determination of the roles and responsibilities of all public sector agencies involved in the wider management of water resources.
RWH2 – Development of the administrative capacity required to ensure the effective implementation of current legislative requirements in relation to the development of rainwater harvesting facilities and associated secondary water conveyance systems.
MDM1 – Comprehensive upgrading of the hydrological cycle monitoring capacity.

3.5.1 FLD1: Modelling the impact of the National Flood Relief Project on flood hazard and risk in identified catchments.

(a) Why is it important?
The National Flood Relief Project has introduced a network of underground tunnels and other conduits which transfers the conveyance of rainwater runoff underground. This process modifies the hydrodynamic characteristics of the catchment and hence it is important to examine the impact of this change on interested urban areas.

(b) What does the measure entail?
A flood hazard and risk assessment will be undertaken to assess the actual mitigation impact of the works undertaken under the National Flood Relief Project, and indentify and residual flood risk impact in the catchments in question. The results of this assessment will be utilized to update the flood hazard and risk classification of these catchments.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2017, and its implementation is expected to be concluded by 2019.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- 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)

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

3.5.2 FLD2: Flood Hazard and Risk Assessment in catchments not included in the National Flood Relief Project.

(a) Why is it important?

It is important to extend the Flood hazard assessment to those catchments which were not assessed during the initial studies undertaken under the National Flood Relief Project. The results of the study will identify any flood hazards in these areas and will propose measures to mitigate such risks. It will also enable the development of catchment-wide measures to optimise rainwater management.

(b) What does the measure entail?

A modelling exercise will be undertaken to assess the flood hazard and risk levels in the water catchments not covered under the National Flood Relief Project. This exercise will continue to build on the work undertaken in the Storm Water Master Plan for the Maltese islands. Three model scenarios representing low, medium and high flood return periods will be considered in this study. The results of this assessment will help guide the development of future upstream and downstream flood risk mitigation projects in these catchments.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2018, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Sustainable Energy and Water Conservation Unit (SEWCU)

The following stakeholders would need to be engaged in the process:

- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Environment and Resources Authority (ERA)
- The Planning Authority (PA)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- Transport Malta (TM)
- The Civil Protection Department (CPD)
- Local Councils

3.5.3 FLD3: Comprehensive assessment for the inclusion of Sustainable Urban Drainage Systems and Natural Water Retention Measures to mitigate flood hazard and risk

(a) Why is it important?

Diversifying the tools available to manage rainwater runoff is an important aspect of any integrated flood management strategy. Sustainable Urban Drainage Systems and Natural Water Retention Systems offer a high potential for the development of 'green' tools to optimise the upstream management of rainwater and reduce the generation of rainwater runoff in the downstream reaches of the catchments.

(b) What does the measure entail?
This measure will seek the development of a master plan identifying the potential inclusion of Sustainable Urban Drainage Systems and National Water Retention Measures in the urban and rural framework of the Maltese islands as environmentally friendly flood mitigation measures. The master plan will identify key measures and projects where the introduction of such measures can be undertaken on a national level. Furthermore, in collaboration with the Planning Authority, the development of a planning guidance document to better guide the adoption of these measures will be developed.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2019, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Environment and Resources Authority (ERA)
- The Planning Authority (PA)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- Transport Malta (TM)
- The Buildings Regulations Office (BRO)
- Local Councils

3.5.4 FLD4: Implementation of Sustainable Urban Drainage Systems and Natural Water Retention Measures as identified under measure FLD3.

(a) Why is it important?
The implementation of the plans developed under measure FLD3 is important to ensure that the full potential of these alternative rainwater runoff management systems is harnessed.

(b) What does the measure entail?
This measure will support the implementation of Sustainable Urban Drainage Systems and Natural Water Retention Measures projects identified under measure FLD3. The implementation of this measure will be coordinated with Local Councils in order to increase the appreciation of these sustainable water management systems in the local context. Project implementation will be prioritised according to the project mitigation potential, both from a quantitative perspective (reduction in rainwater runoff generation) and the impact on the population and economic activities in the catchment.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2020, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Environment and Resources Authority (ERA)
- The Planning Authority (PA)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- Transport Malta (TM)
- The Buildings Regulations Office (BRO)
- Local Councils

3.5.5 RWH1: Survey on the status of existing rainwater 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.

(a) Why is it important?
Several rainwater harvesting initiatives were undertaken in the past – a direct reflection of the importance given to this resource. Most of the stream channels in the major catchments were barred by shallow dams whilst open reservoir schemes were constructed to capture storm water. Underground reservoirs and cisterns, dating back to British and Knights period can be found in towns and villages where good use can be made with the harvested rainwater for landscaping and other secondary purposes. The optimum use of these facilities provides an important potential for bettering the management of rainwater runoff.

(b) What does the measure entail?
This measure will address the state of existing public rainwater harvesting infrastructure and aim to undertake a comprehensive restoration of these public assets to ensure their effective use in the management of rainwater runoff. The implementation of the measure will be undertaken in four parallel phases, namely:
a) identification of the location of existing infrastructure through assessment of existing documentation and a public engagement campaign;
b) survey of the status of these infrastructures and assessment of the rehabilitation works required;
c) identification of potential users for harvested rainwater, and development of management agreements with such users; and
d) undertaking of rehabilitation works to restore the rainwater harvesting infrastructures.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2017, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Superintendent of Public Health (SPH)
- The Environment and Resources Authority (ERA)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- Local Councils

3.5.6 RWH6: Rehabilitation of existing rainwater harvesting dam structures in valleys.

(a) Why is it important?
The importance of valley protection is undiscounted, not only for resource purposes but also for the conservation and protection of ecosystems which thrive in these areas. Valleys provide the lowest terrain of a water catchment and as such are very important for natural recharge. The restoration of dams is therefore conducive towards this aim as it will augment infiltration of harvested rainwater.

(b) What does the measure entail?
This measure will seek the development of a valley management master plan which will regulate the long-term rehabilitation of rainwater runoff storage areas behind valley dam structures whilst ensuring the necessary level of protection to the valley ecosystem. The master plan will seek to identify opportunities for the development of these valley systems into sustainable recreational areas which provide educational information about the important ecosystems sustained in the valley systems.

(c) What is the geographical scope?
The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?
The implementation of this measure is envisaged to start in 2017, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?
Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Sustainable Development, Environment and Climate Crwh2
hange Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)

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

3.5.7 GWM4: Development of Managed Aquifer Recharge schemes for aquifer management purposes

(a) Why is it important?

In recent years, managed aquifer recharge has become increasingly important to hasten the natural processes of infiltration leading to recovery of depleted aquifers. With the availability highly polished treated sewage effluent, it is possible to explore the application of this non-conventional source of water for artificial recharge purpose of the Mean Sea Level Aquifer (MSLA) in Malta and Gozo. Artificial recharge will contribute to raising the potentiometric head of groundwater bodies, and simultaneously push deeper the fresh/saltwater interface.

(b) What does the measure entail?

The application of Managed Aquifer Recharge schemes to increase inflow (recharge) to the aquifer systems will be assessed under this measure. The first Managed Aquifer Recharge scheme will be developed in the area known as Ta' Barkat (l/o Xghajra, Zabbar – Malta) where the application of New Water to create a freshwater barrier to limit sea-water intrusion will be assessed. Based on the results of this first scheme, further Managed Aquifer Recharge sites will be developed using different types of source (recharge) water. The development of these MAR sites will be undertaken through EU research project initiatives.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2018, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Sustainable Energy and Water Conservation Unit (SEWCU)

The following stakeholders would need to be engaged in the process:

- The Sustainable Development, Environment and Climate Change Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Superintendent of Public Health (SPH)
- The Regulator for Energy and Water Services (REWS)
- The Environment and Resources Authority (ERA)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Water Services Corporation (WSC)

- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- Transport Malta (TM)
- Local Councils

3.5.8 GVN1: Determination of the roles and responsibilities of all public sector agencies involved in the wider management of water resources.

(a) Why is it important?

Good governance supports the effective implementation of policy measures conducive towards sustainability. It requires that regulatory responsibilities, currently spread between different institutions, become streamlined by defining clear functions and competencies on water and by enacting specific regulatory remits supported by a strong legal framework. This measure will create the administrative capacity necessary to improve the decision-making process. It will also enable a fair and equitable allocation of resources and access to services for different stakeholders. The definition of administrative roles is also essential to ensure transparency with stakeholders and obtain high levels of administrative efficiency.

(b) What does the measure entail?

The measure entails a study into the current roles and responsibilities of all Government departments and public sector agencies involved in the development, regulation and implementation of water management measures will be undertaken in order to assess regulatory overlaps and gaps in the current public administrative framework. The resulting assessment will propose to Government a regulatory scheme identifying clear roles and responsibilities to ensure the establishment of the administrative capacity necessary for the full implementation of the 2nd Water Catchment Management Plan.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2016 during the first year of implementation of the 2nd WCMP. Its implementation period is expected to be concluded by 2017.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Sustainable Energy and Water Conservation Unit

The following stakeholders would need to be engaged in the process:

- The Sustainable Development, Environment and Climate Change Directorate General (SDECCDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Rural Development Directorate General (RDDG) of the Ministry for Sustainable Development and Climate Change (MSDEC)
- The Policy Development Directorate (PDD-MTI) within the Ministry for Transport and Infrastructure (MTI)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Superintendent of Public Health (SPH)
- The Regulator for Energy and Water Services (REWS)
- The Environment and Resources Authority (ERA)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)

- The Water Services Corporation (WSC)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- The Buildings Regulations Office (BRO)
- Transport Malta (TM)

3.5.9 RWH2 – Development of the administrative capacity required to ensure the effective implementation of current legislative requirements in relation to the development of rainwater harvesting facilities and associated secondary water conveyance systems.

(a) Why is it important?

Responsibilities for the implementation of rainwater capture, at urban level are today spread between several agencies. The urban sector offers potential for the use of alternative sources, in particular rainwater run-off, to broaden the sector's resource base and reduce its dependence on the municipal supply - groundwater and desalinated water. Effective implementation of the regulatory requirements outlined under Technical Guidance Document F for the Conservation of Fuel, Energy and Natural Resources is thereby required to ensure the development of a national capacity for alternative water resources and also ensure their effective use.

(b) What does the measure entail?

This measure will seek the development of the administrative capacity required to ensure the effective enforcement of legislative requirements related to the development of rainwater harvesting facilities and associated secondary water conveyance systems with all new developments.

Furthermore, in collaboration with the Planning Authority, a technical review of existing legislation will be undertaken to optimise the storage requirements for rainwater harvesting cisterns in view of existing constant-use scenarios as opposed to the needs for a carrying over capacity from the wet to dry season. It is envisaged that this review could result in lower storage requirements, and thus lower the economic impact to users related to the development of these facilities.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2017, and expected to be concluded by 2018.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Sustainable Energy and Water Conservation Unit (SEWCU)
The following stakeholders would need to be engaged in the process:
- The Superintendent of Public Health (SPH)
- The Environmental Health Department (EHD)
- The Planning Authority (PA)
- The Buildings Regulations Office (BRO)

3.5.10 MDM1: Comprehensive upgrading of the hydrological cycle monitoring capacity

(a) Why is it important?

The accuracy of a Water Resource Assessment depends on data availability, its accuracy and representativity. The existing real-time monitoring network requires upgrading to improve data resolution and ascertain a high quality collection. With this data a more accurate resource assessment would be possible once the governing parameters are revised and possibly recalculated.

b) What does the measure entail?

A review of the current hydrological monitoring framework will be undertaken in order to identify representative catchments in which to install climatological, rainwater runoff and infiltration monitoring station. New hydrological data management and modelling frameworks will also be acquired/developed to ensure the optimised use of the collected data. This measure thus seeks to upgrade the current hydrological cycle monitoring capacity to increase the reliability of water resource (availability) assessments.

(c) What is the geographical scope?

The measure applies to the entire Water Catchment District.

(d) What is the expected timeline for implementation?

The implementation of this measure is envisaged to start in 2017, and its implementation will be continued throughout the 2nd catchment planning period.

(e) Who is responsible for implementing this measure and which stakeholders need to be involved?

Lead: Sustainable Energy and Water Conservation Unit (SEWCU)

The following stakeholders would need to be engaged in the process:

- The Environment and Resources Authority (ERA)
- The Water Services Corporation (WSC)
- The Marine, Storm Water and Valley Management Unit (MSWVMU) within the Ministry for Transport and Infrastructure (MTI)
- The Eco-Gozo Regional Development Directorate within the Ministry for Gozo (MGoz)
- The Malta College for Arts, Science and Technology (MCAST)

3.6 Implementation of the Flood Risk Management Plan

The implementation of the measures outlined in the Flood Risk Management Plan is envisaged to start in 2016, with the identification of clear Roles and Responsibilities within the Water Management Sector for the implementation of the identified measures. The implementation of the respective measures is envisaged to be staggered over the six-year catchment management cycle. The implementation timeframe to be followed is presented in Table 1 below:

Implementation Start Date	Measure
2016	GVN1
2017	FLD1, RWH1, RWH2, RWH6, MDM1
2018	FLD2, GWM4
2019	FLD3
2020	FLD4

Table 1: Implementation time-table for the identified flood management measures

3.7 Public Consultation Initiatives

The public consultation process supporting the development of the 1st Flood Risk Management Plan was undertaken within the development framework of the 2nd Water Catchment Management Plan,

given that the development of the flood risk management measures was undertaken within the integrated framework considered for the 2nd WCMP's Programme of Measures.

Furthermore, through the collaboration of the Local Councils Associations, a number of public and stakeholder information meetings on the application of Sustainable Urban Drainage Systems in the Maltese islands were held throughout the development process of the 2nd WCMP. These meetings were organised as part of the Local Councils Association's participation in the EU funded E^{2}STORMED Project.

3.8 National Competencies

The National Competent Authority for the implementation of the EU Floods Directive is the Sustainable Energy and Water Conservation Unit (SEWCU). The development and implementation of the Flood Risk Management Plan for the Malta Water Catchment District is therefore being coordiniated by SEWCU in close collaboration with other involved entities including:

- Ministry for Transport and Infrastructure
- Ministry for Gozo
- Malta Environment and Planning Authority