



Performance Audit

Safeguarding Malta's Groundwater

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List of Abbreviations

ATB	Assoċjazzjoni Tal-Bdiewa
BCID	Building Construction Industry Department
CCCA	Climate Change Committee for Adaptation
CCD	Climate Change Division
CoGAP	Code of Good Agriculture Practices
DoA	Directorate of Agriculture
EC	European Commission
EIS	Environment Information System
ERDF	European Rural Development Fund
EU	European Union
EUROSAI	European Organisation of Supreme Audit Institutions
FAO	Food and Agriculture Organisation
FASC	Farm Advisory Services Consortium
FP	Fertiliser Plan
GIS	Geographical Information System
IMC	Inter-Ministerial Committee
KIM	Koperattiva Ta' Min Irabbi l-Majjali
KPH	Koperattiva Produtturi tal-Halib
MCCAA	Malta Competition and Consumer Affairs Authority
MEPA	Malta Environment and Planning Authority
MFEI	Ministry for Finance, Economy and Investment
MGOZ	Ministry for Gozo
MRA	Malta Resources Authority
MRRA	Ministry for Resources and Rural Affairs
MSW	Municipal Solid Waste
NAO	National Audit Office
NAP	Nitrates Action Programme
NAU	Nitrates Action Unit
NCCAS	National Climate Change Adaptation Strategy
NFRP	National Flood Relief Programme
NSO	National Statistics Office
PA	Paying Agency
PHD	Plant Health Directorate

PPCD	Planning and Priorities Coordination Division
RDAD	Rural Development and Aquaculture Department
RDP	Rural Development Programme
RO	Reverse Osmosis
SAI	State Audit Institution
SEA	Strategic Environmental Assessment
SMR	Statutory Management Requirements
TSE	Treated Sewage Effluent
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UOM	University of Malta
WCMP	Water Catchment Management Plan for the Maltese Islands
WFD	Water Framework Directive
WP	Water Policy
WSC	Water Services Corporation
VMU	Valley Management Unit

Glossary

Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
At risk	This does not simply imply that the water body may be classified as being of poor status, but it also draws attention to priority issues or areas where appropriate management measures are needed to ensure that good status is achieved.
Desalinated water production	Potable water which is produced from seawater by the three Reverse Osmosis Plants, which are found at Ċirkewwa, Pembroke and Għar Lapsi.
Evapotranspiration	This describes the transport of water into the atmosphere from surfaces, including soil (soil evaporation), and from vegetation (transpiration).
Groundwater balance	The quantification of all individual inflows to or outflows from a groundwater system and change in groundwater storage over a given time period.
Groundwater body	It is a distinct volume of groundwater within an aquifer or aquifers.
Groundwater production	Water which is abstracted from the mean sea level aquifer and the perched aquifers by means of boreholes and pumping stations.
Inland water	It includes the surface water and groundwater.
Sea-Level aquifer (Lower aquifer)	These are contained in the lower limestone units (porous and fissured globigerina and/or lower coralline limestone). It is partly covered by the perched aquifer with a rather thick unsaturated zone in between. This aquifer is normally in direct contact on its boundaries with sea-water.
Strategic Environmental Assessment	This includes the preparation of an environmental report, the conduct of consultations, the consideration of the environmental report and the results of the consultations during decision making including also the provision of information on the decision in accordance with these regulations.
Perched Aquifer (Upper Aquifer)	These are situated at the bottom of the Upper Coralline Limestone formation. The bottom layer of these aquifers is the Blue Clay formation. In the northern part of the Maltese Islands, due to the general geological structure, such aquifers are in direct contact with sea-water.



Executive Summary

Executive Summary

Introduction

1. The National Audit Office (NAO) conducted the performance audit, entitled “Safeguarding Malta’s Groundwater”. This report examines whether Malta’s groundwater is being adequately protected from current challenges and climate change threats. This entailed evaluating the extent to which climate change adaptation measures to safeguard groundwater are being implemented. Findings and conclusions presented in this report are as at the end of October 2011. The focus on adaptation to climate change was taken into consideration due to a parallel audit performed in conjunction with eight other State Audit Institutions within the auspices of the European Organisation of Supreme Audit Institutions (EUROSAI) Working Group on Environmental Audit.

2. The overall status of groundwater bodies in Malta has been classified ‘at risk’ by various risk and vulnerability assessments commissioned by the Malta Resources Authority (MRA). Out of the 15 groundwater bodies, the two Mean Sea Level groundwater bodies are considered to be the most critical in status since they yield an estimated 66 per cent of the total groundwater abstracted in the country.

3. In view of the deteriorating status of Malta’s groundwater, this audit analysed the extent to which Malta is being effective in safeguarding and recharging groundwater against current and climate change threats. The scope of this audit included the various initiatives undertaken by the responsible Governmental entities to ascertain the long-term protection of groundwater. This audit’s objectives sought to determine the degree to which:

- The prevailing and climate change threats as well as their impact on groundwater have been identified.
- The Government has developed the relevant framework to address the current status of groundwater.

- The proposed measures and recommendations to safeguard groundwater are being implemented in an effective and timely manner.

4. The NAO’s review was primarily based on four key documents namely, ‘A Proposal for a Water Policy for the Maltese Islands’ (Water Policy), the ‘National Climate Change Adaptation Strategy’ (NCCAS), ‘The Water Catchment Management Plan for the Maltese Islands’ (WCMP), and the ‘Nitrates Action Programme’ (NAP). These key documents contribute directly towards Government’s regulatory framework to safeguard groundwater.

5. Various risk and vulnerability assessments were undertaken to determine the current and climate change threats to groundwater. The threats identified were excessive over abstraction, as well as high nitrates and chlorides levels. These risks are expected to be compounded by the effects of climate change.

6. Based on the following, the process leading to the conduct of these assessments was considered to be generally effective:

- i. Five main risk and vulnerability assessments were undertaken. These assessments were the ‘Malta Water Resources Review’, ‘A Preliminary Study of the Identification of the Sources of Nitrate Contamination in Groundwater in Malta’, ‘The Environment Report – Fresh Waters’, ‘The Second Communication to the United Nations Framework Convention on Climate Change (UNFCCC)’ and ‘The Water Catchment Management Plan for the Maltese Islands’. These assessments provided a holistic overview of the current and potential climate change threats to groundwater.
- ii. The adequacy of these assessments is considered to be confirmed since they were subjected to a national review, and where applicable cost estimates were

drawn up. Furthermore, the Second Communication to the UNFCCC and the WCMP were referred to the UNFCCC and the European Commission respectively. To date there was no adverse feedback on these documents.

- iii. The appropriate level of expertise was engaged in the conduct of these assessments. Moreover, where applicable, periodic updates are scheduled so as to reflect emerging circumstances.

7. Despite the foregoing, these assessments were subject to the following main limitations:

- i. Various data gaps exist. For instance, groundwater abstraction levels are based on various assumptions. Consequently, the model used to estimate the volume of groundwater is based on several assumptions since comprehensive data derived through private sources metering of groundwater abstraction is not available. Moreover, time series data relating to a number of variables associated with climate change is not available. This impeded on the generation of more reliable projections on the prevailing status and the potential impact of climate change on groundwater.
- ii. The quantification of groundwater abstraction by the agriculture and commercial sectors cannot be reliably quantified although estimates are available.
- iii. Cost estimates listed in the WCMP were subject to various technical assumptions and based on the prevailing conditions up to 2009.

8. The risk and vulnerability assessments undertaken were the main input to Government's regulatory framework. The Water Policy, the NCCAS, the WCMP and the NAP appropriately define and operationalise Government's vision into specific measures to safeguard groundwater.

9. To a significant degree, these four documents address Malta's prevailing and climate change threats to groundwater. This mainly resulted from:

- i. Adequate recognition of the core risk and vulnerability assessments.
- ii. Provision of the appropriate guidance to the implementing entities in order to achieve the established targets.
- iii. Generally defined targets and outcomes, responsibilities and timeframes.

However, it is to be emphasised that cost estimates have only been drawn up with regards to measures listed in the WCMP.

10. Notwithstanding the above, the Water Policy is still in draft form and this raises the following concerns:

- i. The status of this Policy potentially raises risks regarding adherence to the general direction adopted.
- ii. Although most measures listed in this document are already being implemented through other plans, some of the measures remain outstanding awaiting formal approval of the Water Policy.

11. On the other hand, the NCCAS has only been recently approved by Cabinet with directions for it to be tabled at the House of Representatives. It will only become finalised and hence implemented following discussions in Parliament. Consequently, action relating to most of the measures listed therein is still to commence. In fact, action which has already commenced regarding the recommendations proposed in this document relate to measures that are congruent with the existing groundwater problems.

12. It is to be noted that neither the Water Policy nor the NCCAS provide any cost estimate, given that their scope is to illustrate Government's vision to ensure the sustainability of groundwater. However, the Ministry for Resources and Rural Affairs (MRRA) commenced a cost estimation exercise regarding the NCCAS recommendations. Further detailed costings are envisaged to be developed in subsequent action programmes.

13. Various entities are involved in the implementation of the measures listed in the aforementioned regulatory framework. Coordination at the macro level is carried out by the MRRA. Moreover, the Inter-Ministerial Committee (IMC), chaired by the MRA, is responsible for overseeing the implementation of the WCMP. This Committee meets regularly and has recently clearly defined and formalised its reporting channels to the Cabinet. At the micro level, heads of departments coordinate the initiatives falling within their remit.

14. As at the end of October 2011, many measures relating to groundwater featuring in the four key documents were either implemented or partly implemented. The ensuing discussion provides implementation progress in this regard.

15. **Draft Water Policy** - Although in draft form, a significant number of measures have been or were in the process of being implemented. The implementation of the measures to date mainly address the most critical prevailing groundwater concerns and the fulfilment of Malta's European Union (EU) obligations. The other measures, which solely feature in the Water Policy, are scheduled to be implemented by 2015. Moreover, their

implementation is dependent on the operationalisation of other initiatives and further studies. Among the most critical measures which are still in the process of being implemented are those relating to the efficient, fair and equitable groundwater pricing as advocated by the Water Framework Directive. The outstanding issues in this regard relate to abstraction by the private sector. Water abstracted by the Water Services Corporation is already subject to a pricing mechanism.

16. NCCAS – A number of entities are allocating due importance to climate change impacts and adaptation measures. In fact, action has already commenced relating to measures that also reflect existing groundwater issues. Since the NCCAS is still to be discussed at the House of Representatives, only those measures forming part of related and already approved policies can be fully implemented. Moreover, the implementation of these measures may be potentially hindered due to the following:

- i. The current legal and regulatory framework does not extend to climate change adaptation.
- ii. The lack of adequate human and financial resources within the entities responsible for implementing climate change adaptation measures.
- iii. The implementation of the NCCAS recommendations will have to consider the EU's Climate Change Adaptation Strategy which is scheduled for publication in 2013.

17. WCMP – The WCMP stipulates that collectively all measures are to commence by 2012 and are to be completed by 2015. From a total of 20 measures related to groundwater, it resulted that six measures have been fully implemented while another 14 measures have been partly implemented. Moreover, the implementing entities were optimistic that they will be successful in meeting the implementation target.

18. An important measure listed in the WCMP relates to the metering of groundwater abstraction sources. This measure enables the collection of groundwater data by the various economic sectors. Towards this end, the installation of meters to commercial abstraction sources was nearly completed, while the metering of around 3,250 agricultural water sources is planned to be completed by mid-2013. Although such an implementation schedule is in line with the WCMP target, the non-metering of agricultural sources implies that the provisions of L.N. 241 of 2010 were not implemented. This legislation stipulates that the metering of groundwater sources was to start by 27 April 2011. The MRRA contended that implementation delays were mainly due to:

- i. infrastructural related problems brought about by the various methods used over the years for the drilling of boreholes;
- ii. the unavailability of the appropriate staffing levels at the MRRA to install meters - the recruitment process was still in progress; and
- iii. legal complexities, namely relating to the identification of ownership and multi users of water sources.

19. NAP - The implementation of the NAP has been limited to the provisions of the first Action Programme which also feature in the second NAP. The latter contains more stringent measures than those included in the first Action Programme. The implementation of the NAP was impeded since the legal framework enabling enforcement has only been recently enacted through L.N. 321 of 2011. Implementation was also hindered due to the unavailability of the appropriate administrative capacity. Consequently, the farming community was not being adequately informed of their new NAP obligations. In addition, enforcement of the NAP provisions was limited to farmers in receipt of EU funds.

Overall Conclusions

20. This performance audit sought to determine the extent to which Malta's groundwater is being adequately protected from current challenges and climate change threats. This audit established that the prevailing and climate change threats as well as their impact on groundwater have generally been identified. The current poor status allocated to Malta's groundwater is expected to be amplified unless the necessary measures are implemented to address prevailing and climate change concerns.

21. Improving the status of Malta's groundwater and safeguarding it from the impacts of climate change through adaptation measures is a long-term endeavour. This requires cross-sectoral efforts from various entities and substantial financial investment. Moreover, attaining good water status amongst Member States is an EU obligation.

22. The relevant regulatory framework in terms of policy, strategies and plans has progressed well. This framework developed through various parallel actions undertaken over a number of years. Work to include climate change adaptation measures within the groundwater regulatory framework has also commenced. Recently, the NCCAS has been officially approved by Cabinet. However, the Water Policy, which aims to provide a holistic and integrated management approach of Malta's water sources, is still in the process of being formally adopted by Government.

23. Although some delays have materialised, most entities contended that they are still on time to meet the implementation timeframes. The critical importance of some of these measures, such as those related to groundwater metering and nitrate contamination, potentially have a significant impact on the status of this resource even though the relative timeframes may ultimately be attained. The major factors contributing towards any delays generally related to insufficient administrative capacity at different departmental levels and lack of adequate management information systems.

24. Moreover, these two elements also impinge on the level of enforcement on the implemented measures; a case in point is nitrate contamination. Such a situation does not only impact on the quality of Malta's groundwater but also increases the risk that the relevant EU targets and programmes would not be fully satisfied.

25. The main aquifer systems in Malta are characterised as slow-response systems. Consequently, improving the groundwater status through the various initiatives and climate change adaptation measures is a long term goal. Malta is obliged under the Water Framework Directive to achieve good groundwater status by 2015 (as well as by 2021 or 2027 in special circumstances) or when naturally feasible. In this respect, current efforts to ensure the timely implementation of measures can be considered as a long term investment to safeguard this resource in order to ascertain socio-economic development.

Recommendations

26. In view of the foregoing, the NAO proposes the recommendations listed hereunder.

- i. Research and development relating to all aspects of groundwater is to be intensified. This will require that the necessary resources be directed towards the concerned entities, including the MRA, the Malta Environment and Planning Authority (MEPA) and the University of Malta. This research will eventually provide projections with a higher level of confidence regarding the status of groundwater and the potential threats of climate change.
- ii. Opportunities to undertake joint-research studies on groundwater and the impact of climate change in collaboration with international institutes are to be explored.
- iii. Studies determining the social and financial costs of Malta's groundwater are to be undertaken. These studies are crucial for policy and decision makers since they constitute a critical input for evaluating the cost effectiveness of the proposed measures to safeguard groundwater. The publication of these

studies should also be considered in order to further raise public awareness about the value of such a resource.

- iv. Efforts to publicise the risk and vulnerability assessments are to be intensified. This will enable greater participation from the public and stakeholders in the public consultation process relating to such assessments. In turn, a broader public debate on these assessments will lend further credibility to the ensuing policies and strategies devised.
- v. Whilst acknowledging the importance of considering new developments in the field, efforts are to be intensified to ensure that the Water Policy is finalised in the shortest possible time period. The benefits of formally adopting the Water Policy include the more expedient implementation of the measures therein.
- vi. Whenever possible, policies and strategies are to provide financial estimates of the measures proposed. Costs estimates should also be included in draft documents. These documents broaden the discussion about the subject matter by facilitating project prioritisation and decisions about the feasibility or otherwise of the proposed measures.
- vii. Responsible entities are to initiate action more expediently to ascertain that the appropriate administrative capacity is in place and also to enable the timely implementation of the measures. This will enable better planning and more effective implementation of the measures.
- viii. The national legal and regulatory groundwater framework needs to be broadened to include climate change adaptation. This would facilitate efforts in the monitoring of initiatives. Towards this end, such a framework is to encompass reporting procedures. In addition, it is crucial that these initiatives are supported by the appropriate administrative capacity.
- ix. Whilst acknowledging the complexities involved in the installation of groundwater meters to private sources, the implementation of this measure is to be given utmost priority. Groundwater metering will not only provide valuable information on water use but will also facilitate control over excessive and illegal abstraction.
- x. Consideration is to be given to evaluate the potential risks and benefits of applying fiscal measures to minimise over abstraction of groundwater. In this regard, economic studies, including those related to

groundwater price mechanisms by various entities, may serve as the basis for exploring the impact of such fiscal measures.

- x. The appropriate resources are to be made available to conduct information campaigns intended to inform the farming community of their obligations emanating from the second NAP. In addition, the information campaign project undertaken under the Life+ project should be carried out within the envisaged timeframes. The expedient undertaking of information campaigns minimises groundwater contamination and enables the competent Authority to embark on enforcement action. Moreover, a farming community which is appropriately informed of its obligations minimises the risks of a significant non compliance rate with regards to the implementation of EU programmes.
- xii. Efforts to set up comprehensive and integrated management information systems such as those being considered by the MEPA and the Nitrates

Action Unit should be intensified. These databases are considered critical to policy and decision-making, as well as to enable the monitoring and the relative enforcement of measures relating to safeguarding groundwater.

- xiii. Enforcement action related to various aspects of the legal framework on groundwater should be intensified. Such initiatives are particularly necessary in areas relating to groundwater contamination. A case in point is the broadening of enforcement action beyond the cross-compliance requirement of EU projects, such as in the case of the NAP.
- xiv. Consideration is to be given to compile enforcement plans as internal documents to complement all strategic and legislative measures. Enforcements plans are to detail the administrative capacity requirements and the approaches to be adopted. Such plans will render enforcement more effective and transparent.

Chapter 1



The prevailing situation

Chapter 1 – The prevailing situation

1.1 Introduction

1.1.1 The National Audit Office (NAO) has conducted the performance audit entitled “Safeguarding Malta’s Groundwater”. This Report examines whether Malta’s groundwater is being adequately protected from current challenges and climate change threats. This entailed evaluating the extent to which climate change adaptation measures to safeguard groundwater are being implemented. Findings and conclusions presented in this report are as at the end of October 2011.

1.1.2 In conjunction with eight other State Audit Institutions (SAIs) within the auspices of the European Organisation of Supreme Audit Institutions Working Group on Environmental Audit, the audit also focuses on climate change adaptation measures envisaged by Government to safeguard groundwater.¹ This cooperative audit performed by the diverse participants of the working group aims to assess the degree to which the respective countries have progressed in identifying climate change risks, developing related policies and strategies as well as implementing climate change adaptation measures. The topic under review, which was selected by the respective SAIs, was considered to present particular climate change risks to the respective countries.

1.1.3 This Chapter presents a situation analysis of the aquifers’ current status regarding quantity and quality, as well as the impact of climate change on groundwater in Malta. An overview of the relevant legislative framework is provided. Moreover, this Chapter outlines the audit aims, objectives, and the methodology employed in this review.

1.2 The prevailing situation

1.2.1 Directive 2000/60/EC defines groundwater as water below the surface of the ground in the saturated

zones, in direct contact with the ground or subsoil. These zones are found underground in cracks and spaces in soil, sand and rocks where water fills these areas. Malta’s limestone formation gives rise to two types of groundwater bodies namely the perched aquifer (upper aquifer) and the sea-level aquifer (lower aquifer).

1.2.2 The perched aquifers which are at the bottom of the upper coralline limestone formation are found in the northern part of Malta. The bottom layer of these aquifers is the blue clay formation. Perched aquifers tend to be at a higher risk of contamination in comparison to the sea-level aquifers. The former contain small volumes of water and their water corpus changes relatively faster when compared to sea-level aquifers.

1.2.3 The sea-level aquifers are contained in the lower limestone units. They are partly covered by the perched aquifer with a rather thick unsaturated zone in between. The boundaries of these aquifers are normally in direct contact with sea-water. Such groundwater bodies encompass the Malta Mean Sea Level and the Gozo Mean Sea Level aquifers. These two aquifers are the major water sources as they yield an estimated two-thirds of the total Maltese groundwater abstracted.

Malta and Gozo Mean Sea Level aquifers yield an estimated two-thirds of groundwater abstraction.

1.2.4 This delineation produces 15 separate aquifers, which together with the three desalination plants, constitutes Malta’s freshwater supply. Aquifer replenishment is by rainfall and leaks from the water-supply system, both of which are low in Malta. On the other hand, the major source of water loss is through evapotranspiration.

¹ Appendix I lists the SAIs participating in this cooperative audit together with the title of the respective audit.

1.2.5 Groundwater constitutes a critical water source in Malta. Consequently, a sustainable balance between demand and supply of freshwater is a prerequisite for the continued socio-economic development of Malta.

Groundwater utilisation by public utilities

1.2.6 Groundwater is utilised by both the public and the private sectors. Groundwater abstraction by the former relates to water abstracted by the Water Services Corporation (WSC), which is distributed through the Corporation's network. Groundwater abstraction by the private sector incorporates domestic, commercial, and agricultural users.

1.2.7 During the period 2000 to 2010, water abstraction by the WSC decreased by 32 per cent. In this period, the Corporation registered an overall decrease of 19 per cent in the total water production, that is, water produced through Reverse Osmosis (RO) plants and groundwater bodies. Figure 1 refers. This was mainly due to:

- a substantial reduction in the amount of leakages from the WSC's distribution system;
- increased efficiency in the RO plants which decreased the demand for groundwater abstraction; and
- the introduction of stringent objectives by the European Union (EU) to safeguard groundwater.

1.2.8 As indicated in Figure 1, groundwater resources constitute around 44 per cent of Malta's water supply. This amount excludes abstraction of water from Maltese aquifers by private users.²

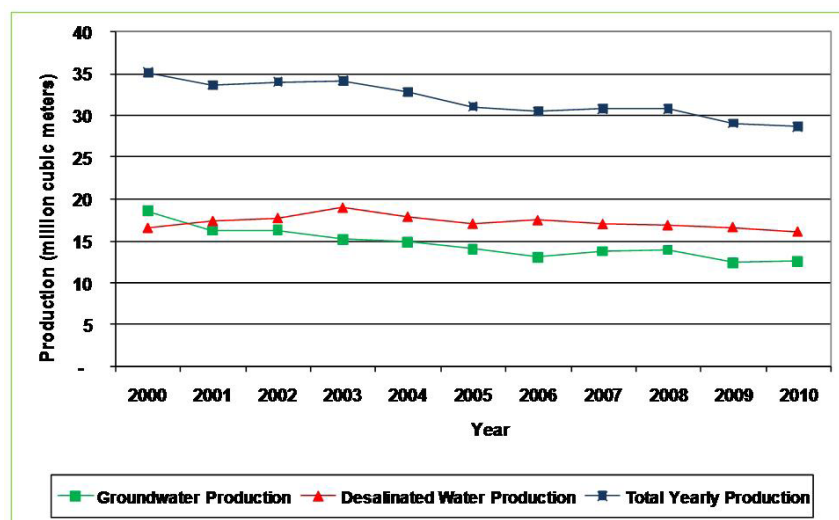
Groundwater abstraction by private users

1.2.9 Currently no measurements relating to water abstraction by the private sector exist since metering of groundwater sources is in its early phases. The National Statistics Office (NSO), remarks that there is a complete lack of data about private groundwater abstraction by domestic, industrial and commercial entities.³ The only private abstraction data available relates to the number of water sources. This data was acquired through the groundwater sources registration exercises carried out during 1940, 1997, and 2008.

Although reliable information exists on water abstracted by the WSC, there is a serious lack of data about private groundwater abstraction.

1.2.10 The 1997 and 2008 registration exercises yielded the declaration of 7,986 water sources. It is to be noted that only around 3,500 of these water sources qualify to date for metering with the legislative metering criteria relating to the low yield of these sources.⁴ The Malta Resources Authority is still in the process of verifying the type of use and the economic sector to which the registered groundwater sources pertain. The Authority contends that

Figure 1 : Groundwater and desalinated water production



Source: NSO News Release World Water Day, 054/2011 and MRA data.

² Private users refers to the utilisation of groundwater by the agricultural and commercial sectors.

³ NSO, 2010. *Sustainable development indicators for Malta*, 2010, p. 17.

⁴ Such sources relate to abstraction levels of less than one cubic metre for instance from spieri (a circular cavity in stone pit/shaft / vertical well) and springs.

the data provided through the registration process is subject to various erroneous declarations, namely regarding the water source type and use. The verification of the declared information is still ongoing by the MRA. Moreover, the MRA is in the process of identifying undeclared water sources. Given these limitations, it is estimated that around 3,250 water sources registered pertain to the agricultural sector and 250 relate to groundwater sources utilised by the commercial sector.

1.2.11 Estimates based on various assumptions carried out by the MRA and the Food and Agricultural Organisation (FAO) were published in 2006. These projections, based on 2003 data, illustrate that groundwater abstraction by private operators amounted to 17.5 million cubic meters.⁵

1.2.12 These estimates indicate that the agricultural and the farming sectors constituted approximately 85 per cent of this abstraction. Groundwater abstraction by the domestic, industrial and tourism sectors amounted to 6 per cent, 6 per cent and 3 per cent respectively.⁶

1.2.13 Based on the lowest residential tariff charged by the WSC, that is, €1.47 per cubic meter, the cost of the total private groundwater abstraction would amount to around €25.7 million.

On the basis of available estimates, if abstraction by private operators is charged at the lowest WSC tariff, this would yield around €25.7 million.

1.2.14 This basic estimate is only to be considered as an indicator of the value of groundwater. Groundwater related pricing mechanisms are issues of government policy and carry wide implications. The impact on the agricultural sector is a case in point. Issues raised through pricing mechanisms in this sector include the potential economic, social and environmental externalities which Malta would incur. An example in this regard relates to higher production costs in an already declining agricultural sector.

Unsustainable abstraction

1.2.15 Local authorities consider that the total level of groundwater abstraction, that is, both by the public and private sector is unsustainable. This situation is leading to the rapid deterioration of the groundwater status.

The current level of groundwater abstraction is considered unsustainable.

1.2.16 Moreover, the effects of climate change pose further threats to the groundwater. The envisaged higher temperatures and variability in precipitation may lead to the potential decrease in the quality and quantity of groundwater resources. Temperature increases affect the hydrologic cycle by directly increasing evaporation of surface water and vegetation transpiration.⁷ These changes may potentially influence precipitation amounts, timings, and intensity rates, which impact on the storage of water in aquifers. In addition, there may be other associated impacts of climate change, such as sea water intrusion in aquifers which will further deteriorate groundwater quality.

1.2.17 The current status of Malta's groundwater, coupled with the potential climate change threats, is conducive to potable water shortages which will need to be countered through water production from the Reverse Osmosis plants. However, water production from RO plants is considered to be costly and subject to various externalities.

Status of groundwater

1.2.18 The overall status of groundwater bodies in Malta has been classified as 'at risk' by the MRA following risk and vulnerability assessments⁸. These assessments classify the quality and quantity status of each aquifer together with the respective level of confidence. As previously outlined, out of the 15 groundwater bodies, the two Mean Sea Level groundwater aquifers are considered to be the most critical in status since they yield an estimated 66 per cent of the total groundwater abstracted in the country.⁹ Table 1 refers.

Over abstraction and high contamination rendered Malta's groundwater classification as 'at risk'.

⁵ FAO, 2006. *Malta Water Resources Review*, p. 47.

⁶ The MRA contends that this information is to be considered only as indicative.

⁷ National Institute of Hydrology. *Impact of Climate Change on Groundwater Resources*, p. 1.

⁸ MEPA & MRA, 2011. *The Water Catchment Management and Plan for the Maltese Islands*, p. 50.

⁹ MRA, 2005. *Initial Characterisation of the Groundwater Bodies within the Maltese Water Catchment District under the Water Policy Framework Regulations*, 2004, p. 7.

Table 1 : Qualitative and quantitative status of groundwater

Groundwater body	Qualitative issues	Quantitative issues	Chemical status	Quantitative status	General status	Level of confidence ¹⁰
Malta mean sea level	Nitrate pollution	Abstraction exceeds recharge	Poor	Poor	Poor	High
	Sea water intrusion					
Rabat-Dingli perched	Nitrate pollution		Poor	Good	Poor	Low
Mġarr-Wardija perched	Nitrate pollution	Abstraction exceeds recharge	Poor	Poor	Poor	Low
Pwales coastal	Nitrate pollution	Abstraction exceeds recharge	Poor	Poor	Poor	Low
	Sea water intrusion					
Mizieb mean sea level			Good	Good	Good	Low
Mellicha perched	Nitrate pollution		Poor	Good	Poor	Low
Mellicha coastal	Nitrate pollution		Poor	Good	Poor	Low
	Sea water intrusion					
Marfa Coastal	Nitrate pollution		Poor	Good	Poor	Low
	Sea water intrusion					
Kemmuna mean sea level			Good	Good	Good	Medium
Gozo mean sea level	Nitrate pollution	Abstraction exceeds recharge	Poor	Poor	Poor	High
	Sea water intrusion					
Għajnsielem perched	Nitrate pollution		Poor	Good	Poor	Low
	Saline pollution					
Nadur perched	Nitrate pollution		Poor	Good	Poor	Low
Xagħra perched	Nitrate pollution		Poor	Good	Poor	Low
Żebbuġ perched	Nitrate pollution		Poor	Good	Poor	Low
	Saline pollution					
Victoria-Kerċem perched	Nitrate pollution		Poor	Good	Poor	Low
	Saline pollution					

Source: MEPA & MRA, 2011, *The Water Catchment Management Plan for the Maltese Islands*, p. 82.

1.2.19 Table 1 raises various issues of concern related to the groundwater status, namely:

- i. Over abstraction is evident in some of the groundwater bodies, including the two Mean Sea Level Aquifers as it is estimated that annual abstraction exceeds the 25 million cubic meters abstraction threshold required to achieve the good quantitative status objectives of the Water Framework Directive (WFD).¹¹ It is pertinent to point out that the MRA's data relating to over abstraction is not considered as fully reliable. This data is based on several assumptions such as:

- environmental factors, including natural aquifer recharge and subsurface groundwater discharges;

- operational aspects including groundwater abstraction by the private sector; and

- the fact that it is calculated by a conceptual model of the aquifer system.¹²

- ii. High levels of nitrate, which in certain perched aquifer systems reaches six times higher than the EU-established parametric value, reflect a deteriorated groundwater quality. Such levels of nitrates are emanating from anthropogenic factors, namely from agricultural activities and to a lesser extent from horticulture as well as landscaping.

- iii. Groundwater quality is also affected by sea-water intrusion and the ensuing surface contamination. Sea-water intrusion, together with over abstraction

¹⁰ MRA classified the level of confidence in accordance with the type and availability of the relevant data. This was dependent on whether the data was based on an actual value or an estimate. Classification related to the confidence levels of quality, dependant on the availability of data over a number of years. The latter classification was also based on the quality of samples derived and analysed.

¹¹ Source: MRA.

¹² It is envisaged that this model will be replaced to enhance the reliability of results.

of groundwater, results in high levels of chloride concentrations in aquifers.

- iv. The current poor status of groundwater may limit Malta's water buffer and contingency supplies in the event that the production of potable water from the desalination plants ceases. In addition, the prevailing status regarding Malta's groundwater is also considered as a threat to the different economic sectors. Among the most vulnerable industries in this respect are the agricultural and animal husbandry sectors.

1.2.20 The foregoing, together with the risks emanating from climate change, stresses the importance of Malta's groundwater sources to be appropriately safeguarded. The unsustainable use of groundwater sources results in financial and social costs implications.

Sustainable groundwater levels

1.2.21 Information relating to the cost of groundwater is currently unavailable. Consequently, it is rendered more difficult to control the abstraction of this resource through pricing mechanisms. In order to realistically estimate the resource value of groundwater, the MRA has commissioned a study which is still underway.¹³ Determining the value of groundwater will also lead to a better appreciation of this resource.

The lack of realistic information to the cost of groundwater hinders policy development relating to price mechanisms.

1.2.22 The diminishing quantity and quality of groundwater severely restrict the water supply available for distribution. Consequently, the shortfall in supply has to be countered by producing through the RO plants and treated sewage effluent (TSE) the amount of water necessary to meet demand. This will, however, further increase energy consumption by the WSC resulting in higher carbon dioxide emissions and, thus, necessitating extra efforts to adhere to the relative EU obligations. Moreover, in the longer term, heavier reliance on desalinated water might eventually necessitate the upgrading of the current RO infrastructure. A costly investment might then be required to meet the demand for potable water.

A shortfall in groundwater supply will be countered by increased dependency on RO plants and treated sewage effluent.

1.2.23 The FAO report published in 2006 estimated that the cost of substituting groundwater with desalinated water, if passed on to the consumers, will lead to the doubling of household water bills. The same report also outlines the scenario where groundwater quality deteriorates to the point that it is unsustainable for agricultural purposes. In this case, the costs to the agricultural sector will also increase significantly since this sector may have to switch to desalinated (polished) groundwater or treated and polished sewage effluent.¹⁴

The FAO report estimates that the total substitution of groundwater with desalinated water will double the cost of water production for consumers.

1.2.24 It is to be noted that the latter initiative has been given due attention in various official documents, including: 'A proposal for a Water Policy for the Maltese Islands', and the 'National Climate Change Adaptation Strategy'. Moreover, pilot projects to utilise Treated Sewage Effluent TSE are currently being undertaken.

Groundwater regulatory framework

1.2.25 Given the critical importance of sustainable water resources to socio-economic development, a sound regulatory framework was established at the EU and the national level. In 2001, the European Commission (EC) adopted the WFD 2000/60/EC as its main driver for the sustainable management of water within the EU. The purpose of the WFD is to establish, in Member States, a framework for the protection of inland waters, transitional waters, coastal waters and groundwater. This is envisaged to prevent further deterioration, as well as to protect and enhance the status of the aquatic ecosystems. In 2006, the WFD was revised to embrace the provisions of the Nitrates Directive 91/676/EEC.

1.2.26 Due to the climate change risks to groundwater, in 2009, the EU published a White Paper entitled 'Adapting to climate change: Towards a European framework for action'. This document aims to stimulate the development of climate change policies and strategies among Member States. Eventually, this Paper will form the basis of an EU Directive to regulate various climate change adaptation initiatives across Member States.

The groundwater regulatory framework reflects the EU obligations and address the national concerns.

¹³ The MRA envisages that this study would be concluded after a one year monitoring period of groundwater abstraction.

¹⁴ FAO, 2006. *Malta water resources review*, p. 20.

Table 2 : Main responsible entities for the key tasks within the regulatory framework

Regulatory framework			Responsible entities										
International obligations	National legislative framework	National policy, strategy and plans	Drafting				Implementation			Oversees implementation			
			OPM ¹⁵		MRRA		MRRA		Government Entities	OPM ¹⁶		MRRA	
			MEPA	MRA	Other Departments	CCCA	NAU	MEPA		MRA	NAU	IMC	
Water Framework Directive	Water Policy Framework Regulations, 2004	Water Policy		X					X				
		WCMP	X	X					X				
Nitrates Directive	Protection of waters against pollution caused by nitrates from agriculture sources, 2003	NAP			X			X					X
Second Communication to the UNFCCC		NCCAS				X			X				

1.2.27 The EU regulatory framework was adopted by Malta through various Legal Notices and Plans, namely:

- L.N. 194 of 2004, ‘Water Policy Framework Regulations, 2004’;
- ‘Protection of Waters against Pollution Caused by Nitrates from Agricultural Sources Regulations, 2001’, which came into force in 2003;
- ‘The Water Catchment Management Plan for the Maltese Islands’ (WCMP), which is a requirement of the WFD;
- ‘Nitrates Action Programme’ (NAP), which is a requirement of the Nitrates Directive, and was transposed into Maltese Legislation through L.N. 321 of 2011.

1.2.28 In addition to this regulatory framework, the draft document entitled ‘A Proposal for a Water Policy for the Maltese Islands’, hereinafter referred to as the Water Policy, seeks to identify a set of priority areas which need to be addressed for the sustainable management of all water resources. This document accounts for Malta’s specific needs and international obligations. The draft Water Policy is intended to cover the period 2010 to 2015.

1.2.29 Most of the provisions and measures included in the previously mentioned regulatory framework are considered to seek to counter the climate change risks.

Nevertheless, the need was felt to develop an ad hoc strategy to ascertain the effective implementation of climate change adaptation measures, including those related to groundwater. The Climate Change Committee on Adaptation (CCCA) presented a Consultation Report entitled ‘National Climate Change Adaptation Strategy’ (NCCAS) in 2010. It is envisaged that this document will serve as the fulcrum of local discussion on climate change adaptation. This document has been recently approved by Cabinet.

1.2.30 Various Governmental entities are responsible for the implementation, monitoring and enforcement of the groundwater regulatory framework. Table 2 outlines the main responsible entities for the key tasks within this regulatory framework.

1.2.31 The various entities included in the above table reveal the complexities involved in coordinating national efforts to safeguard groundwater. Moreover, the broad spectrum of entities involved in the implementation, monitoring and enforcement of groundwater protection measures highlight the various areas of expertise required in this field.

1.3 Audit aims and objectives

1.3.1 Against this backdrop, this audit analysed the extent to which Malta is being effective in safeguarding groundwater against current and climate change threats. The scope of this audit included the various initiatives

¹⁵ As of 10 January 2012, the MEPA responsibilities formerly allocated to the OPM were transferred to the Ministry for Tourism, Culture and the Environment.

¹⁶ Ibid.

undertaken by the responsible Governmental entities to ascertain the long-term protection of groundwater. Consequently, this audit's objectives sought to determine the degree to which:

- The prevailing and climate change threats as well as their impact on groundwater have been identified.
- The Government has developed the relevant framework to address the current status of groundwater.
- The proposed measures and recommendations to safeguard groundwater are being implemented in an effective and timely manner.

1.4 Audit methodology

1.4.1 Various primary and secondary sources were used in the conduct of this audit. Primary sources included the following key documentation: 'A Proposal for a Water Policy for the Maltese Islands' (MRRA, 2010), 'The Water Catchment Management Plan for the Maltese Islands' (MEPA & MRA, 2011), the 'Nitrates Action Programme' (MRRA, 2011), and the 'National Climate Change Adaptation Strategy' (Climate Change Committee for Adaptation, 2010). This Report refers to these four documents collectively as the groundwater regulatory framework. Moreover, the literature review also enabled the identification of Malta's main EU obligations related to groundwater. A selected bibliography is found in Appendix VI.

1.4.2 Secondary sources of information included semi-structured interviews conducted with officials of relevant Government entities, namely, the Ministry for Resources and Rural Affairs (MRRA), the Malta Competition and Consumers Affairs Authority and the WSC. Meetings were also carried out with the Chair of the Inter-Ministerial Committee (IMC) responsible for monitoring the progress of the WCMP.

1.5 Report structure

1.5.1 The ensuing Chapters seek to review the effectiveness of measures undertaken by Governmental entities to safeguard Malta's groundwater.

1.5.2 Chapter 2 seeks to evaluate the adequacy of the risk and vulnerability assessments commissioned by Government to determine and, where possible, to quantify the current and climate change threats to groundwater.

1.5.3 Chapter 3 discusses the appropriateness of the development of Malta's policies, strategies and plans to ascertain the sustainable use and protection of groundwater whilst recognising the impacts of climate change.

1.5.4 Chapter 4 evaluates the implementation of the various measures indicated in the various strategies, policies and plans related to the safeguarding of groundwater from current and climate change threats.

1.5.5 The overall conclusions and recommendations related to this performance audit are presented in this report's Executive Summary from page 8 to 12.



Courtesy of DAI

Chapter 2

Groundwater risk and vulnerability assessments

Chapter 2 – Groundwater risk and vulnerability assessments

2.1 Introduction

2.1.1 This Chapter mainly focuses on the risk and vulnerability assessments carried out or commissioned by the different Governmental entities to identify and analyse the hazards affecting groundwater, including those emanating from climate change threats. This Chapter seeks to evaluate the extent to which the processes involved in the conduct of these assessments enabled the identification of threats to Malta's groundwater.

2.1.2 The ensuing discussion will also provide an overview of:

- the adequacy of the risk and vulnerability assessments undertaken;
- the limitations of these assessments; and
- the main groundwater risks and vulnerabilities identified.

2.1.3 There exists no single standardised definition for groundwater vulnerability.¹⁷ While some experts in the field define it as “*the tendency or likelihood for contaminants to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer*”,¹⁸ others define it as “*an intrinsic property of a groundwater system that depends on the sensitivity of that system to human and/or natural impacts*”.¹⁹ For the purpose of this study, the National Audit Office will consider both of these definitions.

2.1.4 To properly manage, protect, and ultimately to sustain groundwater from the current and the potential impacts of climate change, it is essential to determine areas where this precious resource may be more vulnerable to key threats. Towards this end, risk and vulnerability assessments are conducted. These assessments are a means to synthesize complex hydrogeological information into a form useable by planners, decision and policy-makers, geoscientists and the public.

2.1.5 An effective risk and vulnerability assessment serves as a guide to the various entities responsible for the management of water-related issues. Such assessments provide the framework for developing groundwater risk reduction options and associated cost projections. In addition, the risk and vulnerability assessments encourage the modification of the relevant operational plans to sustain groundwater resource. Consequently, it is considered necessary that such assessments are reviewed periodically to account for changing threats. Some experts in the field of water management state that preferably a vulnerability assessment is “performance-based,” meaning that it evaluates the risk to the water system based on the effectiveness of existing and planned measures to counteract adversarial actions.²⁰

2.1.6 These assessments, which generally tend to be either reflected in a public document or formally subjected to a public consultation process, also act as powerful educational tools for raising public awareness of groundwater protection issues. This is being increasingly recognised globally as on-going need.²¹

¹⁷ Liggett J.E. & Talwar S., 2009. *Groundwater Vulnerability Assessments and Integrated Water Resource Management*, Streamline Watershed Management Bulletin Vol. 13/No. 1, p. 19.

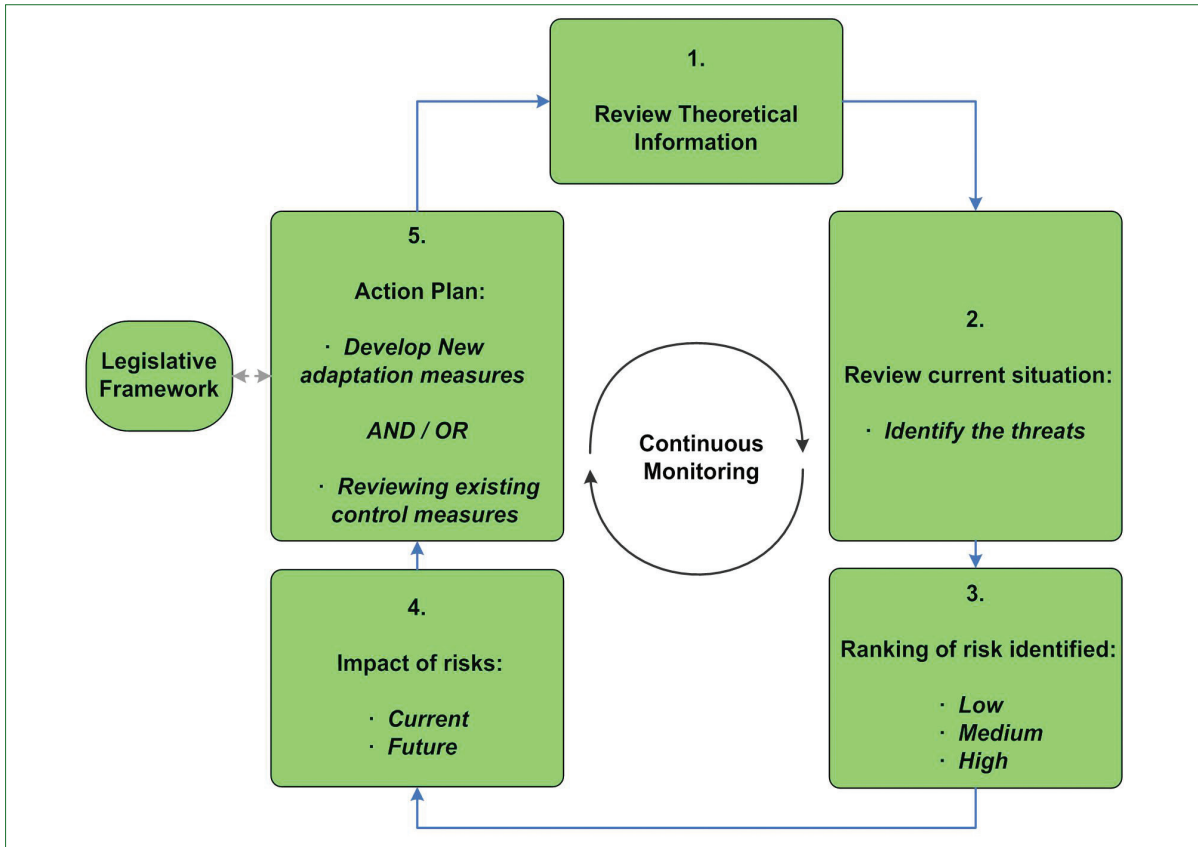
¹⁸ NRC (National Research Council). 1993. *Ground Water Vulnerability Assessment: Predicting Relative Contamination Potential Under Conditions of Uncertainty*. National Academy Press, Washington DC, p. 1.

¹⁹ Vrba, J. and Zaporozec A., 1994. *Guidebook on mapping groundwater vulnerability, International Contributions to Hydrogeology*, Vol. 16, p. 33.

²⁰ EPA, 2002. *Vulnerability Assessment Factsheet*, p. 1.

²¹ Nowlan, L. 2005. Buried treasure: Groundwater permitting and pricing in Canada. Walter and Duncan Gordon Foundation, with case studies by Geological Survey of Canada, West Coast Environmental Law, and Sierra Legal Defence Fund, as cited in the Watershed Management Bulletin Vol. 13/No. 1 Fall 2009, p. 18.

Figure 2 : Risk and vulnerabilities framework



2.2 Groundwater risk and vulnerability assessments carried out in Malta

2.2.1 Risk and vulnerability assessments including those related to groundwater, generally follow a multi-step approach. Such an approach includes the steps outlined in Figure 2.

Various risk and vulnerability assessments were commissioned to identify threats to groundwater.

2.2.2 The risk and vulnerability framework indicated in Figure 2, presents a general approach in the conduct of groundwater risk and vulnerability assessments, as indicated below:

- i. *Review theoretical information* – Available data is collated and analysed to initially characterise the groundwater scenario including the water bodies' characteristics, the impact of human activity on groundwater and the economic analysis of water use.
- ii. *Review current situation* – A more detailed review based on field research is conducted involving the identification of key threats.

iii. *Evaluate the risk* – The identified vulnerabilities are ranked in accordance to their level of risk.

iv. *Analyse the impact of the threats identified on the environment and the economy* - From the data collated, current and future projections of the impact of climate change on groundwater are performed.

v. *Devise action plan* – The required action to manage the identified threats is presented. The plan is to outline key milestones for the achievement of critical initiatives, the entity responsible for developing and implementing the action plan, the resources required to achieve effective results, and a date for reviewing results against the plan.

vi. *On-going monitoring* – The agreed-upon milestones and the results achieved are monitored periodically to determine whether the results attained are in line with the related regulatory framework. This monitoring provides for further development of policies, strategies and plans to sustain groundwater.

2.2.3 Government commissioned the conduct of a number of risk and vulnerability assessments, which generally adhered to the aforementioned framework. For the purpose of this audit, the NAO considered only those assessments that contributed directly to Governments' regulatory framework to safeguard groundwater. These



assessments were either carried out in-house by local Governmental entities or sub-contracted. On one occasion, the assessment was conducted in collaboration with an international organisation.

The process undertaken to conduct these assessments adhered to generally accepted practices.

2.2.4 The first major assessment undertaken in recent years was the ‘Malta Water Resources Review’, 2006. This report provided a broad overview of the issues of concern related to Malta’s water resources. Additionally, this review served as the basis for other risk and vulnerability assessments. In fact, this review was one of the major

inputs of the risk and vulnerability assessments featuring in the Water Catchment Management Plan for the Maltese Islands.

2.2.5 Other major inputs in the WCMP’s risk and vulnerability assessments included the ‘Economic Characterisation of the Maltese Water Catchment District’ and the ‘Initial Characterisation of the Groundwater Bodies within the Maltese Water Catchment District under the Water Policy Framework Regulations, 2004’. These assessments were also supplemented by the further characterisation exercise. It is to be noted that the assessments referred to in this study were also Water Framework Directive (WFD) mandatory requirements. Table 3 refers.

Table 3 : Risk and vulnerability assessments conducted

	Publishing date	Entities performing the assessments	Cost (€)
Malta Water Resources Review	2006	MRA with the collaboration of the FAO	This report was funded by the FAO.
A Preliminary Study on the Identification of the Sources of Nitrate Contamination in Groundwater in Malta	2008	British Geological Survey	242,600
The Environment Report – Fresh Waters	2008	MEPA	60,252 ²² are the total costs of the Environment Report. However, this figure excludes the costs of the work performed by MEPA staff.
The Second Communication to the UNFCCC	2010	MEPA, MRRA, UoM, UNDP	269,668
The Water Catchment Management Plan for the Maltese Islands	2011	MEPA, MRA	Costs are absorbed by the responsible entities.

²² This cost includes €549 direct costs related to the Fresh Waters reporting.



2.2.6 Table 3 also illustrates that primarily the risk and vulnerability assessments conducted focused exclusively on the prevailing groundwater situation. Topic specific assessments included ‘A Preliminary Study on the Identification of the Sources of Nitrate Contamination in Groundwater in Malta’ and ‘The Environment Report 2008 – freshwaters’. The other assessments are considered to be of a holistic nature focusing on the various impacts including climate change threats to groundwater.

2.2.7 The Second Communication to the United Nations Framework Convention on Climate Change (UNFCCC) was a mandatory report requested by the latter. This document seeks to address data gaps and adaptation issues highlighted in the First National Communication (2004), as well as to stimulate the strengthening of Malta’s climate change policies.

2.2.8 Although it was felt necessary to supplement the information provided in the Second Communication to the UNFCCC, the Climate Change Committee for Adaptation (CCCA), entrusted with the compilation of the National Climate Change Adaptation Strategy (NCCAS), was not able to conduct further climate change risk and vulnerability assessments because of:

- lack of essential resources needed to successfully conduct these assessments;
- lack of updated research to compile reliable climate change projections; and
- fragmented data between the concerned entities.²³

2.2.9 The draft National Environment Policy, launched in September 2011, also acknowledges the necessity to improve the understanding of the impacts of climate change in Malta.

For this purpose, the Ministry for Resources and Rural Affairs (MRRA) and the Malta Resources Authority (MRA) will prepare national impact scenarios on climate change by 2012.²⁴

Various constraints impeded the CCCA from conducting risk and vulnerability assessments on climate change projections.

2.3 Evaluating the quality of risk and vulnerability assessments

2.3.1 The NAO sought to determine the effectiveness of the risk and vulnerability assessments conducted. Good quality assessments enable robust decision-making in order to adequately address the current groundwater challenges and the impacts of climate change.

2.3.2 For the purpose of evaluating the quality of these assessments, the NAO adopted the criteria indicated in Table 4. It is to be noted that this criteria does not extend to the technical content of these assessments. This table gives an overview of the result of each assessment against the selected evaluation criteria.

2.3.3 Table 4 demonstrates that, in terms of the NAO criteria, the process undertaken to compile the risk and vulnerability assessments was generally effective due to the following reasons:

- i. The appropriate level of expertise was engaged in the conduct of these assessments.
- ii. Cost estimates related to measures listed in the WCMP were drawn up which were, however, subject to various technical assumptions and prevailing conditions up to 2009.

²³ Climate Change Committee for Adaptation, Malta 2010. *National Climate Change Adaptation Strategy*, Consultation Report, p. 5.

²⁴ OPM, 2011. *National Environment Policy*, p. 76.

Table 4 : Evaluating the quality of the risk and vulnerability assessments

	Engagement of field experts	Projected costings of specific measures	Consideration of the climate change impacts	National review of assessments	Supranational review of assessments	Review date established
Malta Water Resources Review	Yes	Not applicable	Yes	Yes	Not applicable	Not applicable
A Preliminary Study on the Identification of the Sources of Nitrate Contamination in Groundwater in Malta	Yes	Not applicable	Not applicable	Yes	Not applicable	Not applicable
The Environment Report - Fresh Waters	Yes	Not applicable	Yes	Yes	Not applicable	Yes
The Second Communication to the UNFCCC	Yes	Not applicable	Yes	Yes	Yes	Yes
The Water Catchment Management Plan for the Maltese Islands	Yes	Yes	Yes	Yes	Yes	Yes

- iii. Climate change impacts were generally outlined, however, these were subject to inherent limitations concerning national projections.
- iv. The comprehensiveness and quality of the assessments was ascertained in the approval process entailing reviews by relevant ministries, entities and public consultations.
- v. Where applicable, assessments were also subject to United Nations and European Union (EU) reviews.
- vi. The review date in the risk and vulnerability assessments indicates that, where applicable, periodic updates are performed to reflect emerging circumstances.

The approach adopted in the conduct of these assessments led to comprehensive evaluations.

2.3.4 Despite their overall effectiveness, the risk and vulnerability assessments were inherent to three main limitations:

- The quantification of groundwater abstraction by the agricultural, commercial and domestic sectors cannot be reliably quantified although estimates are available. Groundwater abstraction related to the agricultural sector is calculated on the hectares of land a farmer owns and the respective coefficient of water use.²⁵
- The reliability of the results produced by models used to identify trends related to climate change projections is limited due to the lack of the relevant time series data.²⁶
- The small territorial area of Malta and its closeness to the sea increases the complexities involved in compiling climate change studies.²⁷

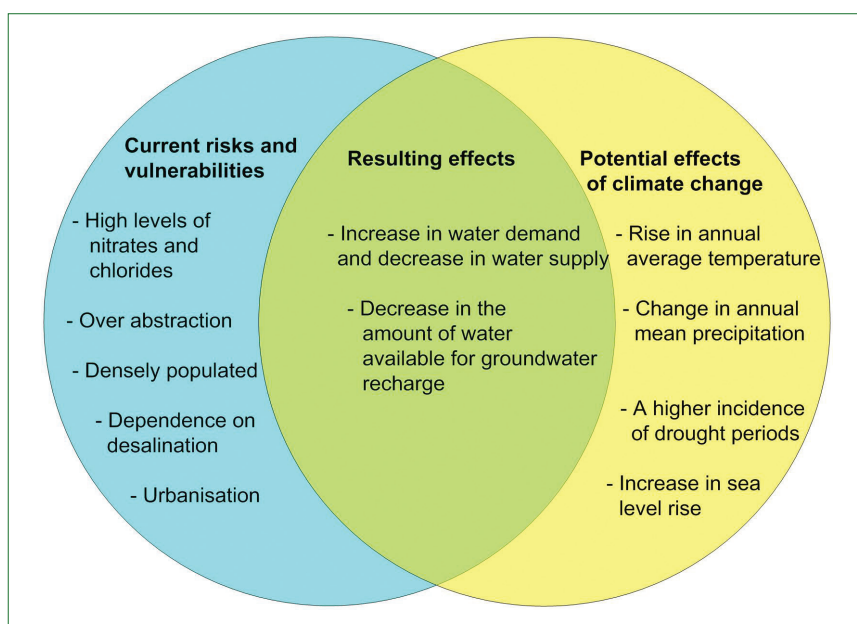
Major limitations of these assessments related to data gaps and reliability of data as well as Malta's territorial size.

2.3.5 Considering the aforementioned limitations, however, the risk and vulnerability assessments undertaken have mainly provided robust indications of the prevailing concerns and the potential threats of climate change to

²⁵ While the metering of groundwater infrastructure related to the agricultural and commercial sectors is still in progress, it is envisaged that abstraction from domestic sources will cease.

²⁶ MRRA, 2010. *The Second National Communication of Malta to the United Nations Framework Convention on Climate Change*, p. 216.

²⁷ *Ibid.*, p. 27.

Figure 3 : Risk and vulnerabilities identified

Malta's groundwater. These are going to be discussed in the next section.

2.4 Threats to groundwater

2.4.1 The risk and vulnerability assessments undertaken identified various threats to Malta's groundwater emphasizing its unsustainable status. Generally, the threats outlined were backed up with quantitative and qualitative technical assessments. Figure 3 refers.

2.4.2 Figure 3 presents only a very broad overview of the risk and vulnerabilities related to groundwater. A more comprehensive evaluation of the current status of Maltese groundwater bodies is presented in Table 1, page 17. It is to be pointed out, however, that the assessments undertaken provide in-depth technical details about specific risk and vulnerabilities, such as those related to excessive over abstraction, as well as high chlorides and nitrates levels.

2.4.3 Over abstraction affects both the quantity and quality of groundwater as it leads to saline intrusion especially in the coastal and sea-level aquifers. In turn, saline intrusion results in high chloride concentration.²⁸

The poor status of water is mainly due to excessive abstraction as well as high levels of nitrates and chlorides.

2.4.4 The nitrates threshold of 50mg/l, established by the WFD, was surpassed by the Malta Mean Sea Level aquifer, which is the most important Maltese groundwater body. Moreover, three other aquifers exceeded this limit by six times.²⁹ The risk and vulnerability assessment concluded that nitrate contamination was mainly due to the anthropogenic activities.³⁰ These include the excessive use of fertilizers and inadequate storage capacity for livestock manure.

2.4.5 Additionally, the most recent assessment, namely the WCMP, noted that groundwater status was considered to be 'at risk' and not adhering to the groundwater status envisaged by the WFD.

2.5 Conclusion

2.5.1 This Chapter sought to evaluate the extent to which the processes involved in the conduct of these assessments lead to the identification of threats to Malta's groundwater. Following the review of the processes undertaken in the compilation of these assessments, these studies have generally identified the risk and vulnerabilities to Malta's groundwater arising from prevailing circumstances and climate change threats.

2.5.2 The main vulnerabilities identified related to the poor status of groundwater due to excessive over

²⁸ It is to be noted that while the nitrates threshold established was common for the EU Member States, the chlorides threshold values are specific to Malta and to the different groundwater bodies.

²⁹ MRRA, 2011. *Draft Nitrates Action Programme Malta*, p. 18.

³⁰ MR, 2005. *Initial Characterisation of the Groundwater Bodies within the Maltese Water Catchment District under the Water Policy Framework Regulations, 2004, Final Draft, 13 January 2005*, p. 14.

abstraction, nitrates and chlorides levels. Such concerns are expected to be further compounded through the impact of climate change.

2.5.3 The process leading to the conduct of these assessments was generally effective. Moreover, the adequacy of these assessments was confirmed through the various reviews at the national and supranational levels. Whenever it was mandatory, these assessments were subjected to public consultation.

2.5.4 However, various data gaps exist. For instance, groundwater abstraction levels are based on various assumptions. Consequently, results derived from models used to estimate the volume of groundwater are based on several assumptions since comprehensive data derived through metering is not yet available. Moreover, time

series data relating to a number of variables associated with climate change is not available. This situation impeded on the generation of more reliable projections on the prevailing status of groundwater and the potential impacts of climate change.

2.5.5 The risk and vulnerability assessments contributed significantly in the compilation of Government's policy, strategy and plans to address the prevailing problem of poor groundwater status.

2.5.6 The next Chapter of this Report evaluates the extent to which the process undertaken to develop the relevant regulatory framework to safeguard groundwater was appropriate and provided adequate guidance to the implementing entities in addressing the current status of Maltese groundwater bodies.



Chapter 3

Malta's strategic vision to safeguard groundwater

Chapter 3 – Malta’s strategic vision to safeguard groundwater

3.1 Introduction

3.1.1 The critical importance of groundwater has been reflected in Government’s vision relating to the sustainability of Malta’s water resources. In accordance with this vision, Government is aiming to improve Malta’s water status in an environmentally and economically sustainable way, to ensure a consistently adequate supply. Furthermore, Government is seeking to recognise and adapt to the impact of climate change on this resource.³¹

3.1.2 In order to implement this vision, Government developed the relevant policy, strategy, and plans reflected in four key documents namely:

- ‘A Proposal for a Water Policy for the Maltese Islands’ (draft), hereinafter referred to as the Water Policy;
- ‘The Water Catchment Management Plan for the Maltese Islands’ (WCMP);
- ‘Nitrates Action Programme’ (NAP); and
- ‘National Climate Change Adaptation Strategy’ (consultation report) (NCCAS).

3.1.3 This Chapter evaluates the extent to which the process undertaken to develop the relevant policy, strategy and plans to safeguard groundwater was appropriate and provides adequate guidance to the implementing entities. The NAO’s evaluation sought to determine the extent to which the measures outlined in these core documents:

1. adhere to the Government’s vision and address the prevailing groundwater concerns and climate change threats to this resource as identified through the various risk and vulnerability assessments carried out; and

2. are appropriately guiding the implementing entities to successfully achieve the established targets by indicating the expected outcomes, timeframes, responsibilities and cost estimates.

3.1.4 It is to be noted that a review of the technical contents of these documents was beyond the scope of this Audit.

3.2 Adherence to Malta’s groundwater vision

3.2.1 Along the years, Malta has been taking diverse action to safeguard groundwater resources. Such measures included the regular monitoring of aquifers, efforts to reduce water demand and minimise water losses through the distribution system, as well as the regulation and the use of boreholes. Despite the aforementioned initiatives which were generally developed to counter prevailing circumstances, the need for a holistic approach to water management was felt. This need was further amplified through Malta’s European Union (EU) obligations, mainly emanating from the Water Framework Directive (WFD) and the Nitrates Directive.

3.2.2 Government’s holistic and integrated approach was intended to address the various efforts of the different entities involved in adopting practices that secure a sustainable water supply. The main responsibilities identified in the four core documents were allocated to the Ministry for Resources and Rural Affairs (MRRA), and the Malta Resources Authority (MRA). Other responsibilities pertained to the Climate Change Committee for Adaptation (CCCA), the Malta Environment and Planning Authority (MEPA) and the Inter-Ministerial Committee (IMC). The responsibilities allocated are illustrated in Table 2 on page 19.

Malta’s strategic vision to safeguard groundwater is mainly reflected in the draft Water Policy, the WCMP, the NAP and the recently approved by Cabinet NCCAS.

³¹ MRRA, 2010. *A Proposal for a Water Policy for the Maltese Islands*, p. 1.

3.2.3 The next section discusses the extent to which the four key documents adhere to Government’s vision and address prevailing groundwater concerns and climate change threats to this resource.

A Proposal for a Water Policy for the Maltese Islands

3.2.4 The development of Malta’s Water Policy was undertaken in two main stages. A draft Water Policy was developed in 2004, entitled, ‘A Water Policy for the future’. Subsequently, the scope of this original policy was broadened in the new 2010 document entitled, ‘A Proposal for a Water Policy for the Maltese Islands’.

3.2.5 The aim of the 2004 Water Policy was to provide a policy framework for the rational management of Maltese groundwater. A consultation exercise on this draft Water Policy was held in 2004. However, since the focus of the 2004 draft did not encompass all water resources, it was deemed necessary to broaden its scope in order to comprise all water resources. Additionally, the lack of availability of appropriate resources constrained Government to prioritise the drafting of the WCMP instead as the latter is an EU requirement. Consequently, the 2004 Water Policy was not adopted but a new one was drafted to provide for a holistic and integrated approach to water management as it is indicated in the preceding paragraph.

The process to finalise Malta’s Water Policy has been ongoing since 2004.

3.2.6 In July 2010, the MRRA presented the draft Water Policy for public consultation. This document is expected to be approved and formally adopted by Government in the coming months. Although still at a draft stage, this Water Policy has not directly impeded on the development and implementation of other water-related initiatives through

other policy documents, such as the WCMP.

3.2.7 This document aims to address both the quantitative and qualitative risks to Malta’s water resources including groundwater. In order to address Government’s vision, the draft Water Policy proposes six key objectives as Figure 4 depicts.

3.2.8 The aforementioned objectives are reflected in the various proposed measures categorised in twelve policy areas. The implementation of the groundwater measures within these policy areas are discussed in Chapter 4.

National Climate Change Adaptation Strategy

3.2.9 In order to ensure the sustainability of water resources as outlined in its vision, Government commissioned the development of the ‘National Climate Change Adaptation Strategy’. This document was intended to complement the work of the Second Communication to the UNFCCC. The NCCAS was also intended to serve as the fulcrum for local discussion on climate change adaptation. In order to achieve the objectives of the Water Policy and the WFD, it is critical that the appropriate adaptation measures are effectively addressed. The NCCAS adopts a holistic approach as it identified the climate change impacts with particular reference to health and socio-economic policy, water and flooding as well as biodiversity and agriculture.³²

The NCCAS was intended to serve as the fulcrum for local discussion on climate change adaptation.

3.2.10 Moreover, adaptation is necessary to reduce the costs and disruptions likely to emanate from adverse climate change conditions, alter behavioural patterns and

Figure 4 : The Water Policy objectives

Supply of good quality water to meet the needs of the population.
Sustainable use and management of the nation’s water resources.
Protection of the water resources and the aquatic environment from pollution.
Fair and transparent regulation of the water industry.
Mitigating against the effects of floods.
Adaptation to climate change.

Source: MRRA, 2010. *A Proposal for a Water Policy for the Maltese Islands*, p. 10.

³² Climate Change Committee for Adaptation, Malta, 2010. *National Climate Change Adaptation Strategy*, p. 1.

enable better planning and decision-making. In this regard, it is important to first acknowledge the causes derived from climate change, particularly from extreme weather events like storms, floods and heat waves, and then devise action plans to tackle such climatic phenomena that will impact on Maltese water resources.

3.2.11 The Climate Change Committee for Adaptation (CCCA) was appointed by the Minister for Resources and Rural Affairs to draft the NCCAS. In accordance with the CCCA’s terms of reference, the recommendations proposed had to be consistent with the relevant EU objectives, the UNFCCC, and the developments of the post-Kyoto Protocol.

3.2.12 In addition, it is to be noted that the recommendations proposed by the CCCA are deemed to be of a ‘no pain’ nature. This implies that any action taken irrespective of climate change considerations will yield positive contributions.

3.2.13 The NCCAS has been recently approved by Cabinet and is in the process of being discussed by Parliament. Consequently, action relating to most of the measures listed therein is still to commence. Action taken so far relates to measures that are congruent with the existing groundwater problems, namely those listed in the WCMP.³³ The fact that this strategy has only recently been approved raises the following concerns:

- i. The formal delegation of responsibilities to specific entities to manage the implementation of the climate change measures are still in the process of being formally assigned. Consequently, this hinders the commencement of preliminary research and related administrative work.
- ii. The NCCAS does not provide for cost estimates in relation to the recommended measures nor implementation timeframes. However, preliminary action in this regard has commenced by the MRRA.

Since the NCCAS has only recently been approved by Cabinet, action taken so far relates to measures that are congruent with the existing groundwater problems.

3.2.14 The recent developments concerning the NCCAS imply that formal delegation of climate change adaptation

responsibilities can take place following the relative debate in the House of Representatives. Consequently, the responsible entities will be in a better position to fully embark on action to implement the NCCAS recommendations.

The Water Catchment Management Plan for the Maltese Islands

3.2.15 Government’s vision to ensure the sustainability of water resources is also expressed through the WCMP. The WCMP was published in March 2011 by the MEPA and the MRA, even though this covers the period 2009 to 2015. The WCMP is an EU and national requirement through the WFD and the Water Policy Framework Regulations, 2004, respectively.

3.2.16 The Plan is holistic as it addresses all waters. In addition, the achievement of its objectives impacts on other sectors, namely, health, biodiversity, landscape, soil and climate factors.³⁴ The objectives related to groundwater include the following:

- preventing deterioration in the status of groundwater bodies;
- protecting, enhancing and restoring all groundwater bodies;
- preventing and limiting the input of pollutants in groundwater;
- reversing any significant upward trend of pollutants in groundwater; and
- achieving good groundwater qualitative and quantitative status by 2015, or in specific circumstances by 2021 or 2027.³⁵

3.2.17 In addition, the WCMP measures were subjected to a climate change check. Such a check was performed to identify those measures best suited to strengthen Malta’s capacity to adapt to climate change and those that will be less effective in this regard. Consequently, these measures can also be considered as climate change adaptation measures.

The WCMP measures were subject to a climate change check.

³³ It is to be noted that some adaptation measures listed in the NCCAS are also included in the draft Water Policy.

³⁴ MEPA, 2010. *Strategic Environmental Assessment for the Water Catchment Management Plan for the Maltese Islands*, p. 127.

³⁵ http://www.mra.org.mt/wfd_introduction.shtml, as at 30 November 2011.

3.2.18 Furthermore, a strength of this Plan relates to the fact that it provides for the IMC to oversee its implementation and to encourage the accountability of the implementing entities. The IMC is chaired by the MRA with the participation of the Ministry for Finance, Economy and Investment (MFEI), the MRRA, the MEPA, the Water Services Corporation (WSC), and the Transport Malta.³⁶

The organisation structure for water management is generally in place.

Nitrates Action Programme

3.2.19 Ensuring the sustainability of Malta’s groundwater in accordance with Government’s vision also entails addressing the problem of nitrates contamination in the aquifers. Reducing the level of nitrates in Malta’s water resources is also an EU requirement in terms of the Nitrates Directive (CD91/676/EEC).

3.2.20 The MRRA issued the Nitrates Action Programme (NAP) through L.N. 321 of 2011. The NAP aims to minimise the contamination of groundwater resources through various initiatives. Since the Maltese Islands are designated as Nitrates Vulnerable Zones, the NAP obliges farmers and livestock breeders to reduce the use of nitrates by adhering to the maximum permissible nitrates threshold stipulated.

The legal framework regulating the use of nitrates is established.

3.2.21 The slow response characteristics of the sea level aquifers imply a long lag time between the implementation of groundwater mitigation and protection measures and their impact on groundwater quality. Thus, with respect to nitrates contamination, the attainment of the established threshold levels will only become apparent over the long-term.³⁷

The implementation of the NAP is considered critical to ensuring good quality status of Malta’s groundwater.

3.2.22 This section of the report established that Government’s vision to ensure the sustainability of Malta’s groundwater is appropriately reflected in the four key documents reviewed since:

- they enable a holistic approach to water resources management;
- they aim to address a broad spectrum of water related concerns;
- most of the measures indicated can be considered as climate change adaptation measures;
- they take into consideration the EU’s obligations regarding water resources including groundwater.

3.2.23 The implementation of Government’s vision is however impeded since the Water Policy is still in draft form and the NCCAS has only recently been approved by Cabinet. These two critical documents are intended to contribute towards providing the overall direction towards attaining Government’s vision. Consequently, the prolonged delays to formally approve these documents may restrict the attainment of good groundwater status within the envisaged timeframe.

3.3 Recognition of risk and vulnerability assessments

3.3.1 The effective developments of the four key documents is dependent on the extent to which the risk and vulnerability assessments are reflected therein. For this purpose, the NAO ascertained that the issues raised and the recommendations proposed by the risk and vulnerability assessments discussed in Chapter 2 are appropriately addressed through the four key documents. One limitation of the risk and vulnerability assessments conducted relates to the fact that due to the lack of appropriate resources, the CCCA was not in a position to conduct a specific assessment to complement the existing work relating to climate change adaptation. Section 2.2.8 refers.

Government’s groundwater regulatory framework considers the risk and vulnerability assessments carried out.

³⁶ MEPA and MRA, 2010. *The Water Catchment Management Plan for the Maltese Islands*, p. 140.

³⁷ MRRA, 2011. *Nitrates Action Programme*, p. 9.



3.3.2 Table 5 shows the risk and vulnerability assessments considered in the compilation of the Water Policy, NCCAS, WCMP and NAP.

3.3.3 Table 5 illustrates the critical importance of the risk and vulnerability assessments carried out for the purpose of the WCMP. In fact, this assessment features in all four key documents. Additionally, each document under review utilises at least two risk and vulnerability assessments. This approach reveals that the compilation of the four key documents is sufficiently robust and comprehensive.

3.4 Operationalisation of strategies

3.4.1 For the purpose of this study, the NAO sought to determine the operationalisation of Malta’s strategic vision to safeguard groundwater. This evaluation entailed establishing the degree to which the policy, strategy, and plans have quantitative and qualitative targets,

a set timeframe, clear roles, where subject to public consultation, and received formal Government approval. The criteria utilised by the NAO are based on generally accepted practices related to operationalising policies, strategies and plans. The NAO utilised a Likert scale to reflect compliance of the measures to the aforementioned criteria. A limitation of this exercise relates to the fact that it does not allocate any weighting to the importance of specific measures. In addition, although there may be a high level of adherence to the evaluation criteria, grading along the Likert scale may exclude the potential effect of critical measures which fail to comply. Moreover, the scope of this exercise did not include evaluating the extent to which the operationalisation criteria pertaining to the specific measures quoted in the respective documents were feasible.

3.4.2 Table 6 provides a general outline showing the level of operationalisation of the policy, strategy and plans.

Table 5 : Risk and vulnerability assessments considered in Government’s regulatory framework

	Water Policy	NCCAS	WCMP	NAP
Malta Water Resources Review	X	X	X	
A Preliminary Study on the Identification of the Sources of Nitrate Contamination in Groundwater in Malta			X	X
The Environment Report - Fresh Waters		X		
Second Communication to the UNFCCC	X	X		
WCMP	X	X	X	X



The data utilised for this exercise emanated from the four key documents under review together with information collected through meetings with the involved entities. Appendices II to V provide details in this respect. The level of adherence to the NAO’s criteria was graded as:

- Yes – All measures adhered to the evaluation criteria.
- To a great extent – A vast majority of measures (80 to 99 per cent) adhered to the evaluation criteria.
- Generally – Most measures (50 to 79 per cent) adhered to the evaluation criteria.
- Very little – Few measures (1 to 49 per cent) adhered to the evaluation criteria.
- No – Non conformity to the evaluation criteria.

3.4.3 Table 6 illustrates that there is a high degree of adherence to the evaluation criteria in three of the four documents reviewed, namely the Water Policy, the WCMP

and the NAP. The results presented in this Table are further discussed in line with the respective document.

A Proposal for a Water Policy for the Maltese Islands

3.4.4 The main concern emanating from this exercise is that the Water Policy is still in draft form. Given that it is still at public consultation stage, the operationalisation criteria quoted therein is subject to change. The implications of such a situation are namely in terms of the general direction envisaged by the Water Policy and implementing accountability. In addition, although the Water Policy includes an implementation plan, however, no cost estimates are included.

The National Climate Change Adaptation Strategy

3.4.5 Since the NCCAS has recently been approved by Cabinet and is open to Parliamentary discussion, it is subject to the same concerns relating to the Water Policy. Possible delays in the formal approval of this Strategy by Parliament potentially hinder the timely implementation of the adaptation recommendations.

Table 6 : Operationalisation of the regulatory framework

Evaluation Criteria	Water Policy	NCCAS	WCMP	NAP
Outcome targets	Yes	To a great extent	Yes	Yes
Timeframe	Generally	Very little	Yes	Yes
Clear roles	To a great extent	Very little	Yes	Yes
Public consultation	Yes	Yes	Yes	Yes
Formal approved	No	No	Yes	Yes

The Water Catchment Management Plan for the Maltese Islands and the Nitrates Action Programme

3.4.6 Both the WCMP and the NAP complied fully with the NAO’s evaluation criteria. It is to be noted that the WCMP and the NAP are EU requirements in terms of the WFD and the Nitrates Directive respectively. Towards this end, the WCMP was referred to the EC.

3.5 Conclusion

3.5.1 This Chapter sought to determine the extent to which Malta’s strategic vision to safeguard groundwater is being reflected through the Water Policy, the NCCAS, the WCMP and the NAP. These documents appropriately define and operationalise Government’s vision into specific measures to safeguard groundwater. To a significant degree, these four documents address Malta’s prevailing

and climate change threats to groundwater. This statement relates even though the Water Policy is still in draft form and the NCCAS is awaiting formal Parliamentary discussion. In fact, some of the measures listed in these documents are being already addressed.

3.5.2 This mainly resulted from adequate recognition of the core risk and vulnerability assessments undertaken in the four key documents. These documents can be considered to provide appropriate guidance to the implementing entities in order to achieve the established targets. For this purpose, these documents generally define targets and outcomes, responsibilities and timeframes. However, it is to be emphasised that costs estimates have not always been established.

3.5.3 The next Chapter of this Report discusses the implementation of the policy, strategy and plans.



Chapter 4

Implementing groundwater measures

Chapter 4 – Implementing groundwater measures

4.1 Introduction

4.1.1 This Chapter aims to evaluate the extent to which the implementation of the measures to safeguard groundwater against the current and climate change threats is progressing in accordance to the set targets. For this purpose, this Chapter aims to discuss the coordination between the various entities involved in the implementation and the progress achieved on the measures, as well as the level of enforcement exercised to ensure compliance with the groundwater regulatory framework.

4.1.2 The findings and conclusions presented in this Chapter are based on the groundwater related measures listed in the four key documents namely, ‘A Proposal for a Water Policy for the Maltese Islands’ (Water Policy), the ‘National Climate Change Adaptation Strategy’ (NCCAS), ‘The Water Catchment Management Plan for the Maltese Islands’ (WCMP) and the ‘Nitrates Action Programme’ (NAP). Most of the measures being implemented are those related to the WCMP and the NAP. It is to be noted, however, that a number of other measures listed in the Water Policy and the NCCAS are nevertheless being implemented through other policies and departmental initiatives.

4.1.3 It is envisaged that the WCMP measures are scheduled to commence by 2012 as stipulated in Article 11 of the Water Framework Directive (WFD), and completed by 2015. Furthermore, the measures listed in the NAP became effective on 5 August 2011. Given that the latter mainly relate to regulatory measures, their implementation is of an ongoing nature.

4.2 Coordinating the implementation of groundwater measures

4.2.1 In view of the diverse nature of the groundwater measures listed in the four key documents, several entities are involved in their implementation. Most of these entities

fall within the remit of the Ministry for Resources and Rural Affairs (MRRA). The other entities involved in implementation projects are the Water Services Corporation (WSC) and the Malta Competition and Consumer Affairs Authority (MCCAA).

4.2.2 Groundwater issues form part of an integrated water resources framework. In view of the number of entities involved, the substantial amount of measures and their relative complexity renders coordination at the macro and micro level a critical element for effective implementation.

The number of entities involved in managing groundwater and the substantial number of measures make coordination a key factor in successful implementation.

4.2.3 This audit evaluated the extent of coordination related to the implementation of groundwater measures on various criteria as outlined hereunder. The data and information utilised for this exercise was mainly derived from the four key documents and semi-structured interviews with the major entities.

Roles and Responsibilities

4.2.4 The four key documents reveal that Government, namely through the MRRA, has the overall responsibility for the implementation of the groundwater measures. For this purpose, at the macro level, the MRRA also has the leading coordinating role with respect to the groundwater policy.

4.2.5 The two plans, namely the WCMP and the NAP, appropriately define the roles and responsibilities for specific measures. This audit ascertained that the entities listed in these documents are appropriately aware of their relative responsibilities.

4.2.6 Moreover, the WCMP details the need for an administrative framework, namely, an Inter-Ministerial Committee (IMC) to ensure the effective and timely implementation of the Plan.³⁸ In 2011, the IMC was set up to oversee the implementation of the Plan.³⁹ The Committee meets around every quarter to review the progress achieved or otherwise on every WCMP measure.

4.2.7 In a few cases related to the measures listed in the Water Policy, the responsible implementing entity was not appropriately identified. Such circumstances mainly arose due to the draft status of the Water Policy. In addition, the NAO exercise revealed that in some cases, entities other than those indicated were implementing the relative measures. Table 7 refers.

In the draft Water Policy and the 2010 NCCAS, the responsible implementing entities were not always defined.

4.2.8 Generally, the 2010 NCCAS does not identify specific entities to implement the measures proposed therein since it has only been recently approved. The NAO acknowledges that the MRRA is currently working to identify and allocate responsibilities related to specific NCCAS measures to the relevant entities.

Table 7 : Undefined roles and responsibilities in the Water Policy

	Measure	Reason
Sustainable groundwater use	Promote the use of alternative methods for plant protection other than pesticides	The DoA is outlined as the implementing entity, however, this measure is being implemented by the MCCA.
	Creation of a perennial system to collect and treat pesticide packaging and non utilised products	The MEPA and the DoA are outlined as the implementing entities, however, this measure is being implemented by the WasteServ.
Optimisation and use of non-conventional water sources	Studies for small decentralised sewage treated plants	The WasteServ is identified as one of the implementing entities, however, this measure does not fall within this entity's remit.
Rainwater harvesting	Financial support mechanisms and incentive schemes for increasing storage for rainwater-runoff for industrial and agricultural sectors	The Water Policy outlines the MFEI and the MRRA Rural Affairs Division as the implementing entities, however, these entities did not acknowledge this responsibility.
	Financial Support mechanisms for integration of rainwater cisterns with the domestic plumbing systems	The BCID and the MFEI are the outlined responsible entities. However, the BCID was dissolved six years ago and the MFEI was not in a position to forward the NAO any reply on this measure.
Protection of water resources from pollution	Control of pollution from nitrates and pesticides through the CoGAP	The MEPA is jointly outlined as one of the implementing entities with the DoA. However, the former's role is regulatory.
Reduction and management of risks associated with floods	Review of the Storm Water Master Plan	The Storm Water Unit within the MRRA and the MRA are outlined as the implementing entities, however, this measure is not being implemented by the former.
	Public information and stakeholder consultation on flood risk mapping and management plans	The Local Councils are outlined as one of the implementing entities, however, neither the Local Councils Departments nor the Local Councils Association are informed of this measure.

³⁸ MRA & MEPA, 2011. *The Water Catchment Management Plan for the Maltese Islands*, p. 40.

³⁹ Ibid.

Compliance to roles

4.2.9 The NAO exercise generally confirmed that the entities responsible for the measures listed in the documents under review acted in accordance with their specified roles. A few exceptions to this norm were noted. These related to measures listed in the Water Policy as indicated in Table 7, and the recently approved NCCAS as outlined in the aforementioned paragraph.

Sufficient coordination and communication

4.2.10 Coordination of the implementation of the various measures listed in the four key documents is undertaken at different levels. At the macro level, the MRRA coordinates the efforts of the various entities involved. Additionally, the WCMP is coordinated by the IMC as discussed in paragraph 4.2.6. The coordinating forums at the macro levels provide an effective platform for the sharing of knowledge and information. This is particularly evident at the IMC, where experts from various departments meet to report and discuss progress regarding the implementation of the measures.

4.2.11 At the micro level, heads of departments are generally responsible for coordination of the implementation of the relative groundwater measures. Towards this end, coordination is affected through regular meetings and communications.

There is generally sufficient coordination between implementing entities at the macro and micro level.

Specialised resources at the implementing agencies

4.2.12 The implementation of this integrated water framework necessitates that the responsible entities are either resourced with, or have access to, the appropriate specialised staff. This exercise revealed that the implementing entities are utilising various experts in the groundwater field. These experts are managing and coordinating the implementation of the measures within their respective entities and at times also providing their expertise to other Governmental bodies. The sharing of knowledge employees between the various Governmental entities increases the efficiency with regards to their utilisation.

Implementing entities utilise and share various groundwater expertise.

4.2.13 The specialised resources available at the implementing entities include hydrologists, engineers and

sustainable resource managers. Such a pool of resources facilitates the integrated management associated with the implementation of these measures.

4.2.14 The coordination to implement the groundwater measures generally adhered to the indicated evaluation criteria. While the aforementioned good practices enabled the planned implementation of a substantial number of measures, others have, however, fallen behind schedule for reasons discussed in the next sections.

4.3 Progress achieved in the implementation of groundwater measures

4.3.1 Most of the measures that have been or are in the process of being implemented are mainly those featuring in the WCMP and the NAP. The measures therein address the current and potential climate change threats through the adaptation measures recommended. It is to be noted that further adaptation recommendations were put forth in the NCCAS.

4.3.2 With regards to the WCMP, various complexities were encountered to implement the measures. Delays in the implementation of these measures may jeopardise the attainment of the WCMP's overall targets. The attainment of these targets is considered crucial since the implementation progress of the WCMP is scheduled for its first mandatory European Commission (EC) review in 2015.

4.3.3 The implementation of the NAP is critical to ensure the timely attainment of groundwater quality related measures listed in the WCMP. Following the transposition of the NAP into L.N. 321 of 2011, Maltese Authorities were empowered to enforce the obligations therein. Given that the Legal Notice became effective on 5 August 2011, a number of the WCMP targets related to groundwater nitrates contamination specifically scheduled for commencement in 2010 and 2011, are or may be delayed.

4.3.4 This audit sought to determine the extent to which the various measures listed in the four key documents have been implemented. Towards this end, the NAO determined whether the appropriate mechanisms to implement and monitor the progress achieved on the groundwater measures were in place. Additionally, the NAO evaluated whether the measures were implemented in accordance to schedule, and, where applicable, whether the intended results and outcomes were attained.

Mechanisms to implement and monitor progress

4.3.5 Both the MRRA as the main coordinator and the implementing entities have various mechanisms in place to implement and monitor progress. This section of the report aims to discuss the effectiveness of the systems in place to

report progress, assess results and allocate budgets, as well as whether the measures were considered by the competent entities to be socially, economically and environmentally sustainable.

There are various mechanisms in place to monitor the implementation progress of groundwater measures.

4.3.6 Report progress and assess results – There are various mechanisms in place to monitor the effective implementation of the groundwater measures listed in the WCMP and the NAP. As already outlined in paragraph 4.2.6, the IMC regularly monitors the implementation progress attained with regards to the WCMP measures. The importance of such monitoring is further emphasised since the IMC reports to Cabinet through the MRRA. Moreover, the EU mandatory reporting regarding the implementation of the WCMP is based on the IMC’s monitoring reports.

4.3.7 Progress related to the measures featuring in the draft Water Policy and the NCCAS which was recently approved by Cabinet are being monitored indirectly through the IMC. Such a situation materialised as a number of measures in these two documents deal with the same issues.

4.3.8 The Nitrates Action Unit (NAU) is responsible for monitoring the implementation of the NAP. Such monitoring entails administrative and technical checks. The administrative checks mainly relate to the proper upkeep of records. Technical checks relate to the analysis conducted to ascertain the levels of nitrates in soil. Both the administrative and the technical checks entail on-site inspections.

4.3.9 However, the NAU is not appropriately resourced. Consequently, checks in this respect are carried out by the Paying Agency (PA) at the MRRA with regards to cases involving EU funds. It is important to note that these checks relate to the regulations which were in force prior to the enactment of L.N. 321 of 2011. Such a situation implies that the monitoring of the NAP implementation is focusing only on about half of the Maltese farming population.

Monitoring of the NAP implementation is focusing only on about half of the Maltese farming population.

4.3.10 Allocation of budgets – A sound financial framework is considered to be a critical mechanism for monitoring the progress in the implementation of the groundwater measures. Cost estimates have been made with respect to the WCMP measures. The WCMP itself provides a detailed explanation of such estimates. The NAP also outlines the estimated costs regarding the measures listed therein.

4.3.11 Funding to implement the measures was undertaken through various channels. Whenever the measures were to be funded nationally, the usual budgetary process stipulated by the Ministry for Finance, Economy and Investment (MFEI) was followed. In cases of co-financing through EU funds, the applicable procedures stipulated by the relevant project fund regulations were also followed. Apart from controls at the implementing entities level, financial control mechanisms to monitor expenditure are in place at the MFEI, the Planning and Priorities Coordination Division, the PA and the EC. Moreover, the financial aspect is given critical importance when evaluation reports are drawn up with regards to the co-financed measures.

4.3.12 On the other hand, the implementation plan included in the draft Water Policy does not provide any cost estimates with regards to the measures listed. In addition, efforts are on the way by the MRRA to estimate the cost of the NCCAS recommendations.

4.3.13 Ensuring the sustainability of measures – The sustainability of measures in terms of their socio-economic and environmental impact was ascertained through the Strategic Environmental Assessments (SEAs). These assessments are a mandatory requirement of the SEA Directive 2001/42/EC which has been transposed into national legislation by the SEA Regulations, 2005 (L.N. 418 of 2005). The WCMP, the NAP and the Water Policy were all subjected to this process.

4.3.14 The SEA process with regards to the WCMP encompassed an evaluation of the measures’ impact on water, health, biodiversity, natural and cultural landscape, soil, climatic factors and waste.⁴⁰ Most of the measures listed in the NAP were transposed from the Rural Development Programme (RDP) for 2007 to 2013, which had already been subjected to the SEA process. Only one measure in the NAP which does not feature in the RDP was not subjected to the SEA process as this was deemed not to have an environmental impact.

4.3.15 The Water Policy was also subjected to the SEA process. This entailed the preparation of an environment

⁴⁰ MEPA, 2010. *Strategic Environmental Assessment for the Water Catchment Management Plan for the Maltese Islands*, p. 118.

report on the likely significant effects of the Policy on diverse sectors of the environment. Following the SEA, a public consultation ensued to ascertain that the measures proposed were not envisaged to cause any adverse socio-economic or environmental impacts.

4.3.16 The terms of reference assigned to the CCCA when drafting the NCCAS included identifying the impacts of climate change likely to affect Malta with particular reference, but not limited to, the Government's health and socio-economic policy, water and flooding, as well as biodiversity and agriculture. Subsequently, the adaptation measures proposed embraced the CCCA's assessments in this regard.

4.3.17 The discussion in the preceding paragraphs illustrated that the appropriate mechanisms to ensure the socio-economic and environmental sustainability of the groundwater measures were in place. However, in order to ensure the envisaged outcomes from such measures, the implementation process must adhere to the principles and timeframes outlined in the regulatory framework as discussed in the next section.

Implementation progress

4.3.18 This section aims to evaluate the level of implementation of the various measures intended to safeguard groundwater against prevailing and climate change threats. The NAO assessed the implementation progress against the pre-determined timeframes and the stipulated objectives of the measures. The undertaking of this exercise entailed reviewing and discussing with the implementing entities the relevant project management data and information relating to the Water Policy, the NCCAS, the WCMP and the NAP. This exercise was concerned with the period up to the end of October 2011.

4.3.19 Whilst acknowledging the draft status of the Water Policy and the fact that the NCCAS was recently approved by Cabinet, various measures listed therein are being implemented through the WCMP, the NAP and through departmental initiatives. On the basis of the foregoing, it was considered appropriate to assess the level of implementation of the measures listed in these documents. A detailed presentation of the results of this exercise is presented in Appendices II and III.

Implementation of a few measures listed in the draft Water Policy and the majority in the NCCAS has not yet commenced.

A proposal for a Water Policy for the Maltese Islands

4.3.20 The Water Policy, which spans over the period 2010 to 2015, aims to provide a holistic, integrated approach to enable the sustainable management of water resources and to support the implementation of the relevant EU Directives as well as other national obligations. Towards this end, the Water Policy proposed 72 measures which potentially have a significant impact on groundwater. These measures were mainly categorised under nine policy areas. It is to be noted that the NAO was not furnished with the requested information on 13 measures. Consequently, these were excluded from any further analysis.⁴¹

Undue delays to formalise the Water Policy may impede the implementation of some measures.

4.3.21 Twenty of these Water Policy measures have been either fully implemented or are in the process of being implemented through the requirements of other official plans, namely, the WCMP and/or the NAP. These measures will be discussed in paragraphs dealing with the implementation of the latter plans (4.3.34 to 4.3.64). Moreover, these measures are identified in Appendix II.

4.3.22 A further 31 measures were either implemented or have been in the process of being implemented through ad hoc initiatives by the concerned entities. The main motivation for embarking on the implementation process mainly related to EU mandatory requirements⁴² and the critical importance of the measure itself towards addressing groundwater and other environmental concerns.⁴³

4.3.23 Among the most critical measures which are still in the process of being implemented are those relating to the efficient, fair and equitable water pricing. In accordance with Article 9 of the Water Framework Directive, Government had to take into account the principle of the recovery of costs of the water services by 2010. In this regard, due consideration, where possible, was to be given to environmental and resource costs in water pricing.

Measures relating to the principle of the recovery of costs of the water services have not progressed as scheduled.

4.3.24 Apart from the fulfilment of EU obligations to undertake an economic analysis of the different water uses, progress so far included ad hoc initiatives undertaken by

⁴¹ These measures relate to those outlined in the Water Policy document as measures: 3.3, 3.7, 4.3, 4.4, 4.7, 5.1, 5.3, 5.4, 5.5, 10.1.2, 10.1.3, 10.4.1 and 11.1.

⁴² Example: Flood risk assessment.

⁴³ Example: Integration, where possible, of runoff storage or artificial recharge facilities in flood-relief initiatives.

various departments. Further progress in this regard will be attained when abstraction levels would have been monitored for, at least, a period of one year. Appendix II refers.

4.3.25 Action regarding the implementation of eight measures listed in the Water Policy has not yet commenced. There are three main reasons contributing to such circumstances namely:

1. *Measures are scheduled for implementation by 2015:* In four cases, implementation has not yet commenced on the basis that they are scheduled to be fully operationalised by 2015. The MRA, contends that these measures will be implemented by their due date. In addition, the Authority pointed out that these measures constitute EU requirements. Consequently the appropriate priority to their implementation will be allocated in due course. The measures in question are listed hereunder:

- Establishment of flood risk management plans,
- Public information and stakeholder consultation in relation to flood management,
- Flood hazard and flood risk mapping,
- Monitor and review effectiveness.

2. *The implementation of the measure is dependent on the operationalisation of other initiatives:* For instance, the measure relating to the financial instruments on water use cannot commence before the metering of groundwater sources is concluded. Furthermore, until the flood risk plan is finalised no progress can be attained on the measure relating to studies for the economic and environment appraisal of technical options for selection of the most appropriate alternatives.

3. *Further studies are required prior to implementation:* Considering the draft status of the Water Policy and the fact that it outlines broad concepts, some of the measures listed therein require further evaluation prior to implementation. There were two such measures listed in the Water Policy namely:

- facilitating competition in certain areas of the water industry; and
- farmers required to keep a record of breeding effluent.

4.3.26 Although still in draft form, a significant number of measures in the Water Policy have been or are being implemented. These measures mainly address the most critical prevailing groundwater concerns and the fulfilment

of Malta's EU obligations. Consequently, further delays to formalise the Water Policy as an official document may impede on the attainment of further progress to safeguard groundwater. A case in point relates to the efficient, fair and equitable water pricing measures.

National Climate Change Adaptation Strategy

4.3.27 In November 2010, the Climate Change Committee for Adaptation (CCCA), appointed by the Minister for Resources and Rural Affairs, published the NCCAS. This document has been recently formally approved by Cabinet and is expected to be fully implemented following Parliamentary discussion. This strategy proposed 49 adaptation recommendations which were considered to be directly or indirectly related to groundwater. Appendix III illustrates the extent of implementation with regards to these adaptation measures.

The implementation of the NCCAS is dependant on the forthcoming Parliamentary discussion.

4.3.28 This audit determined that action has been initiated only with regards to at least 10 recommendations in the NCCAS. These recommendations, which are also deemed to address the prevailing groundwater situation, can be categorised into two main climate change adaptation areas.

4.3.29 The first category encompasses recommendations relating to improving the projections on the impact of climate change. Generally, these recommendations entail the collection of more specific and accurate data, as well as the improvement of modelling techniques related to the projections of climate change impact.

4.3.30 The second category relates to action that has been initiated on recommendations aimed at reducing the pressures on the use of groundwater. These adaptation measures are intended to encourage the sustainability of Malta's groundwater by reducing demand pressures on this resource and ensuring the optimisation of aquifer recharge. Such measures include:

- **A National Flood Relief Plan** – This Plan has been concluded, however, efforts are now directed at securing EU funds to finance the project. It is estimated that the implementation of this plan will cost around €60 million.
- **A maintenance and preservation plan for all valley systems** – To date, action in this regard relates to the annual exercise of cleaning a number of valleys and soak ways. This exercise is mainly dependent on the availability of the MRRA resources.



- **Fiscal incentive schemes** - Towards this end, EU financial assistance was sought to enable 75 farmers to build reservoirs to capture 47,000 cubic meters of water. The cost to implement this initiative amounted to around €3 million. Moreover, the Malta Enterprise is operating two fiscal and one competitive cash grant scheme financed through European Rural Development Fund (ERDF). These schemes are intended to encourage the re-use and the recycling of water.
- **Groundwater metering** – This initiative is intended to provide data relating to groundwater abstraction and the development of a pricing mechanism. It is to be noted that, to date, the meters initiative has mainly focused on commercial enterprises. Recently, work relating to metering in the agricultural sector has commenced. In this regard, EU funding under the Rural Development Programme was obtained. Groundwater sources metering will be discussed in more detail in paragraph 4.3.48 to 4.3.50.
- **Minimising leakages from the water distribution system** – Initiatives by the WSC have enhanced the water distribution system and reduced losses from 3,900 cubic meters per hour in the mid-90s to below 500 cubic meters per hour in 2010. The WSC targets to reduce leakages to 400 cubic meters per hour by 2015.

4.3.31 Limited or no action was undertaken with regards to the remaining recommendations. Such a situation occurred since the Strategy is still to be discussed in Parliament. A case in point relates to measures dealing with establishing the climate change adaptation legal framework.

4.3.32 The fact that a number of key recommendations listed in the NCCAS have been or are in the process of being implemented emphasises the importance of this Strategy. Many entities are allocating due importance to climate change impacts and adaptation measures. However, significant progress can only be registered once the NCCAS has been formally adopted.

4.3.33 The implementation of the NCCAS is expected to gather momentum in the short term. Moreover, Malta is obliged to consider the EU's climate change adaptation strategy scheduled for publication in 2013. In this context, the establishment of the Inter-Ministerial Committee for Climate Change, as envisaged by the National Strategy for Policy and Abatement Measures Relating to the Reduction of Greenhouse Gas Emissions, is rendered critical to ensure timely and effective implementation.

The Water Catchment Management Plan for the Maltese Islands

4.3.34 The WCMP, a requirement of the WFD, aims to reduce the deterioration of groundwater quantity and quality. The WCMP stipulates that collectively all measures are to commence by 2012,⁴⁴ and are to be completed by 2015.⁴⁵ It is to be noted that most entities are targeting the full implementation of the WCMP measures with the latter date.

Despite the various complexities in the implementation of the WCMP measures, the entities are expecting to achieve full implementation by 2015.

⁴⁴ EC, 2000. *Establishing a framework for Community action in the field of Water Policy*, Article 11.7, p. 15.

⁴⁵ Ibid. Article 11.8, p. 15.



4.3.35 The WCMP categorises the proposed initiatives into basic and supplementary measures. Additionally, the aforementioned basic and supplementary measures are further categorised into eight key areas. The NAO review focused on the 20 groundwater related measures pertaining to four out of the eight WCMP categories.

4.3.36 Basic measures listed in the WCMP refer to the actions required by the WFD and other EU Directives such as the Nitrates Directive, the Urban Waste Water Treatment Directive, the Bathing Water Directive and the Drinking Water Directive. The ‘Economic Assessment’ carried out for the purpose of the WCMP estimates that the projected total investment and annual costs of the basic measures listed in the Plan amount to €165 million and €14 million respectively. These initiatives include the cost of the infrastructure needed to distribute Treated Sewage Effluent (TSE), and/or the cost of constructing a water storage facility.

4.3.37 Supplementary measures include a set of measures targeting issues related to the improvement of the regulatory framework, water quality, data compilation, evaluation and dissemination. Some supplementary measures cater for water conservation and efficiency of water use. These measures are beyond the efforts already being made by consumers included under basic measures to conserve and increase water use efficiency. The Economic Assessment referred to in the preceding paragraph forecasted the investment and annual cost of supplementary measures at €67 million and €8.5 million respectively.⁴⁶ The compilation and the verification of these financial estimates were beyond the scope of this audit.

4.3.38 The four key areas reviewed by the NAO relate to regulatory measures, measures related to agriculture and animal husbandry, measures dealing with the improvement in groundwater and measures needed to raise awareness and enhance Malta’s knowledge base on water issues.⁴⁷

4.3.39 From the 20 groundwater measures reviewed, it resulted that six (30 per cent) have been fully implemented while the remainder are in the process of being implemented. The ensuing paragraphs discuss the level of progress achieved in the WCMP’s four key areas.

Regulatory Measures

4.3.40 The WCMP outlines two regulatory measures focusing on the establishment of an IMC to oversee the WCMP’s implementation and to strengthen the existing environmental and planning regulatory processes. The IMC has been established in 2011 and is fully operationalised.⁴⁸

4.3.41 The process of strengthening the existing environmental and planning regulatory framework was scheduled to commence by 2010 in line with the WCMP. The envisaged regulatory framework is intended to develop and implement a framework to integrate water management objectives into sectoral programmes, plans and policies and in so doing, bridge the gap between the environment, resource management and spatial planning.

4.3.42 In this regard, MEPA, in accordance with its regulatory mandate, is rendered a critical player. However, the Authority was undergoing organisational reform and did not possess the appropriate specialised knowledge to fully develop and implement such measures. In view of

⁴⁶ MRA & MEPA, 2011. *The Water Catchment Management Plan for the Maltese Islands*, p. 120.

⁴⁷ It is to be noted that measures within the four key areas can pertain to either to the basic or supplementary categorisation.

⁴⁸ Further information on the IMC is presented in paragraph 4.2.6 and 4.3.6.

these circumstances, it was agreed within the IMC that the timeframe to commence the implementation of this measure be extended to end of 2011.

Measures related to agriculture and animal husbandry

4.3.43 Agricultural activities are significant contributors to nitrate pollution in groundwater. From a total of seven measures relating to agriculture and animal husbandry, two have been implemented. These measures related to the collection and treatment of pesticide packaging and non-utilised products as well as the establishment of the Farm Advisory Services for the farming community through L.N. 113 of 2010.

The majority of agriculture and animal husbandry practices measures are still work in progress.

4.3.44 The remaining five measures have been partly implemented. This situation has materialised because three of these measures relating to controlling nitrates contamination are dependent on the implementation of the second NAP. Paragraph 4.3.58 to 4.3.64 refer.

4.3.45 The commencement of the other two measures relating to controlling pesticide contamination was delayed. This situation materialised since the relative EU Directive has still to be transposed into national legislation. It was envisaged that this would take place by the end of 2011. In addition, the training provided was limited to full-time farmers.

Measures dealing with improvement in groundwater

4.3.46 The WCMP outlines six measures to safeguard groundwater within this category. Three of these measures, which are considered to be of an ongoing nature, have been implemented. These include:

- regulation of private water supply operators through the licensing issued by the MRA as stipulated by L.N. 525 of 2004;
- the WSC's efforts to continuously reduce water losses in the municipal distribution system; and
- increasing the capacity of rainwater runoff storage facilities through the periodic cleaning of valleys.

4.3.47 The remaining three measures listed under this category remain partly implemented. These measures are considered to be essential in order to control the amount of groundwater being abstracted. Moreover, these measures provide input data for further research on groundwater.

4.3.48 Measures in the process of being implemented include the installation of meters to water sources. This is considered to be a critical measure to safeguard groundwater. Such a measure facilitates the control of water abstraction, enables the development of groundwater pricing mechanisms and encourages further scientific studies. The WCMP envisaged that the groundwater metering of commercial and agricultural sources will commence by the end of 2011. The installation of meters of commercial sources has generally progressed and by the end of December 2011, there were around 80 meters still to be installed. However, the MRA has not yet commenced the monitoring of abstraction levels from the commercial sector. Such a situation resulted since the relative metering information has not yet been made fully available to the MRA.

Monitoring of abstraction levels has not yet commenced even though most of the commercial meters are installed.

4.3.49 The installation of meters of around 3,250 agricultural water sources is planned to be completed by mid-2013. However, completion of this process by this date implies that the provisions stipulated in L.N. 241 of 2010, 'Groundwater Abstraction (Metering) Regulations, 2010' cannot be implemented.⁴⁹ This legislation stipulates that the metering of groundwater sources was to start by 27 April 2011.

The non metering of groundwater sources prohibits the implementation of L.N. 241 of 2010.

4.3.50 The MRRA explained that various complexities hindered the earlier implementation of the metering process. The following refers:

1. Prior to the installation of meters, it had to be ascertained that the adequate infrastructure was in place. Towards this end, the MRRA had to conduct inspections at all water sources. By the end of October 2011, the MRRA had conducted around 200 of such inspections.
2. Progress related to the installation of meters was also hindered due to technical difficulties. These include infrastructural problems brought about by the different methods adopted over the years in the drilling of boreholes.
3. The WSC has procured meters to be installed to the agricultural sources. The first of these meters was installed recently. However, installation of these meters is dependent on the availability of the appropriate staffing levels at the MRRA. It is to be

⁴⁹ This Regulation came into force on the date it was published in the Government Gazette, that is, 27 April 2010.

noted that the recruitment process was in progress. Subsequently, training of the new appointees was planned to be provided by the end of 2011.

4. Legal complexities relating to the ownership of the water source has also impeded the progress of this measure. Ownership disputes occur when one or more parties abstract water from the same source. Consequently, in order to ascertain the volume of water abstracted by each party, multi-user cards to grant access to the water source will be provided. A call for tender for these multi-user cards is still to be issued.

4.3.51 Consequently, any delays in installing meters to agricultural sources will hinder the timely provision of data regarding groundwater use, leading to delays in action to remedy the problem of over abstraction in this sector.

Legal and technical complexities have delayed the commencement of the metering of the agricultural groundwater abstraction sources.

4.3.52 The other two partly implemented measures are dependent on the implementation of SW MED, MORISO and MEDIWAT projects. The main objective of these projects is to further undertake research on water demand and supply. The MRA and The Ministry for Gozo, are planning to conclude these co-financed projects within the stipulated timeframes, where the former will be concluded by 2013 and the remaining two by 2014. Appendix IV refers.

Measures needed to raise awareness and enhance the knowledge base

4.3.53 The five measures within this area have all been partly implemented. The aim of these measures is to increase the level of public awareness in order to generate greater support for the implementation of the Plan. These measures relate either to information made available to the general public or to the scientific officers for the purpose of safeguarding groundwater.

4.3.54 During discussions held at the IMC regarding the implementation of awareness campaigns by the various entities, it transpired that there is no consolidated approach to coordinate such campaigns. Such a fragmented approach may lead to the ineffective implementation of this measure and, as indicated during the IMC meeting, to EU reporting related problems.

4.3.55 Furthermore, efforts are being exercised by the implementing entities to conduct awareness campaigns to enhance the public knowledge on the use of groundwater.⁵⁰ It was pointed out in the IMC that currently the resources required to assist with campaigns to raise awareness and enhance the public knowledge base are not available.

Information campaigns undertaken by the different entities involved are not appropriately coordinated.

4.3.56 Moreover, the attainment of the measures under this area are dependent on the maintenance of two management information systems. These systems which focus on farm holdings⁵¹ and environmental concerns including water pertain to the DoA and the MEPA. Such systems are to be utilised for internal record keeping and analysis purposes. The implementing entities pointed out that such measures will be in place by 2012 and 2013 respectively.

Management information systems relating to farm holdings and water information are not maintained.

4.3.57 Given that preliminary work relating to measures scheduled to be implemented shortly is still at an early stage, the NAO is not in a position to ascertain whether these initiatives will commence by their due date in order to meet the relevant EU targets. However, the implementing entities were optimistic that they will be successful in meeting the 2015 target.

Nitrates Action Programme

4.3.58 As part of the obligations of the Nitrates Directive, all EU Member States are bound to establish the required legislative set-up to control nitrates pollution. Malta has complied with this requirement. This also entailed the identification of both water and land pollutants, and the drafting the Maltese Code of Good Agricultural Practice (CoGAP)⁵² and the NAP.

4.3.59 The goal of the NAP is to launch measures to reduce the impact of nitrates on water sources and prevent further contamination. The first NAP was issued in 2004 and was revised in 2011 to reflect more stringent measures beyond those stipulated in the Nitrates Directive.

4.3.60 All the measures listed in the NAP are of an ongoing nature, that is, action towards their effective

⁵⁰ The implementing entities refers to those participating in the IMC, namely the MRRA, MRA, MEPA and WSC.

⁵¹ This issue is further discussed in paragraph 4.3.62b.

⁵² The purpose of the CoGAP is to deal with the Nitrates Directive and provides a comprehensive list of all good practices emanating from EU Directives, national legislation, good farming practices as well as other practices which may be undertaken on a voluntary basis.

implementation is continuous and not a one-time occurrence. The implementing, monitoring and enforcing entity is the Nitrates Action Unit (NAU) set up under the DoA within the remit of the Rural Development and Aquaculture Department (RDAD). The PA which falls within the remit of the MRRA, currently is enforcing implementation on farmers receiving EU funds.⁵³ This exercise focused on 33 groundwater related measures which mainly reflect good agricultural practices listed in the NAP. Appendix V refers.

4.3.61 Eleven out of these 33 measures were implemented through the first NAP and the CoGAP. These measures mainly relate to controlling the application of fertilisers and the adequate storage of manure. Checks on these measures are performed by the PA under SMR 4, a statutory mandatory requirement which must be adhered to when implementing nitrates related EU programmes. The NAU pointed out that more scientific checks are planned to be conducted in 2012 when the appropriate resources are available.

NAP implementation is limited to those measures listed in the 2004 Action Programme.

4.3.62 The remaining 22 measures were, until end of October 2011, partly implemented. This was due to the following reasons:

- i The relevant legal framework was not in place, prior to 5 August 2011, when the NAP was transposed into L.N. 321 of 2011. Following the enactment of this legal notice, the NAU was then empowered to enforce its obligations and impose fines to defaulters. However, any action to enforce the legal notice has been limited for reasons outlined in the next paragraphs.

Even though, the use of nitrates has been legally regulated, the relative enforcement is not proceeding as the farming community is not deemed to be fully aware of its new NAP obligations.

- ii The implementation of the NAP is dependent on the farming community being knowledgeable on the Legal Notice provisions. However, efforts to conduct such information campaigns only commenced following the enactment of L.N. 321 of 2011.

Farmers could not be fully informed of the 2011 NAP obligations due to the unavailability of sufficient administrative capacity.

- iii Towards this end, the MRRA endorsed the €1.39 million grant agreement, ‘Information and communication campaign for the proper use and management of nitrates in agriculture and livestock breeding’ under the Life+ programme. This project which has a 28 month duration was scheduled to start from 1 September 2011. At the time of drafting this report, the RDAD was still in the process of recruiting the necessary personnel and procuring the required equipment⁵⁴ through the tendering procedure. Consequently, until this programme is implemented, farmers will not receive the necessary training to enforce the provisions of the NAP.

4.3.63 Effective implementation of the NAP requires that the provisions therein are appropriately enforced. This exercise has revealed that the NAP enforcement is considered limited since:

- a. Enforcement action is only being performed on farmers receiving EU funds. In 2010, this amounted to 47 per cent of the total farming population estimated at around 13,000. Such enforcement is intended to ensure the achievement and maintenance of standards on environmental and public health, animal and plant health as well as animal welfare.

Enforcement action is limited to the less stringent measures in the NAP, and only with respect to farmers receiving EU funds.

Cross-compliance checks conducted by the PA in 2010 on a sample of 679 farmers revealed an 88 per cent compliance rate with SMR 4 obligations. This compliance rate includes cases of minor non-compliance. Although the minor non-compliance rate noted is within the tolerable EC limits, the PA was obliged to increase the 2011 on-the-spot-checks from 11 to 12.75 per cent.

Although the non-compliance rate noted was within the tolerable EC limits, the PA was obliged to marginally increase its 2011 on-the-spot-checks performed.

⁵³ Refer to paragraph 4.3.63a.

⁵⁴ One such typical example includes the need for farmers to own soil analysis kits to determine nitrate in soil extracts which in turn leads to the development of an adequate fertiliser plan as approved by the NAU.

- b. Enforcement is also impeded since the National Nitrate Database system is not yet fully in place. The NAU plans to install this database to provide an integrated collection of consolidated data into a common pool for the organisation, storage, management, and retrieval of agriculture-related information.⁵⁵ It shall be utilised by the NAU and the PA to enable better controls on farmers and livestock breeders compliance with regards to the NAP. This system is estimated to cost €80,000, and is currently in the early stages of the procurement process. Furthermore, this database shall start functioning only when the relative administrative capacity is in place and information is collated from the farming community.

Enforcement action by the NAU is hindered by the lack of a management information system.

4.3.64 The implementation of the second NAP has been limited to the provisions of the first NAP which also feature in the former document. Moreover, implementation of the NAP was impeded since the legal framework enabling enforcement action to be taken on the NAP has only recently been enacted. Implementation of the NAP was further hindered due to the unavailability of the appropriate administrative capacity. Consequently, the farming community was not being adequately informed of their obligations and a comprehensive management information system is not fully implemented. In addition, enforcement of the NAP provisions was limited to farmers in receipt of EU funds.

4.4 Results and impact of measures

4.4.1 The expected results and impacts of the implemented measures are generally indicated in the documents discussed above. Most of the results and impacts outlined, including those relating to climate change, are attainable over the longer term. For example, good groundwater status in terms of quantity and quality is achievable only in the long-term due to the slow-response characteristics of the aquifers.

Implementation is targeted to proceed in line with the 2015 milestone.

4.4.2 Malta will be in a position to gauge its implementation progress and the relative impact on the groundwater status in 2015. This date signifies the first significant reporting obligations in terms of the WFD.

4.4.3 Given the circumstances discussed in the preceding paragraphs, this audit could only focus on the implementation progress attained thus far. The implementation of the groundwater measures appears to be addressing the most critical prevailing groundwater concerns and the fulfilment of Malta's EU obligations in this regard.

The implementation of the measures to date mainly addresses the most critical prevailing groundwater concerns and the fulfilment of Malta's EU obligations.

4.5 Conclusion

4.5.1 Malta's groundwater has been classified as 'at risk'. Such a classification implies that the sustainability of this resource is being seriously threatened through over abstraction and contamination. Over time, the regulation of this resource was not appropriate. Moreover, awareness related to the value and sustainable use of this resource was not given due consideration by all stakeholders.

4.5.2 This audit aimed to determine the extent to which the various measures being undertaken by government entities are effective in countering prevailing and climate change threats to Malta's groundwater. These measures aimed to establish a regulatory framework, control abstraction, minimise contamination and raise public awareness on the importance of sustaining this resource.

4.5.3 As at the end of October 2011, many measures related to groundwater were either implemented or partly implemented. However, due to the fact that the Water Policy is still in draft form and the NCCAS has only recently been approved by Cabinet, no action has been taken in relation to a number of measures listed in these documents. The entities involved pointed out that the necessary administrative process to finalise the Water Policy is at an advanced stage. However, undue delays to finalise this over-riding document may further impede the implementation of the measures to protect groundwater against prevailing and climate change threats.

4.5.4 Groundwater related concerns are being addressed through a holistic and integrated approach. Consequently, it is critical that the timeframes established for the implementation of specific measures are strictly adhered to. The non adherence to the stipulated commencement dates indicated in the various plans may cause implementation delays. Moreover, implementation delays may possibly

⁵⁵ MRRA, 2011. *Nitrates Action Programme*, p. 40.

lead to the non attainment of targets and the unfulfilment of legal provisions. An example of this eventuality relates to the metering of groundwater abstraction sources within the agricultural sector.

4.5.5 Implementation to date has focused considerably on the establishment of the regulatory framework to control groundwater abstraction and to ascertain its quality through minimising contamination. Although the

relative legal provisions are in place, the administrative and organisational capacity at various entities is still not available to fully enforce these provisions.

4.5.6 Finally, current efforts to ensure the timely implementation of the measures can be considered as a long term investment in order to safeguard this resource and thus to ascertain socio-economic development.



Courtesy of MRRA-PA

Appendices

Appendix I – State Audit Institutions participating in the cooperative Audit on adaptation to Climate Change

State Audit Institution	Audit title	Audit subject
Austrian Court of Audit	Adaptation to climate change on the level of the provinces (Laender)	Strategic and operative approach of the provinces; programs, plans and measures concerning the sectors forestry, water management, tourism, spatial planning; comparison of the auditees.
The National Audit Office of the Republic of Bulgaria	Adaptation measures undertaken by the Bulgarian Government to address the climate change	The audit is focused on the implementation of adaptation measures and activities undertaken by the Bulgarian Government to address the climate change in some of the sectors defined by the European Parliament as most vulnerable - water management, forestry and agriculture. Additionally, the audit is focused on government measures and actions in prevention and limitation of consequences from disasters, including the National Early Warning System.
Audit Office of the Republic of Cyprus	Adapting to climate change in Cyprus with focus on water, agriculture, forests and tourism	Assess the measures taken to adapt to climate change in the above sectors.
European Court of Auditors	Adaptation to climate change	EU progress on planning an EU policy on adaptation to climate change.
State Audit Office of Hungary		Observer Status.
National Audit Office – Malta	Safeguarding Malta's Groundwater	To determine the extent to which Malta's ground water is safeguarded against prevailing and climate change threats.
The Netherlands Court of Audit	Climate adaptation policy in the Netherlands	Topic - Foundations of the Dutch climate adaptation policy: risk assessment, adaptation strategy and adaptation programme. Objective: insight and oversight.
The Office of the Auditor General of Norway	The Office of the Auditor General's investigation into the efforts of the authorities to limit flood and landslide hazards	The goal of the investigation was to assess the extent to which the Ministry of Petroleum and Energy and the Ministry of the Environment and their subordinate agencies follow up the decisions and intentions of the starting and national objectives for the prevention of flood and landslide hazards.
Accounts Chamber of the Russian Federation	Climate Change Adaptation	To analyze the implementation of public policies on climate change and its impacts on agriculture. To evaluate the effectiveness of measures aimed at the adaptation of the Russian agriculture to climate change.
Accounting Chamber of Ukraine	Performance audit of the use of budget funds allocated to implementation of provision of the Kyoto Protocol to the UNFCCC, including funds received from parts of greenhouses trading	The objective of this audit is to assess the fulfilment of obligations by Ukraine within the Kyoto Protocol to the UN Framework Convention on Climate Change, in particularly adaptation to climate change on the national and regional levels; to estimate the legality, economy and efficiency of budget funds allocated to the implementation provisions of the Kyoto Protocol to the UNFCCC in 2010-2011, including funds received from parts of greenhouses trading according to the Article 17 of the Kyoto Protocol.

Appendix II – Measures listed in ‘A Proposal for a Water Policy for the Maltese Islands’

Legend:

WP + WCMP		WP + WCMP + NCCAS	
WP + NCCAS		WP + WCMP + NAP	

Measure	Implementation				Comments		
	Date as outlined in the WP	Ongoing	Status	Description			
Sustainable groundwater use	Water catchment management plan	2010		Implemented	Draft WCMP was issued in 2010 and finalised in 2011.	The cost of implementing this measure is: 1. Basic measure: €165m investment and €14m annual cost 2. Supplementary measure: €67 investment and €8.5m annual cost. MRA and MEPA are the two key responsible entities.	
	Outline of characteristics of water catchment including summary of pressures and impacts of human activity on groundwater status	2005	Yes	Implemented	Implemented through the finalised WCMP.	This measure was implemented in-house by MEPA and MRA.	
	Registers of protected areas of groundwater, habitats and species dependent on water	2005	Yes	Implemented	Implemented through the finalised WCMP.	This measure was implemented in-house by MEPA and MRA.	
	Assessment of current status of all water bodies	2005	Yes	Implemented	Implemented through the finalised WCMP.	This measure was implemented in-house by MEPA and MRA.	
	Development of programme of measures	2005	Yes	Implemented	Implemented through the finalised WCMP.	This measure was implemented in-house by MEPA and MRA.	
	Economic analysis of water use	2005	Yes	Implemented	Implemented through the finalised WCMP.		
	Implementation of a programme of measures for achieving the WFD environmental objectives	2012-2015				This is a core measure which is further discussed through the following ten measures.	

Measure	Implementation				Comments	
	Date as outlined in the WP	Ongoing	Status	Description		
Sustainable groundwater use	Modelling of the Mean Sea Level Aquifer systems	2015		Partly implemented	MRA was awarded the MORISO project through Interreg Italia-Malta. The project has started and the tendering process is underway. Project duration is over the period 2011-2014.	The total maximum project cost is €165,000 out of which MRA is going to co-finance 15%.
	Pilot projects on water demand management and supply augmentation	2015		Partly implemented	MRA in conjunction with MGOZ was awarded the SW MED project through the ENPI MED. In addition there is the MEDIWAT project which has started and focuses on using TSE to recharge aquifers.	For the SW MED, MRA and MGOZ have a budget of €128,708 each.
	Farmers required to keep a record of breeding effluent volumes and destination to application to land	2015		Not Implemented		NAU personnel explained that effluent in accordance with L.N. 321 of 2011 is deemed a pollutant as explained under the definition for slurry and therefore cannot be applied to land as stated.
	Farmers required to keep a record of farming practices.	2015		Partly implemented	Currently spot checks are being performed by the PA on farmers who are benefiting from EU funds. With the introduction of the NAP, all farmers are obliged to adhere to this measure. Information campaign to update the farmers with their new obligations is underway. Enforcement of the NAP measures is scheduled for 2012.	Enforcement of the NAP measures is scheduled for 2012.
	Construct anaerobic digestion plants for municipal waste and animal waste	2015		Partly implemented	WasteServ is in the process of planning two anaerobic digestion plants for the treatment of municipal solid waste (MSW) which shall also take on manure generated by a number of farms in Malta and Gozo. A third plant in Siggiewi shall cater for the treatment of manure generated by a cluster of 12 farms which shall be relocated from other areas.	Together these three plants are foreseen to generate circa 51GWh of energy (electricity and heat) by 2015 from both manure and MSW. This measure is being implemented by WasteServ.
	Reduce point source nitrate contamination from livestock units	2015		Partly implemented	Several but not all farms had updated their waste facilities in line with the CoGAP and NAP prior to the issue of L.N. 321 of 2011.	L.N. 321 of 2011 came into force on 5 August 2011.
	Farmers to draw up and comply with a nutrient management plan.	2015		Partly implemented	L.N. 321 of 2011 establishes the 2011 Nitrates Action Programme. This measure is obligatory under the NAP.	For further information, refer to Appendix V.

Measure	Implementation				Comments	
	Date as outlined in the WP	Ongoing	Status	Description		
Sustainable groundwater use	Promote the use of alternative methods for plant protection other than pesticides	2015		Partly implemented	One of the first tasks undertaken by the Technical Regulations Division - MCCAAs was the promotion of alternative methods for plant protection other than pesticides. The Technical Regulations Division has a minor role while the PHD and the DoA play a major role. Several other approaches are being undertaken: the creation of a Geographical Information System based programme in co-operation with the DoA regarding the ranking of pesticides to be used by farmers according to climate, soil, and hazard to the environment. In collaboration with the DoA, MCCAAs is exploring possible funding options and tenders for the implementation of this measure. In addition to the GIS-programme as a form of promotion of the PPPs with the least detrimental effect to the aquatic environment, the Pesticides legislation also requires the training and licensing of farmers. Training includes pesticides management and the usage of alternative methods for plant protection other than pesticides. Training materials have been prepared by MCCAAs for this purpose. As from 2012, new legal obligations will start coming into force on the local community with regards to the sustainable use of pesticides. The EU directive on the sustainable use of pesticides is to be transposed into national law by end of 2011 and is currently at consultation phase.	Although this measure outlines that the DoA are the responsible entity, this measure is being implemented by the MCCAAs.
	Creation of a perennial system to collect and treat pesticide packaging and non utilised products	2015		Implemented	Since the start of operation of the Civic Amenity sites in 2006, the general public has had the possibility of depositing pesticide waste. In December 2009, two additional deposit cabinets were placed for the collection of empty/full pesticide containers at Ghammieri (Malta) and the Experimental Farm (Gozo). To date some 0.44 tones of this waste stream have been collected and directed for treatment. This is an ongoing activity.	This measure outlines that MEPA and DoA are the implementing entities but actually WasteServ is the responsible entity for implementing the measure. MEPA has a stakeholder consultative role. The cost of the additional cabinets amounted to €1861.50.
	Establishment of an advisory service for the farming community	2015		Implemented	There are two farm advisory services – APS Consult and FASC. FASC which is a consortium between Government, KIM, KPH and ATB has been established but will be launched in November 2011.	L.N.113/2010 establishes the Farm Advisory Regulations. The recruitment process will soon be concluded for the FASC and training will start to be delivered.

Measure	Implementation				Comments
	Date as outlined in the WP	Ongoing	Status	Description	
Introduction of groundwater abstraction regime and legislative framework				This is a core measure which is further discussed through the following seven measures.	
Regulations to control groundwater abstraction	2010		Implemented	L.N. 241 of 2010, Groundwater Abstraction (Metering) Regulations, 2010 was issued.	
Assessment and authorisation of groundwater abstraction	2010		Partly Implemented	A cabinet decision was taken to set up the process of metering and the results of such metering shall be monitored for one year.	
Code of practice for groundwater abstraction	2010		Implemented	MRA implemented this measure.	The PA had identified the agricultural borehole users. It was estimated that the cost of this exercise amounted to €7,400 This estimate is exclusive of the salaries of fulltime workers who were involved in the process related to the receipt of applications.
Classification system for different users of groundwater	2010				
Allocation scheme for groundwater abstraction to agricultural sector	2010-2011		Partly implemented	The agricultural metering process has been taken over by MRRA. An IT system within MRRA is in place to integrate such information with that of MRA and to issue abstraction quotas.	
Registration and monitoring system of groundwater abstraction	2010-2015		Partly implemented	The MRA is holding discussions with the involved stakeholders on e-tracking of water tankers.	
Regulatory and licensing regime for water tankers including e-tracking	2010		Partly implemented		

Measure	Implementation				Comments
	Date as outlined in the WP	Ongoing	Status	Description	
National water saving campaign	2010 - 2012		Partly implemented	Each entity involved in the conservation of water sources is promoting the effective use of such resource.	
Support schemes for water recycling and re-use technologies in the industrial and commercial sectors			Implemented	Malta Enterprise does not have particular schemes specific on water recycling and re-use technologies but interested parties can apply through three other schemes where proposals for projects related to recycling and re-use water are accepted.	
Promotion of water auditing and water conservation in industry			Not available	Not available	Pending stakeholder and public consultation.
Sustained leakage control programmes and monitoring WSC operations	Pending stakeholder and public consultation		Implemented	This is an ongoing measure. Currently leakage amounts to 460m ³ /h which constitutes an ILI of 2.1.	The aim is to reduce leakage control to 400m ³ /h by 2015.
Efficient use of water by agricultural sector			Partly Implemented	Funding for reservoir construction and installation of efficient irrigation systems has been provided by the Paying Agency under the RDP.	Pending stakeholder and public consultation.
Financial instruments on water use	Pending stakeholder and public consultation		Not implemented	This measure cannot start to be implemented before metering of all groundwater sources is in place.	
The Automated Revenue Management Systems Ltd, will seek to nationally implement the Smart electricity and water meter grid	2012		Not available	Not available	The NAO was not forwarded the requested information.

Measure	Implementation				Comments		
	Date as outlined in the WP	Ongoing	Status	Description			
Optimisation and use of non-conventional water resources	Optimisation and regulation on the use of TSE taking into account health considerations and the protection of groundwater resources	2011 - 2015		Not available		The health considerations of this measure fall under the Public Health's responsibility. Currently, the Environmental Health Directorate has no detailed report on the quality of treated effluent. Thus this Directorate cannot recommend any type of reuse of TSE.	
	Studies for small decentralised sewage treated plants - Government will seek to pursue the use of treated effluents for secondary purposes by industry subject that such use takes place outside of the groundwater zone and the distribution network provides value for money	2010 - 2015		Not available	Not available		Although, the Water Policy (WP) identifies WasteServ as one of the implementing entities, this measure is not directly related to WasteServ activities. However, WasteServ is identifying routes for reutilisation of second class water generated through its current and future processes.
	Studies on infrastructural requirements for distribution of TSE		Yes	Not available	Not available		The NAO was not provided with the requested information.
	Assessment of incentive schemes for the treatment and re-use of grey-waters in the industrial sector	2010 - 2015		Partly Implemented	When analysing the schemes the Malta Enterprise reviews their economic performance.		Pending stakeholder and public consultation.

Measure	Implementation				Comments
	Date as outlined in the WP	Ongoing	Status	Description	
Assessment of health impacts and risks associated with rainwater use particularly by domestic consumers and establishment of guidelines and safeguard measures for rainwater use	Pending stakeholder consultation		Not available	Not available	The Environment Health Directorate does not recommend the use of rain water from wells for personal use as only regulated water which falls under the provisions of L.N. 17 of 2009 can be used. Well water may only be used as second class water.
Building regulations for construction of rainwater harvesting facilities	Pending stakeholder consultation		Partly Implemented	The Building Regulation Office is still being set up. L.N. 261 of 2008 is already in place.	The BCID which is the implementing entity outlined in the WP was dissolved and the functions within its remit started to form part of the Services Division. Later, this Division was replaced by the Cleansing and Maintenance department.
Financial support mechanisms and incentive schemes for increasing storage for rainwater-runoff for industrial and agricultural sectors			Not available	Not available	Although the WP outlines two different responsible entities no information was provided to the NAO.
Financial support mechanisms for integration of rainwater cisterns with the domestic plumbing system	2010 - 2013		Not available	Not available	The BCID which is one of the entities outlined by the WP as the implementing entities was dissolved about six years ago.

Measure	Implementation				Comments	
	Date as outlined in the WP	Ongoing	Status	Description		
Rainwater harvesting	Promotion of the restoration of existing runoff storage facilities			Not available	Not available	The WP outlines the Services Division and RAD as the implementing entities but none of them is implementing this measure. In addition, the NAO did not receive information on this measure from the WSC, which is listed as another implementing entity.
	Integration, where possible, of runoff storage or artificial recharge facilities in flood-relief initiatives	2010 - 2015		Partly implemented	The initial proposals started in 2006. This measure is being implemented through the National Flood Relief Project (NFRP). Tenders under the NFRP include CT 3014/2011, CT 3032/2011, and CT 3025/2011.	CT 3014/2011 is estimated to cost €1.5 m. CT 3025/2011 is estimated to cost €350,000. In addition, for the latter project, MRRA has provided elements that cost around €500,000. CT 3025/2011 has a second phase which is estimated to cost around € 350,000. The cost of CT 3032/2011 is estimated to cost €33.5m. The NFRP has the potential capacity to recycle around 300,000 cubic meters.
Protection of water resources from pollution	Protection of water resources from pollution				This is a core measure, which is further divided into the following two measures.	
	Control of pollution from nitrates and pesticides through Code of Good Agricultural Practice		Yes	Partly Implemented	The CoGAP has been drafted in 2004.	Although the WP outlines MEPA as one of the responsible entities, MEPA is not involved in this measure.

Measure	Implementation				Comments	
	Date as outlined in the WP	Ongoing	Status	Description		
Protection of water resources from pollution	The Ministry for Resources and Rural Affairs will proceed with the implementation of the Agricultural Waste Management Plan with an objective of generating 33,000 MWh annually and removing 50% of nitrogen in manure	2015		Partly implemented	WasteServ is in the process of planning two anaerobic digestion plants for the treatment of MSW which shall also take on manure generated by a number of farms in Malta and Gozo. A third plant in Siggiewi shall cater for the treatment of manure generated by a cluster of 12 farms which shall be relocated from other areas.	Together these three plants are foreseen to generate circa 51GWh of energy (electricity and heat) by 2015 from both manure and MSW. MARRA is implementing this measure through WasteServ.
	Groundwater quality monitoring		Yes	Implemented	This measure is being implemented through the ongoing monitoring required for the WCMP.	
	Protection of groundwater recharge areas			Partly implemented	This measure is being achieved through Policy discussion.	
Effective and transparent regulation of the water industry	Bringing into force Water Supply and Sewerage Services Regulations, 2004			Implemented	WP states that this measure was implemented in 2009.	
	Facilitating competition in certain areas of water industry		Yes	Not implemented	In the Maltese water industry there is no water competition.	
	Monitor operations of and services provided by the water industry		Yes	Partly implemented	Preparatory works for the monitoring is being done. MRA will be monitoring the operations of the water tankers, which costs are borne by the owners.	MRA is conducting this exercise by using its own resources.
	Licensing regime for regulating drilling operations			Partly implemented	The equipment used for drilling has to be licensed. One is required to complete an application to get approval to drill prior to starting any drilling works.	This measure is being implemented by MRA staff.
	Establishment of a licensing regime for water tanker operations		Yes	Implemented		This measure was implemented by MRA staff.

Measure	Implementation				Comments	
	Date as outlined in the WP	Ongoing	Status	Description		
Efficient, fair and equitable water pricing	Economic analysis of the different water uses		Yes	Implemented	This measure was implemented through the WCMP.	
	Incentives for efficient water use		Yes	Partly implemented	It is being implemented as part of other initiatives to encourage adequate water use.	MRA is using its own resources to implement this measure.
	Introduction of costs for polluting activities			Partly implemented		This measure is being implemented by MEPA.
	Application of principle of cost recovery for water services			Partly implemented	Work on this measure has started.	
Reduction and management of risks associated with floods	Evaluate on a regular basis flooding problems of worst hit areas scientifically, and develop remedial measures to mitigate them as a matter of priority				This is a core measure which is implemented through the following three measures.	
	Preliminary proposals for worst hit areas	Started 2004	Yes	Implemented	This measure was implemented thus it is not an ongoing measure.	This measure was financed by Government funds as well as EU funds.
	Review of the Stormwater Master Plan	2011 - 2013		Not available	Not available	Each of the entities involved referred the NAO to discuss the progress achieved on this measure with the other entity.
	Strategic Plan	2011 - 2012		Not available	Not available	
	Create and maintain a technically sound basis for long term storm water and valley management				This is a core measure which is implemented through the following four measures.	
	Flood risk assessment	2013		Partly implemented	Implementation of this measure has started. MRA plans to report to the EC by 22 December 2011.	
	Flood hazard and flood risk mapping	2011 - 2015		Not implemented	Discussions are planned to be held on the way forward. In addition, MRA is to report to the EC by 2013.	

Measure	Implementation				Comments
	Date as outlined in the WP	Ongoing	Status	Description	
Establishment of flood risk management plans	2010 - 2015		Not implemented	MRA to report to the EC by 2015.	
Public information and stakeholder consultation on flood risk mapping and management plans	2010 - 2015		Not implemented	This measure will start to be implemented in 2015.	Although this measure outlines Local Councils as one of the implementing entities, a meeting held with the Local Council Department and an email received from the Local Council Association, illustrate that they are not informed of this measure.
Develop, appraise and continually adapt strategies to mitigate the risks and impacts of flooding				This is a core measure which is further sub-divided into the following four measures.	
Identification of areas prone to flooding			Not implemented		This measure will be conducted in-house by MRA after completion of the flood risk assessments.
Options to address areas prone to flooding	Not available		Implemented	The measure was implemented during the period April 2009 to December 2010 through CT 2510/2008. This tender involved consultancy services for the carrying out of Environment Impact Assessment and Cost Benefit Analysis studies.	The problem encountered was to finalise the formal EU application for the financing of this project.
Studies for the economic and environmental appraisal of technical options, for selection of the most appropriate alternatives	2009 - 2013		Not implemented	This measure will start to be implemented after 2015 that is after the flood risk plan has been completed.	
Monitoring and review effectiveness		Yes	Not implemented		
Strengthen the institutional basis for Flood Risk evaluation and management				This is a core measure which is further sub-divided into the following two measures.	

Measure	Implementation				Comments
	Date as outlined in the WP	Ongoing	Status	Description	
Strengthening the competent authority	2010 - 2015		Not available	Not available	
Capacity building of Valley Management and Storm Water Units within the Cleansing and Maintenance Department	2008 - 2013		Partly implemented	The Storm Water Unit includes also the marine section and is composed of 15 employees. The Valley Management Unit is composed of 24 employees.	
Undertake a comprehensive valleys and storm water systems maintenance program				This is a core measure which is further sub-divided into the following two measures.	
Inventory of structures and infrastructures for water retention and flood relief systems	Started 2006			The Valley Management Unit (VMU) has started collecting data on second class reservoirs. To build an inventory, it needs to conduct a specific exercise. In fact, the VMU has already asked for the cooperation of the local councils but, the response rate was low. In addition, this Unit has recorded the reservoirs owned by agriculture, WSC and the Ministry. However, there are also reservoirs in schools which are not yet recorded.	One of the problems encountered with implementing this measure is that there is only one person who is in charge.
Maintenance program of valleys and rainwater infrastructure	Started 2006		Implemented	The cleaning of valleys and soak ways is ongoing.	
Continue with the implementation of Flood Relief Projects				This is a core measure which is further sub-divided into the following two measures.	
Improvement of existing Stormwater systems	Started 2004		Implemented	This is an ongoing measure.	
Finalisation and Implementation of the National Flood Relief Project	2007 - 2013		Partly implemented		The application for co-funding still needs to be submitted to the EC.

Measure	Implementation				Comments	
	Date as outlined in the WP	Ongoing	Status	Description		
Adaptation to climate change	The Water Service Corporation will continue to review the technology of its Reverse Osmosis plant to apply innovation and introduce improvement through technical design modifications to reduce further the energy utilised for the production of potable water		Yes	Not available	Not available	
	The Water Services Corporation will continue to review the water transfer and distribution network to apply innovation and introduce improvement through technical and design modifications to reduce the demand per cubic meter of water produced and distributed		Yes	Implemented	The WSC is replacing its network pipes with better quality ones. This includes a complete revision of specifications for procurement as well as laying in sleeves for mechanical protection and to enable easy repair. This is an ongoing measure.	

Appendix III – Measures in the ‘National Climate Change Adaptation Strategy’⁵⁶

Legend:

NCCAS + WCMP	
NCCAS + WP	

NCCAS + WCMP + WP	
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	Measure	Implementation			Comments
		Date as outlined in NCCAS	Status	Description	
Risks, financial impacts and adaptation	The Climate Change Committee for Adaptation (CCCA) is of the considered opinion that, whilst the uncertainty of the science of climate change deters Malta from adopting an adaptation approach based on a worst case scenario, Malta should address its efforts towards those sectors that are vulnerable today and will continue to be so in the future, even if the best case scenario with regards to climate change had to result.	Not yet defined			
	The CCCA recommends that while the Government should follow international as well as EU developments in this regards it should leverage the commitment in the Emissions Trading Scheme Directive for the application of revenues generated from the auctioning of allowances including revenue generated from the aviation sector for the financing of a Climate Change Adaptation National Emergency fund.	Not yet defined			
	The CCCA recommends that, given that recent climate disasters have shown that traditional methods of calculating risk exposure may significantly underestimate risk, the Government, through the Malta Financial Services Authority, should take the lead in stewarding discussion among the stakeholders to identify suitable mechanisms and instruments that will ensure that the insurance market remains sustainable in the event of increasing unpredictability of climate change impacts on various sectors in Malta.	Not yet defined			
Identifying the requisite legal framework	The CCCA recommends that the design of adaptation measures should not, unless there is no further option, run counter to mitigation policy measures.	Not yet defined			
	The CCCA recommends that the Government should consider that the Climate Change Division (CCD) within the MRA should be empowered, by law, to act as the centralised authority for Climate Change, so that it may intervene to regulate and secure compliance when enterprises and public authorities fail to do so, or when they do not provide data and information in this respect.	Not yet defined	Not implemented		
	The CCCA recommends that the underpinning role of the CCD should be to coordinate and oversee mainstreaming of both mitigation and adaptation issues in existing policies, rather than creating new policies in parallel, since implementation of both mitigation and adaptation should ideally, from a logistical point of view, be carried out through existing sectoral policies.	Not yet defined	Not implemented		

⁵⁶ The recommendations outlined in this Appendix emanate from the Consultation Report, published in 2010 by the CCCA.

Measure	Implementation			Comments
	Date as outlined in NCCAS	Status	Description	
Identifying the requisite legal framework	The CCCA recommends that an appropriate legal framework directed to support an adaptation strategy to climate change should seek to endow the same competent authority with the legal authority and responsibility to: (i) adopt national positions relating to climate change adaptation (and mitigating) to ensure an integrated approach; provide systematic observation of the effects of climate change (ii) on a national level and the development of data archives related thereto; (iii) assess the best options available when taking national adaptation measures; (iv) provide a steady flow of information to civil society relating to mitigation measures that may be adopted and how they are being implemented.	Not yet defined	Not implemented	
	The CCCA recommends that the responsibility for the over-arching role in advising government so as to better guarantee that all the best options are considered when choosing which adaptation measures Malta should adopt to meet its obligations under the UNFCCC and the Kyoto Protocol, should rest with the newly set-up CCD and that in this regard, the Strategic Environmental Assessment Regulations should be amended to include a screening assessment for climate change.	Not yet defined	Not implemented	
	The CCCA recommends that the CCD should optimise all legal instruments available to it so as to secure the broadest extent possible of awareness building, public participation and information on matters relating to adaptation measures.	Not yet defined		
	The CCCA recommends that the Government should introduce a legal instrument, designed on the principles of the EU LIFE programme, directed to boost local research in promoting technological response strategies and tools for adaptation measures as well as in investing in the capacity building of human capital climate change adaptation disciplines.	Not yet defined		
	The CCCA recommends that a legislative instrument be introduced, which enshrines the importance of sustained and regular adequate qualitative and quantitative public benchmarking and reporting as well as to seek to ensure compliance and secure implementation both at the regulatory and the operational level. This legislative instrument should also provide the appropriate organisational resources to ensure that these important obligations can be met.	Not yet defined		
	The CCCA recommends that a regulatory framework for adaptation measures to climate change should be designed with the goal of preventing environmental emergencies.	Not yet defined		

Measure	Implementation			Comments
	Date as outlined in NCCAS	Status	Description	
Identifying the requisite legal framework	The CCCA recommends that a regulatory framework for adaptation measures to climate change should seek to identify criteria for assessment when selecting key technologies that facilitate sectoral adaptation to climate change; address gaps related to the transfer of and access to environment technologies; and establish obligations for research and systematic observation systems relevant to the various sectors.	Not yet defined		
	The CCCA recommends that the mainstreaming of climate change adaptation measures should be addressed as soon as possible in the revision of the structure plan and the local plans.	Not yet defined		
	The CCCA recommends that emphasis should be placed on minor and already vulnerable groups and that all sectors should be legally bound to maintain a Geographic Information System to integrate data related to climate change, as well as any other data required apart from spatial information.	Not yet defined		
Sustainability and adaptation	The CCCA is of the considered opinion that changes in, amongst others, temperature, precipitation and drought in Malta over the past 50 years make it prudent to assume the measures for climate change adaptation that are planned and embarked upon today should far outweigh the costs of inaction from both an economic and social perspective.	Not yet defined		
	The CCCA recommends that adaptation measures to be undertaken should, primarily, be those that constitute ‘no regret’ options, that is to say, actions that Malta still needs to undertake as, for example, the reduction of water intensity use, in order to secure sustainable development in Malta.	Not yet defined		
	The CCCA is of the considered opinion that the concept of sustainable development is re-launched and the debate on this generation’s use of natural resources and the natural resources that we will pass on to future generations, are re-launched given that these considerations are both central to the climate change debate, with a view to obtaining national consensus and a bipartisan agreement.	Not yet defined		
Water and adaptation	The CCCA recommends that the Government should introduce in a phased manner a polluter’s fine compliance regime targeting those who abuse or misuse water resources which allows and persuades people, farmers and entrepreneurs to adjust and change behaviour and norms as a climate change adaptation culture is inculcated whilst concurrently applying sanctions by means of a targeted ‘polluter pays’ fine should the desired behavioural change not come about.	Not yet defined		

	Measure	Implementation			Comments
		Date as outlined in NCCAS	Status	Description	
Water and adaptation	Whilst the CCCA recognises that the MRA has embarked on a programme to install meters on boreholes and thereafter carry out a one year monitoring process on the basis of which policy direction will be set, this Report recommends that the process of over-extraction through the misuse and abuse of boreholes is reduced as early as possible, given that the loss of this natural resource could have implications on economic, environmental and social activities in Malta. In this respect, Government should immediately ban the use of domestic boreholes whose primary use is for recreational purposes, such as swimming pools, lawns and private gardens. Malta cannot afford the extravagant use of public resource for private gain.	Not yet defined	Partly implemented	Installation of the meters to the agricultural sources will be completed in an approximately 1.5 years, starting from January 2012.	Preparation work for the installation of meters has already started and the work is being conducted by MRRA.
	Given the strategic importance of groundwater as a suitable and strategic resource, the CCCA recommends that Government and stakeholder involved should continue to mobilise the necessary and appropriate financial and human resources to allow Malta to meet the EU WFD obligations prior to the 2027 target date to the extent that this is scientifically and technically possible.	Not yet defined	Implemented	Through the monitoring of the Inter-Ministerial Committee, the entities involved in the WCMP measures meet on regular basis to discuss the progress attained on each measure.	
	The CCCA recommends that the metering of all groundwater abstraction sources should be in place by not later than 2011.	2011	Partly implemented	Enactment of legislation L.N. 241 of 2010. Meters will be installed to all commercial sources by December 2011. In addition, the installation of the meters to agricultural sources will be completed in an approximately 1.5 years, starting from January 2012.	
	Moreover, given the strategic importance of water both in terms of its scarceness and the need to secure the regeneration of the water tables, the Government should by not later than 2012 establish pricing mechanism for private groundwater extraction based on social, economic and environmental considerations in order to target a reduced level of private extraction from the current 21.5 million m ³ /year to 16 million m ³ /year.			Not yet defined	
	The CCCA recommends that the government continues to implement fiscal incentive schemes directed at the farming and livestock breeding sector to construct or rehabilitate existing reservoirs to capture rainwater for re-use for irrigation and other appropriate uses.	Not yet defined	Implemented	Around 75 farmers have benefited from a scheme to build reservoirs.	
	The CCCA recommends that the government introduces appropriate economic instruments financed through local funds directed at the farming and livestock breeding sector to encourage them to use water more efficiently as well as to use the best-available irrigation technologies.			Not yet defined	

Measure	Implementation			Comments
	Date as outlined in NCCAS	Status	Description	
Water and adaptation	The CCCA recommends that the Government introduces an incentive scheme financed through local funds directed at commercial and industrial entities to assist them to build reservoirs and other rainwater catchment measures; to re-use captured water; and to recycle grey water for non-potable purposes as well as to introduce efficient water use technologies.	Not yet defined	Implemented	Malta Enterprise does not have particular schemes specific on water recycling and re-use technologies but interested parties can apply through three other schemes where proposals for projects related to recycling and re-use water are accepted.
	The CCCA recommends that the Government introduces an incentive scheme financed through local funds directed towards domestic households that have a cistern and water catchment infrastructure but require the appropriate plumbing to direct captured water for re-use as well as to re-use grey water as well as for the repair of cisterns in households.	Not yet defined		
	The CCCA recommends that the Energy Saving Lighting scheme launched by Government in 2009 for households is replicated by a similar scheme directed at providing the free supply of water saving kits technologies such as water low-use taps that could reduce the use of water by the household sectors.	Not yet defined		
	The CCCA reinforces the recommendation made by the CCC on Mitigation Measures and proposes that the loci of responsibility invokes with immediate effect the legal provisions that mandate that buildings must have rainwater capture reservoirs or wells. The CCCA further recommends the introduction of a one-off Flood Fine on those properties that, following the 2007 notice on cisterns as a planning requirement by the MEPA, do not have cisterns and are therefore contributing to floods during every storm event. The revenue collated from this tax should go to a Flood Political Fund that will act as a source of financing for collective flooding relief remedies such as the maintenance and upkeep of flood mitigation infrastructure such as roadside reservoirs, soakaways and dams.	Not yet defined		
	The CCCA recommends that the Government should introduce legal instruments to ban groundwater use for landscaping and introduce a tough financial penalty regime to discourage misuse of a scarce and valuable resource. Government should immediately ensure that its own landscaping and afforestation projects so not use groundwater, so as to set the example.	Not yet defined		
	The CCA recommends that through the introduction of schemes for the re-use of captured water and the use of grey water should seek to achieve the following targets: - replace groundwater demand by 2 million m ³ / year by 2020; - replace groundwater demand by 3 million m ³ /year from 2021 to 2030.	Not yet defined		

Measure	Implementation			Comments
	Date as outlined in NCCAS	Status	Description	
The CCCA recommends that the Government should continue with further studies such as those underway in Gozo to determine infrastructural requirements such as the use of a bowser vehicle network for the distribution of treated sewage treatment effluent on a regional and national scale.	Not yet defined			
The CCCA recommends that the Government should consider the re-instatement and extension of the San Antnin network and its link to Ta' Barkat given that the South East Area has a very high potential for the re-use of TSE.	Not yet defined			
The Climate Change Committee for Adaptation recommends that the Government should introduce appropriate incentives to encourage the agricultural, industrial, commercial, and domestic sectors to use sewage treatment effluent within pre-defined guidelines as opposed to using groundwater. This should be coupled with the introduction of effective disincentives on the use of groundwater	Not yet defined			
The Committee on Climate Change and Adaptation recommends that through the introduction of facilities for the distribution and supply of quality treated effluent, the government should seek to achieve the following targets: - provide 5 million m ³ /year by 2015 as a replacement of groundwater used for agriculture, commercial, and industrial need; - provide 10 million m ³ /year from 2016 to 2020 as a replacement of groundwater used for agriculture, commercial and industrial need; - provide 15 million m ³ /year from 2021 to 2030 as a replacement of groundwater used for agriculture, commercial and industrial need.	Not yet defined			
The CCCA recommends that a maintenance and preservation plan for all valley systems in Malta and Gozo be designed and implemented at the earliest possible but not later than end 2011, given that such action would not only greatly help control flooding but will also act as a natural reservoir allowing the captured water to sink into the aquifer.	2011	Implemented	The cleaning of valleys and soakaways is ongoing.	
The CCCA is of the considered opinion that the current approach of regulating maintenance works in valleys as development is unnecessarily bureaucratic and should be replaced by a system of approved maintenance plans that could be put into effect on a regular basis.	Not yet defined			
The CCCA recommends that the Government should take all the appropriate action to secure the implementation of the National Flood Relief Plan by the projected 2015 target date.	2015	Partly implemented	Work on the NFRP has started. For further information refer to Appendix II.	

Measure	Implementation			Comments	
	Date as outlined in NCCAS	Status	Description		
Water and adaptation	The CCCA recommends that when constructing or refurbishing roads or undertaking road landscaping, the Malta Transport Authority should continue to ensure that the design for the said works, includes reservoirs to act as water catchment areas to cushion flooding as well as allow for the seepage of such water into the aquifer and should seek progressively increase the number of existing soakaways along the road infrastructure in such a way as to divide the catchment into manageable smaller catchment areas which allow for recharge of the aquifer.	Not yet defined			
	The CCCA is of the considered opinion that whilst it is unrealistic to expect that Malta could ever do without desalination, the government, through the WSC, should continue to channel applied R&D&I financing in order to seek improvements in rendering the RO water treatment management more efficient, particularly through the combination of renewable energy sources with RO operations.	Not yet defined			
	The CCCA recommends that the Government, through the WSC, should continue with efforts to identify and reduce leaks in the water distribution system as a direct measure to conserve water to the maximum level possible.	Not yet defined	Implemented	Currently leakage amounts to 460m ³ /h which constitutes an ILI of 2.1.	This is an ongoing measure. The aim is to reduce leakage control to 400m ³ /h by 2015
	The CCCA recommends that the government prepare a contingency plan for drought periods.	Not yet defined			
	The CCCA recommends that the government constructs a 3-D numerical model to further understand the aquifer systems in Malta as soon as possible.	Not yet defined	Partly implemented	MRA was awarded the MORISO project. The project is at the tendering phase. Project duration: 2011 to 2014.	The total maximum project cost is €165,000 out of which MRA is going to co-finance 15%.
	The CCCA recommends that the Government continues with the studies underway to determine whether the artificial recharge of aquifers in Malta are technically and financially feasible.	Not yet defined	Partly implemented	MRA is one of the partners in the MEDIWAT project; this project has started and focuses on using TSE to recharge aquifers.	
	The CCCA recommends that the government, continues with the studies currently underway, prepares an implementation plan for these adaptation measures as soon as possible, and provide continuous monitoring of the measures in question.	Not yet defined			
Agriculture and adaptation	The CCCA recommends that in order to bridge the significant knowledge gaps that are critical in order to fully assess the issues of vulnerability, a comprehensive study leading to the design of a National Agricultural Policy should be embarked upon by the MRRA with a target completion by end 2012.	2012	Not yet defined		
	The CCCA recommends, that, in an effort to counter water shortages, incentives should be made available to the agricultural community to build or re-activate water catchment systems as well as improve irrigation systems.	Not yet defined			

Measure	Implementation			Comments
	Date as outlined in NCCAS	Status	Description	
Agriculture and adaptation The CCA recommends that the Government should encourage the farming community to adopt sound land management practices which are essential for soil conservation and which, together with flexibility regarding land use, will help minimise the impacts of climate change on agricultural soils. The Government should also encourage the farming community to embark on long-term management strategies that increase soil organic matter, resulting in a soil which has a high nutrient content and strong water-holding capacity, which renders the land better able to cope with future climatic changes.		Not yet defined		

Appendix IV – Measures in ‘The Water Catchment Management plan for the Maltese Islands’

Legend:

WCMP + WP		WMCP + NAP		WCMP + NCCAS	
WCMP + WP + NAP		WCMP + WP + NCCAS			

Measure	Implementation				Comments	
	Start date outlined in WCMP	Ongoing	Status	Description		
Regulatory measures	Set up an inter-ministerial water committee to oversee the implementation of Water Catchment Management Plan.	2011		Implemented	The measure is implemented as the Inter-Ministerial Committee (IMC) was established. First meeting was held in February 2011.	
	Strengthen the existing environmental and planning regulatory processes to cater for the objectives of the WFD.	2010	Yes	Partly implemented	WFD requirements are often integrated within the EIA process and development control process when applications for development are assessed on a case by case basis.	The IMC has moved the original date of implementation to 2011 from 2010 as it was deemed more realistic as MEPA was concurrently undergoing reform.
Measures related to agriculture and animal husbandry	Farmers required to keep a record of farming practices by keeping a record on the use of organic and inorganic fertilisers and their application to land.	2011		Partly implemented	Currently spot checks are being performed by the Paying Agency (PA) on farmers who are benefiting from EU funds. With the introduction of the NAP, all farmers are obliged to adhere to this measure. Information campaigns to update the farmers with their new obligations is underway. Enforcement of NAP measures is scheduled for 2012.	Enforcement of the NAP measures is scheduled for 2012.
	Farmers required to keep a record of pesticide practices.	2010		Partly implemented	MCCAA performed training to farmers. The PA is conducting controls on farmers receiving EU funds. So far, licenses have been issued for professional agricultural users but there are a number of farmers who are still neither trained nor licensed.	The course to obtain the license is of a 20 hour duration.
	Reduce point source nitrate contamination from livestock units.	2010		Partly implemented	Several but not all farms had updated their waste facilities in line with the CoGAP and NAP prior to the issue of L.N. 321 of 2011.	L.N. 321 of 2011 came into force on 5 August 2011.
	Farmers to draw up and comply with a nutrient management plan.	2012		Partly implemented	L.N. 321/2011 establishes the 2011 Nitrates Action Programme. This measure is obligatory under the NAP.	For further information, refer to Appendix V.

Measure	Start date outlined in WCMP	Implementation			Comments
		Ongoing	Status	Description	
Measures related to agriculture and animal husbandry	Promote the use of alternative methods for plant protection other than pesticides.	2012	Partly implemented	One of the first tasks undertaken by the Technical Regulations Division - MCCAAs was the promotion of alternative methods for plant protection other than pesticides. The Technical Regulations Division has a minor role while the PHD and the DoA playing a major role. Several other approaches are being undertaken: the creation of a Geographical Information System based programme in co-operation with the DoA regarding the ranking of pesticides to be used by farmers according to climate, soil, and hazard to the environment. In collaboration with the DoA, MCCAAs is exploring possible funding options and tenders for the implementation of this measure. In addition to the GIS-programme as a form of promotion of the PPPs with the least detrimental effect to the aquatic environment, the Pesticides legislation also requires the training and licensing of farmers. Training includes pesticides management and the use of alternative methods for plant protection other than pesticides. Training materials have been prepared by MCCAAs for this purpose. As from 2012, new legal obligations will start coming into force on the local community with regards to the sustainable use of pesticides. The EU directive on the sustainable use of pesticides is to be transposed into national law by end of 2011 and is currently at consultation phase.	Although this measure outlines that the DoA is the responsible entity, this measure is being implemented by the MCCAAs.
	Creation of a perennial system to collect and treat pesticide packaging and non utilised products.	2010	Implemented	Since the start of operation of the Civic Amenity sites in 2006, the general public has had the possibility of depositing therein their pesticide waste. In December 2009, two additional deposit cabinets were placed for the collection of empty/full pesticide containers at Ghammieri (Malta) and the Experimental Farm (Gozo). To date some 0.44 tones of this waste stream have been collected and directed for treatment. This is an ongoing activity.	This measure outlines that MEPA and DoA are the implementing entities but actually WasteServ is the responsible entity for implementing the measure. MEPA has a stakeholder consultative role. The cost of the additional cabinets amounted to €1861.50.
	Establishment of an advisory service for the farming community.	2011	Implemented	There are two farm advisory services – APS Consult and FASC. FASC which is a consortium between Government, KIM, KPH and ATB has been established but will be launched in November 2011.	L.N. 113/2010 establishes the Farm Advisory Regulations.

Measure	Implementation			Description	Comments	
	Start date outlined in WCMP	Ongoing	Status			
Measures dealing with improvement in groundwater	Regulation of private water supply operators.	2010		Implemented	This measure was implemented as licenses to Private Water Supply Operators issued were according to the requirements of L.N. 525 of 2004.	This is an ongoing measure.
	Metering of significant private groundwater abstraction sources.	2011		Partly implemented	Enactment of legislation L.N. 241 of 2010. This measure is partly implemented as it is planned that meters will be installed to all commercial sources by December 2011. In addition, the installation of the meters to agriculture sources will be completed in approximately 1.5 years, starting from January 2012.	
	Reduction of losses in the municipal distribution system.	2010		Implemented	This is an ongoing measure. Currently leakage amounts to 460m ³ /h which constitutes an ILI of 2.1.	The aim is to reduce leakage control to 400m ³ /h by 2015.
	Increase the capacity of rainwater runoff storage facilities.	2010		Implemented	The cleaning of valleys and soakaways is ongoing.	
	Pilot projects on water demand management and supply augmentation.	2011		Partly implemented	MRA in conjunction with MGOZ was awarded the SW MED project through the ENPI MED. In addition there is the MEDIWAT project which has started and focuses on using TSE to recharge aquifers.	For the SW MED, MRA and MGOZ have a budget of €128,708 each.
	Modelling of the Mean Sea Level Aquifers.	2011		Partly implemented	MRA was awarded the MORISO project through Interreg Italia-Malta. The project has started and the tendering process is underway. Project duration is over the period 2011 - 2014.	The total maximum project cost is €165,000 out of which MRA is going to co-finance 15%.
Measures needed to raise awareness and enhance our knowledge base	National water saving campaign.	2012		Partly implemented	Each entity involved in the conservation of water sources is promoting the effective use of such resource.	
	Develop an awareness campaign/s for groups of measures.	2011		Partly implemented	The awareness campaigns are specific to the particular measures they are promoting.	The costs of implementing this measure are absorbed by the measure for which an awareness campaign is conducted.
	Set up a National Water Information System.	2011		Partly implemented	The setting up of a National Environment Information System (EIS) is expected to incorporate water as a main theme. MEPA has recently evaluated received tenders for the setting up of a shared EIS.	Through this EIS, MEPA, EU and national requirements with respect to data sharing shall be set up. It is expected that this process will be up and running by end of 2013.

Measure		Start date outlined in WCMP	Implementation			Comments
			Ongoing	Status	Description	
Measures needed to raise awareness and enhance our knowledge base	Prepare and implement a full information campaign on good agricultural practices.	2012		Partly implemented	This information campaign is being co-financed through a Life+ project. The recruitment and the tendering process to implement this campaign has started.	The campaign is expected to be launched in March 2012.
	Complete a comprehensive database of farm holdings.	2011		Partly implemented	Funds were secured to implement this database	

Appendix V – Measures in the ‘Nitrates Action Programme’

Measure	Implementation			Comments
	Implementation date	Implementation status	Description	
Any farmer responsible for agricultural activities taking place on a holding shall prepare, before the 1st March of each year, a fertiliser plan (FP) in respect of such holding for that particular year.	05/08/2011	Partly implemented	Part implementation is due to the fact that while farmers are expected to have an FP in place, implementation is not yet strictly enforced. This is because the Nitrates Action Programme (NAP) has only recently been backed up by virtue of L.N. 321 of 2011; and the Nitrates Action Unit (NAU) has only recently been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new agricultural legal obligations including also the maintenance of a FP. Such campaigns are planned to commence in 2012 and/or when the responsible entity has sufficient human resources for this purpose.	Current controls are performed by the Paying Agency (PA) under SMR4 to ensure farmers have a FP. L.N. 321 of 2011 necessitates more refined controls that require the FP to be based on scientifically established data which determines the fertilizer application. Adherence will be verified by the NAU in 2012 following this Unit’s enhanced administrative capacity.
The fertiliser plan, in terms of sub regulation (1) hereof, shall determine the crop fertilisation requirement for each crop type on each production unit of the holding for that year and shall establish safe methods of land application of fertiliser.	05/08/2011	Partly implemented	Part implementation is due to the fact that while FPs already include such data, however, under the new L.N. requirements, obligations are stricter and expectations are higher. In addition, the NAU has recently been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to comply with the NAP and L.N. 321 of 2011. Such campaigns are planned to commence in 2012 and/or when the responsible entity have sufficient human resources for this purpose.	Current controls are performed by the PA under SMR 4. However, more refined controls are planned to be conducted by the NAU in 2012 through checks on FP documents.
The fertiliser plan shall: (a) indicate the area intended to be planted; (b) indicate the type of crops to be planted and the month when such crop will be planted; (c) calculate the optimum amount of nitrogen fertiliser required in relation to each crop on each production unit of the holding for that year, taking into account the crop’s nutrient requirements and the amount of nitrogen available from soil and water based on adequate soil and water analysis; and (d) include a Schedule of Fertilisation indicating fertiliser types and quantities to be used.	2012	Partly implemented	Part implementation is due to the fact that while FPs already include most of this data, soil and water analysis are the new basic foundation for determining fertilizer application, whereas in the past the crop type was taken into consideration as the basis for application. Other reasons include the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011; and the NAU has only recently been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to comply with the NAP and L.N. 321 of 2011. Such campaigns are planned to commence in 2012 and/or when the responsible entity has sufficient human resources for this purpose.	Once the NAU is established, it plans to perform more refined verification of adherence to this measure through records and on site inspections.

Measure	Implementation			Comments
	Implementation date	Implementation status	Description	
No fertiliser shall be applied to any crop in that year prior to the preparation of a complete fertiliser plan as required in terms of this regulation.	05/08/2011	Implemented		While current controls are performed by the PA under SMR4, however, more refined and scientific checks are planned.
The storage facilities for livestock manure for each holding shall be of sufficient capacity to provide for the storage of all the livestock manure produced on that holding between the 15 October of a particular year and the 15 March of the following year.	05/08/2011	Partly implemented	Those livestock breeders who do not have the correct facilities are being phased out. In addition, the NAP has only recently been covered by virtue of L.N. 321 of 2011 and the NAU has only recently been awarded LIFE+ funding to support a full scale Information Campaign to educate farmers on their new obligations. Such campaigns are planned to commence in 2012 and/or when the NAU has sufficient human resources.	While current controls are performed by PA under SMR4, the more refined controls are planned that shall include capacity measurement (based on livestock onsite) as well as a certificate from a warranted architect ascertaining adherence to this measure.
The livestock manure storage capacity of a holding, shall be calculated by taking into account the following farming practices: (a) the number, type and age of animals present on the holding; (b) the quantity of livestock manure produced; (c) waste solids removed from slurry other than pig slurry by means of a slurry separator; (d) any additional storage available off the holding including by means of an agreement with another holding; (e) any valid contract the holding possesses with a manure processing facility.	05/08/2011	Implemented	All manure storage facilities developed following the introduction of the Nitrates Directive have been constructed based on these calculations.	While current controls are performed by the PA under SMR4, however, more refined controls are planned to be conducted through on site inspections in 2012.
Livestock manure shall be stored in a leak-proof, covered storage clamp which is connected to a cesspit.	05/08/2011	Partly implemented	Those livestock breeders who do not have the correct facilities are being phased out. Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, the NAU has been awarded LIFE+ funding to support a full scale Information Campaign to educate farmers on their new obligations to comply with the NAP and L.N. 321 of 2011. Such campaigns are planned to commence in 2012 and/or when the responsible entity has sufficient human resources for this purpose.	While current controls are performed by the PA under SMR4, however more refined controls shall be conducted by through capacity measured (based on livestock on site) and a certificate from a warranted architect ascertaining adherence to this measure.
Cesspits shall be leak-proof, covered and shall be of sufficient capacity to collect all urine and washings for at least 15 days.	05/08/2011	Partly implemented		While current controls are performed by PA under SMR4, however controls through verification of records shall be introduced.

Measure	Implementation			Comments
	Implementation date	Implementation status	Description	
Cesspits and manure clamps shall be certified leak proof by a warranted architect every five years, or following any structural works within the holding or in its immediate vicinity.	05/08/2011	Implemented	Those farmers who have cesspits and manure clamps that do not comply are being given warnings thus phasing out such cesspits and manure clamps.	Current controls are performed by the PA under SMR4, however, more refined controls are planned to be conducted through on site inspections in 2012.
Livestock manure may be stored in the field where land application will take place subject to a maximum limit of 120 days between 16 March to 14 October if the dry matter content is at least 30%.	05/08/2011	Partly implemented	Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, recently the NAU has been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	Current controls are performed by the PA under SMR4, however, more refined controls are planned to be conducted to ensure compliance with this measure by capturing the farmers in the act, as well as through traces, soil samples, tracks and past records.
When stored in a field, livestock manure shall not be stored in the same location of the field in consecutive years, it shall be stored in a compact heap and such heaps shall not be placed within: (a) 20m of water courses; or (b) 30m of a borehole, spring or well; or (c) 100m of a borehole used for a public water supply; or (d) 100m of the coast.	05/08/2011	Partly implemented		Current controls are performed by the PA under SMR4, however, more refined controls are planned to be conducted through on site inspections.
The land application of organic fertiliser to any holding shall not be permitted between 15 October of a particular year and 15 March of the following year.	05/08/2011	Implemented		Current controls are performed by the PA under SMR4, however more refined controls are planned to be conducted through on site inspections and, in the case of permitted application, through the checking of records.

Measure	Implementation			Comments
	Implementation date	Implementation status	Description	
The land application of organic fertiliser to any holding shall not be permitted between 15 October of a particular year and 15 March of the following year.	05/08/2011	Implemented		Current controls are performed by the PA under SMR4, however more refined controls are planned to be conducted through on site inspections and in the case of permitted application through the checking of records.
The land application of inorganic fertiliser to any holding shall not be permitted between 15 October of a particular year and 15 March of the following year. Provided that the land application of inorganic fertiliser may be permitted by the Director in the event of demonstrable crop nitrogen requirement between those dates being notified by the farmer to the Director, and accompanied by relevant proof. Provided further that the Director may, where deemed reasonable owing to justified circumstances, permit the application of inorganic fertiliser during such period, and shall notify such decision in the Gazette.	2012	Partly implemented	This is an entirely new measure. Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, recently the NAP has been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	The planned control shall take place via on-the-spot checks, traces, soil samples, and tracks.sure
The land application of organic fertiliser shall not be permitted when: (a) the land is sloping to a degree of 7% or greater, taking into account factors such as proximity to watercourses, soil condition, ground cover and rainfall, or there is a significant risk of causing water pollution, unless incorporated immediately after application; or (b) the land is located or is in a manner which would make it likely that the nitrogen fertiliser will directly enter a watercourse or water contained in any underground strata.	05/08/2011	Partly implemented	Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, the NAU has also been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	Current controls are performed by the PA under SMR4, however in the new legislation the gradient of the slope has changed from 10% to 7%. This will be controlled via on-the-spot checks, that is, by capturing farmers in the act.

Measure	Implementation			Comments
	Implementation date	Implementation status	Description	
The land application of slurry shall not be permitted.	05/08/2011	Partly implemented	Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, recently the NAU has been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	Current controls are performed by the PA while informing the DoA of any infringements. The controls on this measure include on-the-spot checks, that is, capturing farmers in the act, as well as traces, soil, samples, tracks, and buffer zones indicated on parcel image.
Without prejudice to the provisions of sub regulation (1) hereof, organic and inorganic fertilisers shall not be applied: (a) to any type of natural water courses; (b) within a minimum distance of 5m of natural water courses; (c) within 5m of springs, galleries, gallery shafts, boreholes and karst features; (d) within 30m of any borehole used for public water supply; or (e) within 100m of the coast.	05/08/2011	Partly implemented		Current controls are performed by the PA. The distance specifications have been altered via L.N. 321/11. The controls on this measure include on-the-spot checks that is, capturing farmers in the act, traces, soil samples and crop growth patterns.
The farmer shall ensure that all types of inorganic and organic fertilisers are distributed uniformly on the field and incorporated into the soil as soon as possible.	05/08/2011	Implemented		Verification is through on site inspections and farmers' records.
The application of inorganic and organic fertilisers shall be effected in accordance with the fertilisation plan taking into consideration the balance between the foreseeable nitrogen requirements of the crops and the nitrogen supply to the crops from the soil and from fertilisation as specified in Schedule I to these regulations.	2012	Partly implemented	Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, recently the NAU has also been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	This is a standing obligation under the Nitrates Directive, however, the basis of a fertilizer plan has changed. Controls include on-the-spot checks, that is, capturing farmers in the act, as well as through traces and soil samples.
The amount of “total nitrogen” applied from livestock manure, including excreta by the animals themselves, shall not exceed 170 kg N/ha per year as specified in Schedule II to these regulations	05/08/2011	Implemented		Current controls are performed by the PA under SMR4. One example of the conduct of such controls is via on-the-spot checks, that is, by capturing the farmers in the act.

Measure	Implementation			Comments
	Implementation date	Implementation status	Description	
Inorganic and organic fertilisers shall only be applied close to sowing and in a manner which permits of splitting of fertiliser application whenever possible.	05/08/2011	Implemented		Verification through farmers' records.
Holdings with an area greater than 1 hectare under irrigated cultivation shall have a Nutrient Management Plan drawn up in terms of the provisions of Schedule III to these regulations.	2012	Partly implemented	Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, recently the NAU has also been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	Verification through on site inspections of livestock holdings.
All animal holdings and animal passageways shall be suitably covered at all times.	05/08/2011	Implemented		The PA have been conducting checks of this nature by reviewing farmers' records and imposing sanctions on noted infringements.
Farmers shall keep adequate and updated farm management records, and shall make them readily available for inspection to the Department upon request.	05/08/2011	Implemented		Current controls are performed by the PA under SMR4 by reviewing farmers' records.
Farm management records shall include the following information, as applicable: (a) the farmer for the calendar year in question; (b) the total agricultural area including the size and location of each field; (c) the cropping regimes and their individual areas; (d) the number of livestock kept on the holding, their species and type, and the length of time for which they were kept on the holding; (e) the capacity of livestock manure storage, and where applicable the details of rented storage, livestock manure production, manure separation, the details of any rental or contractual agreement; (f) the quantity of each type of fertiliser moved on or off the holding, the amount of each type of fertiliser applied, the nutrient content of the inorganic fertiliser, the location used; (g) the date of movement of organic fertiliser, the name and address of the consignee, the consignor and any third party transporter of the manure.	05/08/2011	Partly implemented	Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, the NAU has also been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	Since the issue of L.N. 321 of 2001, farmers are expected to maintain additional records than those stated in the Nitrates Directive. The verification process is through reviewing farmers' records.

Measure	Implementation			Comments
	Implementation date	Implementation status	Description	
Farm management records for a particular year shall be implemented by the 30 October of the following year and shall be retained on the holding for a minimum period of five years.	05/08/2011	Implemented		Current controls are performed by the PA under SMR4. Cross-checking will be performed with the National Nitrates Database system once this system is operational.
Any person using organic or inorganic fertilisers shall be registered with the Department.	2012	Partly implemented		Cross checking will be performed with the National Nitrates Database system once this system is operational.
Any person who wishes to make use of organic or inorganic fertilisers shall be required to attend a training course on land application of fertiliser approved by the Director.	2012	Partly implemented	Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. In addition, recently the NAU has been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	Cross checking will be performed with the National Nitrates Database system once this system is operational.
The Department shall keep a register of farmers and respective holdings making use of fertilisers and shall only permit the use of fertilisers to such registered users who have attended the course in terms of sub-regulation (2) hereof.	2012	Partly implemented		Cross checking will be performed with the National Nitrates Database system once this system is operational. Verification of adherence to this measure will be performed by reviewing farmers' records inputted into this system.
All sales or deliveries of organic fertiliser shall be covered by receipts or delivery notes.	05/08/2011	Implemented		Verification performed by reviewing records.
All importers, distributors and resellers of fertilisers shall be registered with the Department.	2012	Partly implemented	Part implementation is due to the fact that the NAP has only recently been covered by virtue of L.N. 321 of 2011. Recently the NAU has also been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	Cross-checking will be performed with the National Nitrates Database System once this system is operational.
The sale or movement of livestock manure to and from holdings shall be notified to the Department by the 30 October of each year.	2012	Partly implemented	Part implementation is due to the fact that the NAU has only recently been covered by virtue of L.N. 321 of 2011. Recently the NAU has also been awarded LIFE+ funding to support a full scale information campaign to educate farmers on their new obligations to be in compliance with this measure.	Cross-checking will be performed with the National Nitrates Database System once this system is operational. Verification of adherence to this measure will be performed by reviewing records inputted into this system.

Measure	Implementation			Comments
	Implementation date	Implementation status	Description	
The sales or purchase of organic and inorganic fertiliser shall be recorded and notified to the Department by the 30 October of each year.	2012	Partly implemented		Cross-checking will be performed with the National Nitrates Database System once this system is operational. Verification of adherence to this measure will be performed by reviewing records inputted into this system.
The importation of inorganic or organic fertiliser by farmers shall be notified to the Department by the 30 October of each year.	2012	Partly implemented		Cross-checking will be performed with the National Nitrates Database System once this system is operational. Verification of adherence to this measure will be performed by reviewing records inputted into this system.

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