3rd River Basin Management Plan: MALTA

March 2024

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The 3rd River Basin Management Plan for the Malta Water Catchment District 2021 – 2027
March 2024.

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1. Introduction

1.1. Background and scope of the River Basin Management Plan

The European Union (EU) Water Framework Directive (WFD) requires EU Member States to develop River Basin Management Plans (RBMP) aimed at the adoption of an integrated approach towards the protection of water, including groundwater, inland surface waters, transitional waters and coastal (marine) waters. This plan, which is subject to updating and reporting to the European Commission on the basis of six-year implementation cycles, focuses on the management of water resources as defined through designated 'water bodies.

RBMPs constitute the main management tool for the protection of all water resources in Malta, and in fact are considered as National Water Management Plans in their own right. These plans are developed pursuant to the EU Water Framework Directive 2000/60/EC and are updated every six years on the basis of the six-year implementation cycle of the Directive.

The plan describes and assesses these water bodies in terms of their status and pressures thereon. On the basis of such assessment, the Plan put forward a Programme of Measures targeting the protection and, where necessary, the restoration of water bodies.

The overall aim of the River Basin Management Plan is to ensure the sustainable management of Malta's water resources, and the protection of aquatic ecosystems associated with our natural waters. This is achieved through the definition of a set of measures (Programme of Measures) addressing the most significant challenges that Malta's water resources are facing.

In this regard, the plan describes the status of the water bodies and the pressures affecting water status, whilst also setting environmental objectives to be achieved through the implementation of the Programme of Measures.

1.2. Water Resources availability in the Maltese Islands

The Maltese islands experience a typical semi-arid Mediterranean climate with long-dry, hot summers and mild-wet winters. Rainfall, the only source of natural freshwater input in the islands, generally occurs between the months of September and April, with the intervening months being characteristically dry. Annual precipitation tends to average at 500 mm per year, with however a high intra-annual variability ranging between 200 and 700 mm. The temperate climatic conditions also result in high evapotranspiration rates, with the mean annual potential evapotranspiration value reaching 1300 mm – and hence significantly exceeding the annual rainfall levels.

The semi-arid nature of Malta's climate is confirmed through the application of United Nations Environment Programme's Aridity Index, which is defined as the long-term average annual precipitation to annual potential evapotranspiration ratio. As outlined in Figure 1, Malta's climatic conditions predominantly fall within the semi-arid range of this index. Water resources in arid and

semi-arid areas are very scarce due to the low rainfall and high evapotranspiration, and hence can be considered as regions facing permanent water-scarcity conditions. Semi-arid conditions therefore go beyond "prolonged droughts" as envisaged under the WFD, in terms of water scarcity being permanent as opposed to a temporary condition.

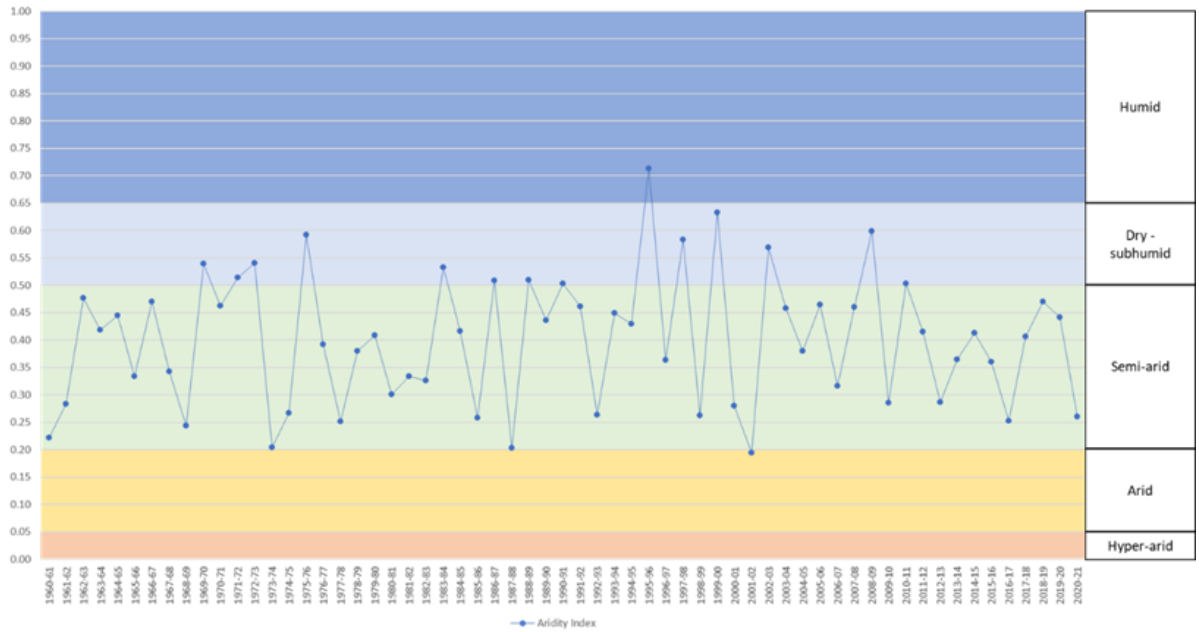

Figure 1 *Application of the Aridity Index to the Maltese Islands (1960-2022), highlighting the semi-arid nature of Malta's climate.*

Hence Malta's 3rd RBMP primarily addresses the prevailing conditions of permanent scarcity of natural water resources as experienced in the Maltese islands. The 3rd RBMP can therefore be considered as a Drought Management Plan in itself, given that it addresses a water management context which is significantly different than that experienced in mainland Europe. Malta's context of permanent scarcity of natural freshwater resources goes beyond the impact of temporary droughts and results in the permanent scarcity of natural freshwater resources.

1.3. The National Water Resource Base

Naturally renewable freshwater resources in the Maltese islands are not sufficient to meet the national water demand, even if such demand is kept at highly efficient levels. This condition arises due to natural factors such as the climatic and geomorphological conditions prevailing in the islands as well as due to the islands' high population density, which is by far the highest amongst the Member States of the European Union. This is not a recent development, and in fact, the insufficient availability of freshwater resources has historically been considered as a limiting factor for the social and economic development of the country.

The first reference to the unavailability of freshwater resources in Malta dates to 1536, in a description of the Maltese Islands authored by Knight Quintinus Haedus which reported that "*The water is salty and putrid but there are good springs which are probably due to rain fallen in wintertime. The origin*

of these springs is not very deep, they often disappear in summer, but they always diminish in volume. One generally drinks rainwater collected in tanks or in ditches."[1]

Addressing water scarcity has remained a national priority ever since, addressed by the different administrations of the islands. In this regard, one can note the development of rainwater harvesting facilities with the aim of balancing water availability between the wet and dry seasons, the progressive development of groundwater abstraction resources in the perched and subsequently in the early 1800's in the Mean Sea Level aquifer systems, followed by the installation of the first sea-water distillation plants in the 1880's and the first reclamation plants for treated wastewater used in landscape irrigation developed in the 1950's.

The production of alternative (additional) water resources has therefore been a feature of the development of the water sector in Malta over the last centuries, with the aim of developing a sufficient freshwater production capacity to supplement available groundwater resources to meet the ever-increasing national water demand and ensure that natural groundwater resources are used in a sustainable manner.

1.4. Development of the national water demand

The main factors which contribute to the water demand in the Maltese islands can be identified as population growth, the development of the agricultural sector and the industrial/commercial sectors, including tourism. In addition to the actual water requirements of these sectors, the demand of the distribution system, in terms of losses during the conveyance of water from the production source to the point of use also needs to be taken in consideration.

The resident population of the Maltese islands has seen a continued increased, registering an increase of around 20% over the last decade. This recent change has occurred due to an expanding economy which has resulted in an increase in the foreign workforce. This provides added challenges from a water management perspective, not just due to the actual increase in population numbers but also due to the different water use practices.

The Gross Domestic Product (GDP) of the Maltese islands shows an increasing trend, reflecting the expansion of the economy and its progressive transformation to a services-oriented economy. An increasing GDP is also considered to be reflected in a generalized improvement in the standard of living of the population. From a water demand perspective, economic development needs to be considered from two diametrically opposite but complementary perspectives namely one which sees an expanding economy as requiring an increased volume of water being supplied, and another where the transformation of the economy into a service-oriented economy where one would see a reduction in high water requiring economic activities and hence an associated reduction in the water demand.

The development of the agricultural sector in the Maltese islands is characterized by two opposing factors, namely the reduction in the overall land under agriculture but which is complemented with

[1] Descriptio Insula Melitae apud Thesaurus Antiquitatium, Vol. XV.

an increase in the coverage of irrigated land. The local climate enables multi-season cropping, whereas cultivation of crops during the spring and summer seasons requires substantial volumes of irrigation water. Increasing the area under irrigation, and its use during the spring and summer seasons, can potentially lead to an increase in the water demand of the agricultural sector.

From a system demand perspective, Malta has achieved significant progress in managing the municipal water distribution networks significantly reducing leakage levels. Over the past twenty years, the national water utility, has lowered its ILI from 5 (in 2004) to less than 1.5 (in 2022)[2]. These results have led to a significant reduction in the water production for municipal purposes, in spite of population increase and the expanding economy, as is illustrated in Figure 2. The agricultural sector primarily operates using multiple on-site water sources, therefore reducing the importance of distribution losses. This will however change in the coming years when leakage management in the network supplying reclaimed water to the agricultural sector will increasingly gain importance to ensure the effective use of this resource.

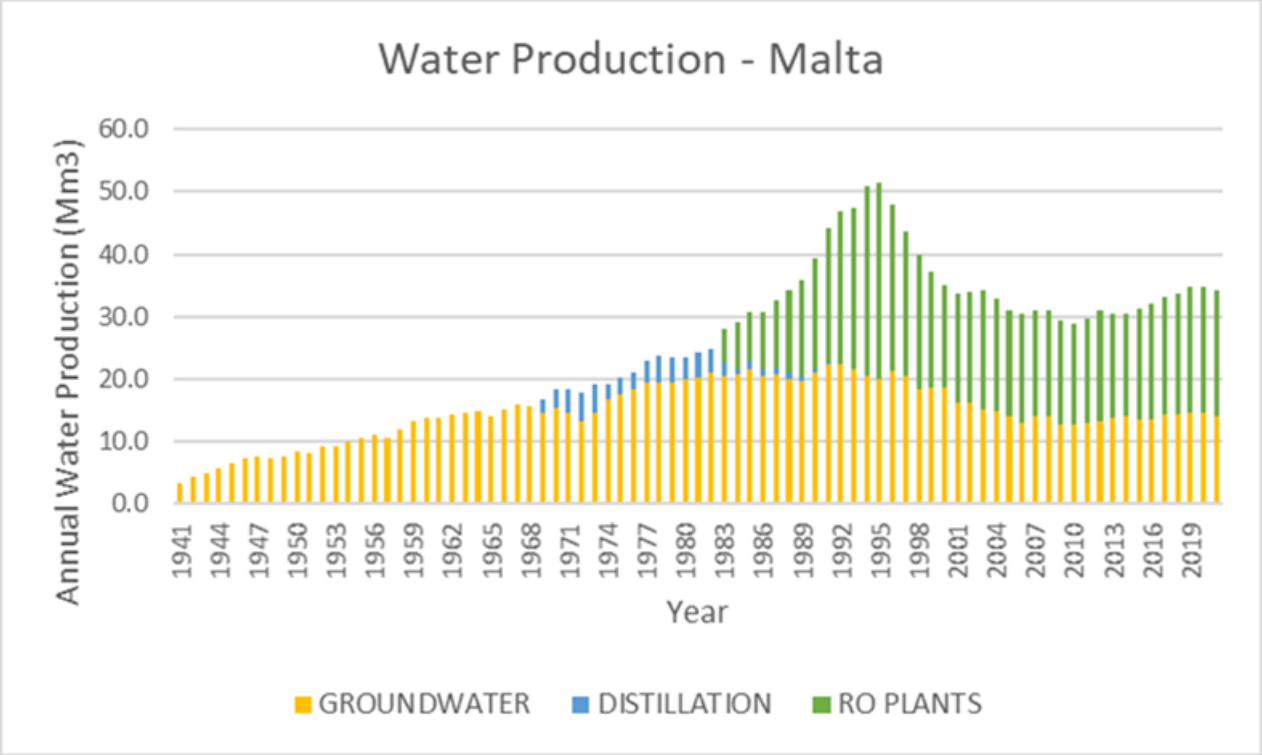

Figure 2 *Water Production for municipal supply in Malta.*

In addition to the internal factors outlined above, external factors, such as Climate Change, also need to be considered when assessing the development of the national water demand. Climate Change is expected to result in a reduced rainfall depth as well as a change in the rainfall patterns favouring more high intensity rain events, two factors which are expected to result in a reduction in the mean annual recharge to groundwater. Furthermore, increased temperatures will be expected to result in increased water demands whilst also entailing increased natural losses from evapotranspiration.

[2] WSC. (2022, June 22). *Annual Report 2021.* Retrieved November 28, 2023, from Water Services Corporation: https://www.wsc.com.mt/annual_report_2021/.

Overall, Climate Change is expected to result in exacerbating the current water scarcity conditions prevailing in the Maltese Islands.

1.5. The importance of Malta's surface waters

Water scarcity and the increasing water demand should also be viewed in relation to effects on aquatic ecosystems and the RBMP, as the main management tool for the protection of all water resources, should be seen in the wider context of the importance of all water types.

Malta's surface waters supporting aquatic ecosystems encompass inland surface waters, transitional waters at the coastline, and coastal waters that surround our islands. These waters are important from an ecological but also socio-economic point of view.

Inland surface waters

Malta's inland fresh surface waters are the most susceptible to water scarcity, which may also render them less resilient to other anthropogenic pressures affecting water quality. These waters constitute very small streams, water courses or standing waters, as well as transitional water bodies characterised by brackish waters found at the mouths of valley catchments in close proximity to the sea.

The watercourses are parts of larger valley systems, locally known as 'widien'. The level of water and flow within these watercourses generally varies seasonally. However, some are linked to springs that outflow from perched aquifers and in these watercourses, water tends to be present throughout the year. Given Malta's Mediterranean climate and geology, these waters are important because they support habitats and freshwater aquatic species that are found in very few places within the Maltese islands, such as the endemic Maltese freshwater crab (*il-qabru*) and galleries of white willow and white poplar trees.

Malta's transitional waters also support particular habitats and species and are important resting grounds for migrating birds. The waters are hence popular for bird watching, eco-tourism and education, apart from being unique landscape features that support biodiversity and provide flood protection.

In view of their small scale and characteristics, Malta's inland surface waters and transitional waters support a relatively small percentage of the total economy. Economic sectors that are dependent to some extent on these waters include agriculture, tourism, entertainment, research, and coastal defence, and it is estimated that 0.1% of the total economy (or €10.82 million) and around 300 jobs depend on these waters. In fact, many ecosystem services that these waters provide cannot be valued in monetary terms. Their key value is for non-market activities such as recreational uses, including bird-watching and outdoor walks, their aesthetic and landscape value, as well as the role they have in terms of supporting biodiversity, coastal and flood protection (in the case of wetlands), and maintaining hydrological flows and aquifer recharge.

Coastal waters

Malta's coastal waters on the other hand are not affected by water scarcity but are still susceptible to anthropogenic pressures, including pressures from land-based activity. It is thus important for Malta's water policies to address management of coastal waters, also in view of the fact that they support a range of economic sectors as well as recreational activities, providing fish and seafood, a means for the transport of goods and services, space for leisure and recreation and a sink for key utilities' waste streams.

Dependence on the marine environment of the various economic sectors varies, from 100% in the case of fisheries, aquaculture, and shipping to lower, but still significant percentage, for electricity generation, water production, sewerage, motion pictures, telecoms, accommodation, and real estate among others.

Fisheries and aquaculture make use of marine resources as a direct input and rely on the good environmental state of our seas in order to function. Transport of goods by shipping is dependent on the sea, as is the provision of telecommunications that rely on underwater cables between Malta and Sicily that provide for a substantial part of its service provision.

A significant part of tourism activity in Malta entails sea-based entertainment, with tourists making use of the sea both directly, in the activities they engage in, as well as indirectly, since the pleasure reaped in consuming certain goods and services are greater given that the sea is accessible and visible.

The same can also be said to apply for the economic sectors that encompass restaurants, real estate, and movie/TV production, for which the aesthetic and visual amenity of seascapes contribute to the intrinsic value of sites and settings.

Key utilities such as wastewater treatment, electricity generation and desalination depend on the sea, as a direct input for their processes and/or a sink for their discharges. Electricity generation makes use of the sea for the provision and discharge of cooling waters, water production through desalination is dependent on seawater as a direct input as well as a sink for the resulting brine discharges, while treated wastewater from the national urban wastewater treatment plants is also discharged to sea. These sink services do not have an economic cost assigned, but without them these utilities could not function. Approximately 15% of Malta's economy and 12% of jobs have been estimated to depend on the marine environment, equivalent to €1,636 million Gross Value Added (GVA[3]) and 27,639 jobs[4] in 2018[5]. This share may seem high when compared to the 1.3% contribution of the Blue Economy to the EU[6], but it reflects the central role that the sea has in Malta's economy as an island state.

[3] Gross Value Added (or Net Output) is the value of output less the value of intermediate consumption; it is a measure of the contribution to the gross domestic product made by an individual producer, industry, or sector. At factor cost, value added is the gross income from operating activities after adjusting for operating subsidies and indirect taxes. https://nso.gov.mt/metadata/ConceptDetails.aspx?id=924

[4] As Full Time Equivalents.

[5] E-Cubed & ADI Associates (2020) Economic and Social Analysis of Marine, Coastal, Inland Surface and Transitional Water Bodies in Malta. Unpublished.

[6] The EU Blue Economy Report 2019 based on 2017 data. European Commission (2019). The EU Blue Economy Report. 2019. Publications Office of the European Union. Luxembourg.

In addition, there are non-market activities such as the recreational use of the sea made by locals which does not always feature in national output figures, but which are central to our quality of life, such as enjoyment of the sea for swimming, diving, boating, fishing, and coastal activities such as walking, picnicking, climbing, and angling.

Other services provided by marine ecosystems, that are not factored into economic statistics, include the mitigation of storm surges, coastal erosion and flooding by seagrass meadows, habitats for marine species to breed, feed and shelter as provided by seagrass meadows, caves, and reefs, as well as the bioremediation, filtration and dispersion of waste, toxins, and other nuisances.

1.6. National Water Policy Framework

The above considerations highlight the need for water management in Malta to be considered from a starting point of gross unavailability of natural freshwater resources, where available resources are not sufficient to meet the national water demand. This is a different context to water management than that prevailing in mainland Europe. Water management in Malta is not just about managing available water resources, but also about creating the additional water resources required to address the gap between available naturally renewable supplies and demand.

As illustrated in Figure 3 Malta's national policy framework therefore focuses on the containment of water demand, through water demand management measures applied at the national and the user level, intended to achieve a high level of water use efficiency. However, cognisant of the remaining gap between the availability of natural freshwater resources and an efficient national water demand, the policy framework aims to address this gap through the development of Non-Conventional Water Resources, thereby ensuring that water supply security is continually achieved hence supporting the continued social and economic development of the country, in a progressively sustainable manner.

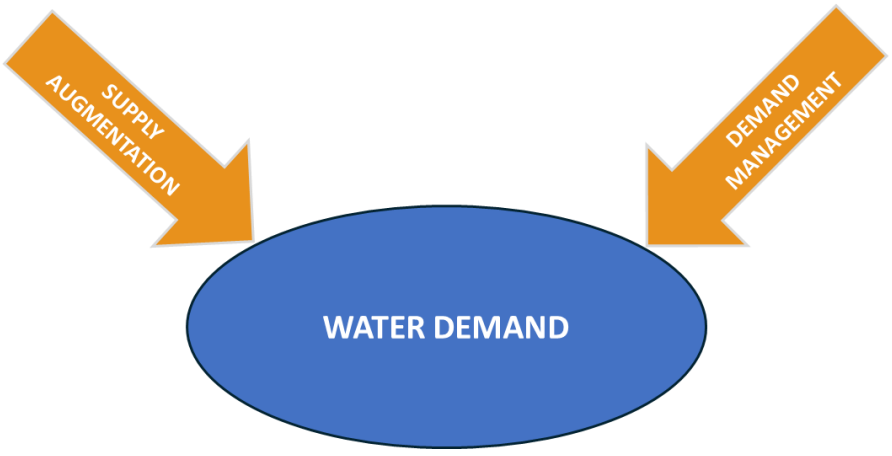

Figure 3 *Schematic of Malta's water policy framework, addressing water demand through the conjunctive use of water demand management and water supply augmentation measures.*

The need to produce water increases the linkages between the water and the energy sectors, where energy efficiency in water production and efficiency in water use itself become important factors for reaching policy targets which go beyond the water sector, such as decarbonization targets. In fact,

the progressive reduction of the specific energy for the production of desalinated water enabled other aspects of energy use in the national municipal water cycle to gain increased relevance, including energy use in the distribution of water, the pumping of groundwater and the energy requirements of wastewater treatment.

Malta's 3rd RBMP will be addressing all the above-mentioned issues, together with issues related to water quality and ecosystem functions, with a view of ensuring a holistic and comprehensive consideration of the water sector and its linkages with broader national targets. This is in line with adopting a water management framework based on the principles of the Water-Energy-Food-Ecosystems Nexus. The interlinkages between these four nexus cornerstones are important policy elements, and the 3rd RBMP will broaden the linkages between water and energy to food production, in particular through the diversification of water supply resources for agriculture. Furthermore, the resulting eventual decreased reliance of the agricultural sector on groundwater will open up opportunities for protecting groundwater flows sustaining important groundwater dependent ecosystem hubs.

1.7. Defining the Significant Water Management Issues for the Malta River Basin District

Within this broad water management context which is being introduced through the 3rd RBMP, a number of Significant Water Management Issues (SWMI) addressing the specific characteristics of this water scarce river basin district (RBD) will be given priority in the Programme of Measures. The identification of these SWMIs was based on a consultation with key stakeholders, a process which highlighted that water management in Malta needs to be considered from the "unavailability perspective". This is explained as natural freshwater resources being permanently not sufficient to meet demand, a context where water scarcity does not occur because of droughts, but because of the natural semi-arid climatic conditions experienced in the river basin district.

The SWMIs however also cover quality-related issues which affect all water types. In particular, these reflect emerging issues which need to be addressed through concerted efforts across various policy sectors.

The priority SWMI which are addressed in the 3rd RBMP are:

Quantitative Water Management Issues

- Energy Efficiency in Water Services
- Optimisation of wastewater treatment and conveyance infrastructure
- Water management in the urban environment
- Management of Groundwater resources

Water Quality Management Issues

- Addressing contaminants of emerging concern
- Improving the use of agricultural fertilizers

- Understanding surface water status
- Addressing Marine Litter

Horizontal Issues

- Improving the understanding of water's contribution to the economy
- Promoting Research and Innovation in the water sector
- Alignment of National Policies related to the water sector
- Addressing extreme events and the reduction of flood risk

1.8. Roles and Responsibilities

1.8.1. Governance Framework

The Governance framework for water resources management recognizes the importance of the clear identification of the roles and responsibilities of the different public agencies involved in the management of water resources. A roles and responsibilities analysis of the national water sector was undertaken as part of the development process of the 3rd RBMP with the scope of identifying and addressing regulatory gaps.

Through this analysis, a clearer picture emerged of the different roles of public entities in managing water resources, with a clear demarcation between the policy, regulatory and operational functions. Additionally, whilst policy and regulatory functions are inherently the domain of public administration entities, operational functions are the domain of both government and the private sector.

The analysis focused on the seven different typologies of water resources present in the Malta River Basin district, as outlined hereunder:

- Potable water, being that water as delivered through the main network of the Water Services Corporation.
- Desalinated water, a component of waters, produced by the Water Services Corporation in the drinking water process.
- Groundwater, being that water which is extracted from groundwater bodies present in the Maltese islands by the Water Services Corporation (WSC) and private operators.
- Coastal waters being of relevance in the context of the abstraction of saline water for desalination purposes as well as because of the discharge of treated wastewater effluents thereto, in addition to their importance in supporting marine ecosystems.
- Stormwater being that water that is discharged from impermeable surfaces or saturated permeable surfaces, and which flows under the influence of topographical characteristics, and which may be confined or unconfined.
- New Water is treated wastewater which is further polished to produce a high-quality water product.
- Inland surface and transitional waters being those waters flowing or retained in valleys; pools and areas of brackish waters which are critical to supporting aquatic ecosystems.

1.8.2. Public Entities involved in water management

The public entities involved at policy, regulatory and operational level in the water sector in the Maltese Islands are identified in the list below (and in Figure 4).

POLICY LEVEL

- Energy and Water Agency (EWA)
- Policy Development and Programme Implementation Directorate, Ministry for the Environment, Energy and Regeneration of the Grand Harbour (MEER)
- Rural Development Directorate, Ministry for Agriculture, Fisheries and Animal Rights (MAFA)
- Policy Development Directorate, Ministry for Transport, Infrastructure and Public Works (MTIP)

REGULATORY LEVEL

- Environment and Resources Authority (ERA)
- Malta Resources Authority (MRA)
- Regulator for Energy and Water Services (REWS)
- Superintendence of Public Health (SPH)
- Planning Authority (PA)
- Buildings and Construction Authority (BCA)
- Transport Malta (TM)
- Department of Fisheries and Aquaculture (DFA)

OPERATIONAL LEVEL

- Ambjent Malta (AM)
- Project Green (PG)
- Water Services Corporation (WSC)
- Coastal and Storm Water Unit Public Works Department (PWD)
- Infrastructure Malta (IM)
- Local Councils (LC)

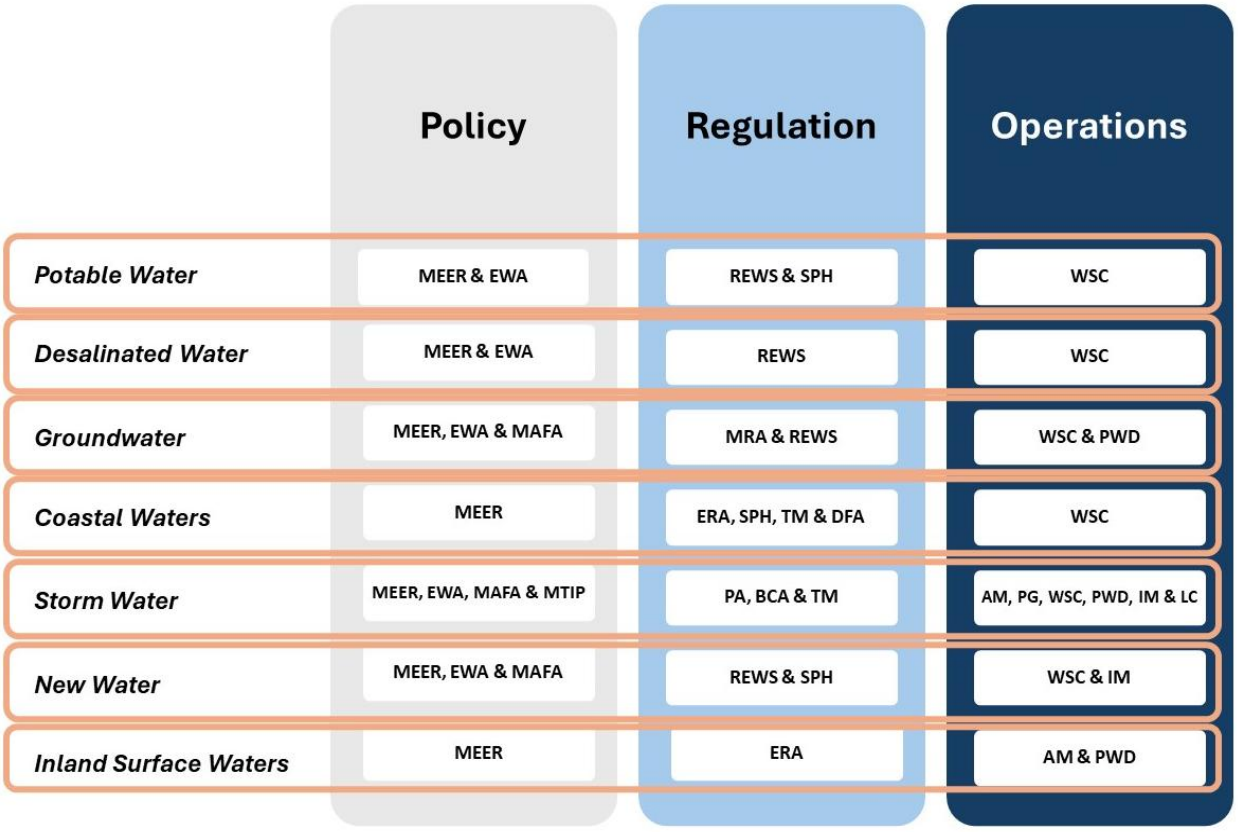

Figure 4 *Roles and Responsibilities of Public Entities in the management of water resources in the Malta River Basin District based on the seven identified water typologies.*

2. Characterisation of water resources in the Maltese Islands

2.1. Characterisation of surface waters

Surface water bodies are categorised as **rivers**, **lakes**, **transitional waters,** or **coastal waters**. Within each category, the water bodies are differentiated into 'types' on the basis of physical descriptors[7] or defined physical and chemical factors that determine their ecology[8]. Noting that the ecological character of surface waters will vary according to their different physical regimes, the classification of the water bodies into types enables the definition of type-specific reference conditions for determination of ecological status. Reference conditions are a description of the 'Biological', 'Physico-chemical' and 'Hydromorphological' Quality Elements associated with the water body that would exist at high status, with no or very minor disturbance from human activities. The below sections outline the typologies and discuss reference conditions for each type of surface water body. The details of the characterisation process are in the Technical Document "Surface Water Bodies: Characterisation and Designation of Heavily Modified Water Bodies".

2.1.1. Rivers

The Water Framework Directive (WFD) defines a 'River' as a body of inland water flowing for the most part on the surface of the land, but which may flow underground for part of its course. Malta has no large and permanent river systems, but rather very small streams and watercourses with fluctuating water levels throughout the year. All three watercourses delineated as WFD water bodies, Wied tal-Baħrija (MTWC01), Wied il-Luq (MTWC02) and Wied tal-Lunzjata (MTWC03) are temporary. Temporary streams may be defined as bodies of freshwater that undergo a recurrent dry phase of varying length that is sometimes predictable in terms of both its time of onset and duration (Williams, 1996 in Sánchez-Montoya et al 2011[9]). In temporary streams the main factors affecting the aquatic assemblages present, their function and structure, is their hydrological intermittency.

The use of 'System A' for characterising the 'river' water bodies in Malta remains non-applicable, primarily due to the fact that the catchment area for all three watercourses is less that the minimum of 10 km^2. The application of System B for the characterisation process concluded that the three watercourses belong to the same type of water body, which can be described as small, lowland, calcareous and temporary watercourses. On the basis of the types of 'river' water bodies identified as part of the intercalibration process in the Mediterranean region, all three watercourses are considered

7 Set for the purpose of 'System A' for determination of typologies by Annex II to the Water Framework Directive.

8 Set for the purpose of 'System B' for determination of typologies by Annex II to the Water Framework Directive.

9 Williams, D.D. 1996. Environmental constraints in temporary freshwaters and their consequences for the insect fauna. *Journal of North American Benthological Society*, 15, 634 – 650 *in* Sánchez-Montoya, M.M., Gómez, R. Suárez, M.L., and Vidal-Abarca M.R. 2011. Ecological assessment of Mediterranean streams and the special case of temporary streams. River Ecosystems: Dynamics, Management and Conservation, 109-148.

to be more closely belonging to the type R-M5, namely Mediterranean small lowland temporary rivers[10] (Table 1 and Table 2).

Table 1 *Typology for Inland Surface Water Bodies (Water courses) in Malta.*

TYPE	MEDITERRANEAN RIVER CHARACTERISATION	WATER BODY
R-M5	Small, lowland, temporary rivers	Wied tal-Baħrija (MTWC01) Wied il-Luq (MTWC02) Wied tal-Lunzjata (MTWC03)

Table 2 *Characteristics of the Mediterranean rivers common intercalibration type R-M5.*

TYPE	CATCHMENT (km^2)	ALTITUDE (m)	GEOLOGY	FLOW REGIME
R-M5	10 – 100	<300	Mixed	Temporary

The current knowledge of the pressures on the three water bodies indicates that none of the sites along the watercourses has the potential to represent undisturbed conditions for 'river' type water body in Malta. This is particularly due to the following points:

- The agricultural activity taking place within the catchment area which gives rise to diffuse sources of pollution.
- The morphological alterations to which all three watercourses were subject through time, in particular historical interventions.
- The presence of the Great Reed *Arundo donax* which dominates throughout the majority of the three watercourses.

This is confirmed when comparing key hydromorphological and physico-chemical parameters with the criteria used to benchmark sites for R-M5 river types within other Mediterranean countries. Malta's watercourses are particularly rich in $N\text{-}NO_3$ (nitrates) throughout their whole length. It is also not possible to identify near-natural reference sites, in view of limitations in the availability of data which does not allow Malta to undertake a test correlation between pressures and Ecological Quality Ratios. Within this context, where possible and pending the identification of reference conditions for Malta's watercourses, the harmonised values of the Ecological Quality Ratios based on the reference conditions identified for river types R-M5 and associated reference values will be used to interpret the status of the Biological Quality Elements for the watercourses.

2.1.2. Lakes

The 'Lake' water body category is defined by the WFD as a body of standing inland surface water. The presence of standing waters or permanent freshwater pools in the Maltese Islands is scarce, reflecting the scarcity of surface freshwaters on the islands as a result of the semi-arid climate. Nevertheless, Malta has delineated two permanent and extremely small pools as WFD water bodies. These are Il-Qattara (MTSW01) and L-Għadira ta' Sarraflu (MTSW02), both located on the island of Gozo. The two pools are permanent, that is although their water levels fluctuate, they never dry out completely.

[10] Van De Bund W, editor. Water Framework Directive Intercalibration Technical Report. Part 1: Rivers. EUR 23838 EN/1. Luxembourg (Luxembourg): OPOCE; 2009. JRC51339.

The typologies of 'lakes' as identified for the Mediterranean ecoregion as part of the WFD intercalibration process are restricted to deep reservoirs, with water depth >15 m. The two freshwater pools under consideration have a mean depth of <3 m. Therefore, Malta's pools do not fit into the Mediterranean lake typologies. Furthermore, the size of the pools (area) precludes the possibility of applying System 'A' for characterisation purposes, which system sets a minimum size typology of 0.5 – 1 km^2.

For the purpose of the 3rd RBMP, the characterisation of these two pools is in accordance with the obligatory and relevant optional factors of System 'B'. The typology proposed for Maltese freshwater or standing water pools is based on the geology, depth, surface area, reflecting the parameters used in defining the Mediterranean lake typologies. On the basis of this characterisation process the pools are considered to be lowland, very shallow, calcareous pools with fluctuating salinity[11] (Table 3 and Table 4).

Malta's 2nd RBMP designated L-Għadira ta' Sarraflu as a Heavily Modified Water Body (HMWB). This designation is being revisited on the basis of the WFD methodologies in the 3rd RBMP.

Table 3 *Typology for Inland Surface Water Bodies (Pools) in Malta.*

TYPE	MEDITERRANEAN STANDING WATERS CHARACTERISATION	WATER BODY
N/A	Lowland, very shallow, calcareous pools	Il-Qattara (MTSW01) L-Għadira ta' Sarraflu (MTSW02)

Table 4 *Characteristics of the Mediterranean pools in Malta.*

TYPE	ALTITUDE *(mM)*	MEAN DEPTH (m)	SURFACE AREA (km^2)	CATCHMENT (km^2)	ALKALINITY
N/A	<200	<3	< 0.5	<20,000	Calcareous

The main pressures as screened in terms of presence/absence in Annex 1 are primarily related to diffuse sources of pollution from the surrounding agricultural activity, diffuse sources from urban activity in particular roads and quarries in the case of Il-Qattara, and some minor alterations to the pool banks. L-Għadira ta' Sarraflu is additionally subject to biological pressures from the introduction of various non-indigenous species, and this can be considered one of the most significant pressures on this freshwater pool.

Due to the small size of the pools, screening of pressures was not necessary to confirm that they constitute discrete water bodies. It is also clear that the identification of reference sites representing undisturbed conditions in these unique water bodies is not possible in view of the influence of diffuse sources of pollution which would affect the whole water bodies in question. While mean annual nutrient levels are relatively low in the two freshwater pools, the surrounding agricultural use is quite significant ranging from 61 – 72% of the catchment areas.

Within this context, where possible and pending the identification of reference conditions for Malta's freshwater pools, the harmonised values of the Ecological Quality Ratios based on the reference

[11] While the pools are primarily influenced by rainfall and fed by freshwater seepage in the case of Il-Qattara, the salinity fluctuates throughout the seasons, in some cases reaching levels that are considered slightly saline.

values identified for the closest comparable water body types will be used to interpret the status of the Biological Quality Elements associated with pools.

2.1.3. Transitional waters

The WFD defines transitional waters as "bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters, but which are substantially influenced by freshwater flows". Such waters are near the coast and typically brackish, i.e. their salinity is in-between that of seawater and fresh water. Only few of these waters are still extant in the Maltese islands, as saline marshlands were historically drained and reclaimed for agriculture or other uses since the seventeenth century. Furthermore, the transitional waters that exist today have been altered by human activity over time.

Five transitional waters have been delineated as WFD water bodies: Is-Salini (MTTW01)[12], Il-Magħluq ta' Marsascala (MTTW02), Il-Ballut ta' Marsaxlokk (MTTW03), Is-Simar (MTTW04) and L-Għadira (MTTW05). For the purpose of this update, the five transitional waters are characterised in accordance with the obligatory and relevant optional factors of System B. The characteristics that may define the typologies of Malta's transitional water bodies are summarised hereunder:

- All five transitional water bodies are shallow with water depths <30 m and located in sheltered/ very sheltered locations.
- While salinity fluctuates in all five water bodies, mean salinity indicates that four transitional water bodies are polyhaline (MTTW01, MTTW02, MTTW03 and MTTW04) and one is hyperhaline (MTTW05)[13].
- Connection to sea and residence times are strongly influenced by the modifications that the water bodies have been subject to through time, noting that most of the transitional water bodies are connected to the sea through artificial structures.

While Malta's transitional water bodies may be distinguished or categorised into different typologies on the basis of the salinity range, differentiation on the basis of hydrological characteristics is difficult in view of the distinct modifications that each water body has been subject to. The closest comparable typologies of Malta's transitional water bodies on the basis of salinity and the categories identified at Mediterranean level are included in Table 5. However, limitations in the application of such typologies for Malta's transitional water bodies should be acknowledged and should be viewed within the context of their heavily modified nature. Malta's 2nd RBMP has in fact designated all transitional water bodies as HMWB. Such designation is being revisited on the basis of theWFD methodologies in the 3rd RBMP.

[12] The boundary of the WFD water body has been extended to include riparian land on the banks of the west channel.

[13] Based on the salinity boundaries utilised for the intercalibration of the Mediterranean transitional waters.

Table 5 *Closest comparable typologies for transitional water bodies in Malta.*

WATER BODY	SALINITY	SHAPE	CLOSEST COMPARABLE TYPE
Is-Salini (MTTW01)	Polyhaline	Shallow U-shaped channel open to sea	Coastal Lagoon -Polyhaline restricted
Il-Magħluq ta' Marsascala (MTTW02)	Polyhaline	Shallow straight enclosed channel	Coastal Lagoon - Polyhaline chocked
Il-Ballut ta' Marsaxlokk (MTTW03)	Polyhaline	Shallow enclosed transient lagoon	Coastal Lagoon - Polyhaline chocked
Is-Simar (MTTW04)	Polyhaline	Shallow enclosed permanent coastal lagoon	Coastal Lagoon - Polyhaline chocked
L-Għadira (MTTW05)	Hyperhaline	Shallow enclosed permanent coastal lagoon	Hyperhalines (Salinity > 40 psu)

All the five water bodies are subject to hydromorphological alterations, mostly of historical nature in the case of Is-Salini and il-Magħluq, or in the case of the other three, dating back to the creation of the current wetland/saline marshland habitats in the 1980 - 1990s. Modifications linked to agriculture and urban development have taken place in the wider context of the catchment areas for the water bodies. As a result of their highly modified nature, no attempt is made to define reference conditions. Instead, the definition of ecological potential will be resorted to as part of the evaluation of the sites as HMWB (refer to 2.1.5).

2.1.4. Coastal waters

The WFD defines coastal waters as "surface water on the landward side of a line, every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured, extending where appropriate up to the outer limit of transitional waters". Therefore, these waters extend outwards from the coastline, up to 1 nautical mile into the Mediterranean Sea from the baseline and are exclusively composed of marine waters.

Nine 'coastal' water bodies were characterised by Malta's 2nd RBMP using System B optional factors. The process included an assessment of depth; exposure based on prevailing winds, water depth and fetch; bathymetry and topography of the Mediterranean basin; water circulation; sea currents; and resultant sea surface temperatures. The 3rd RBMP confirms these typologies as per Table 6.

Table 6 *Typology for Coastal surface waters in Malta (2nd RBMP).*

TYPE	CHARACTERISATION	WATER BODY
I	Very exposed, deep (> 50 m)	MTC 101, MTC 108
II	Exposed, intermediate (30 – 50 m)	MTC 104, MTC 105, MTC 106, MTC 107
III	Exposed, intermediate (30 – 50 m) to deep (> 50 m)	MTC 102, MTC 109
IV	Exposed, intermediate (30 – 50 m) to deep (> 50 m) with channel mixing	MTC 103

In terms of typologies of coastal water bodies defined for the Mediterranean eco-region, different types have only been defined in relation to the phytoplankton Biological Quality Element, and for which all Malta's coastal water bodies are Type IIIE (Table 7).

Table 7 *Characteristics of the Mediterranean coastal waters type III E (Source: Commission Decision (EU) 2018/229[14]).*

TYPE	DESCRIPTION	DENSITY (kg/m^3)	ANNUAL MEAN SALINITY (psu)
Type IIIE	Not influenced by freshwater input (Eastern Basin)	>27	>37.5

The main pressures associated with Malta's coastal water bodies are primarily related to rainwater runoff from the urban and agricultural land use, discharges to sea from land-based installations as well as marine installations (such as aquaculture farms), and hydromorphological alterations. In relation to hydromorphology, all Maltese coastal water bodies have undergone some degree of modification to their coastlines and/or seabed, primarily through the construction of piers, jetties, quays, and slipways, including alterations of a historical nature that reflects the country's dependence on maritime activities. Seven coastal water bodies host minor alterations, however, the two coastal water bodies in which the main ports are located (MTC 105 and MTC 107) host both major seabed and coastline modifications which warrant their screening as HMWB. Major alterations include interventions such as maintenance/capital dredging, land reclamation, large-scale breakwaters, and widespread modifications linked to intensive harbour associated operations.

Reference sites have been identified for all four Biological Quality Elements (BQEs) used for the purpose of the ecological classification of coastal water bodies.

2.1.5. Delineation of Heavily Modified Water Bodies

Surface waters characterised as part of the implementation of the WFD in Malta have been subject to physical alterations by anthropogenic activity, which may have resulted in substantial changes in their natural characteristics. Water bodies within all four categories of surface waters are thus screened for the identification and designation of HMWB in accordance with Article 4(3) of the Directive.

In order to qualify as HMWB, there is a need to demonstrate that the hydromorphological alterations to which they were subject would not enable them to achieve Good Ecological Status as one of the main WFD objectives for surface waters. HMWB designation allows the continuation of the specified uses providing valuable social and economic benefits, while allowing mitigation measures to improve water status. Although Malta's 2nd RBMP identified HMWB in each water category, the 3rd RBMP seeks a systematic approach to verify or otherwise such designation in accordance with the requirements of the Directive.

In order to screen the surface water bodies and identify those to be subject to the HMWB designation process, an indicator system is used. This system assesses the extent and intensity of the physical alterations to the surface water bodies in consideration of the uses (past and present) of the water bodies and surrounding land. The assessment method applied is based on selected features from EN 17123:2018 (*Water quality - Guidance on determining the degree of modification of the*

[14] Commission Decision (EU) 2018/229 of 12 February 2018 establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, the values of the Member State monitoring system classifications as a result of the intercalibration exercise and repealing Commission Decision 2013/480/EU.

hydromorphological features of transitional and coastal waters), which was also adapted to the extent possible for pools and water courses (with reference to EN 14614:2004 (*Water quality - Guidance standard for assessing the hydromorphological features of rivers*)).

Five criteria were selected per water body type, to assess physical alterations to the water bodies' physiography (i.e. prominent coastal landform features), connectivity[15], geology and water balance. The intensity of the modification was scored on the basis of quantitative or qualitative criteria, and the overall delineation as HMWB deemed applicable when the overall score, or the individual score on one criterion, was indicative of extensive (or severe) modifications. The criteria used, as well as the related indicators and classification per score, are shown in Table 8.

[15] Defined (in EN 17123:2018) as 'linkage within and between water bodies and between water and land through exchange of water, sediment, and organisms'.

Table 8 *Assessment method applied for assessing degree of hydromorphological modification for classification of Heavily Modified Water Bodies.*

ASSESSMENT CATEGORY	TYPE OF PHYSICAL MODIFICATION (FEATURE ASSESSED)	INDICATOR PER WATER CATEGORY		INTENSITY OF MODIFICATION AND SCORING					
		QUANTITATIVE CRITERIA (5 CLASSES)		Natural	Near Natural	Slightly modified	Moderately modified	Extensively modified	Severely modified
		SCORE		0	1	2	3	4	5
		QUALITATIVE CRITERIA (3 CLASSES)		Natural	Near natural to slightly modified		Slightly to moderately modified	Extensively to severely modified	
		SCORE		0	1		3	5	
1 - Physiography	Artificial (hardened) structures affecting the shoreline / banks[16]	Rivers	% length of banks	0	0-5%	> 5 % to 15 %	>15 % to 35 %	> 35 % to 75 %	> 75 %
		Pools	% length of banks						
		Transitional	% of total shoreline length comprises artificial structures						
		Coastal							
2 - Physiography	Channelisation / Artificial alteration to path	Rivers	% length of watercourse	0	0-1%	> 1 % to 5 %	>5 % to 10 %	> 10 % to 35 %	> 35 %
	Artificial structures affecting the surface area of a water body	Pools	% surface area	0	0-1%	> 1 % to 5 %	>5 % to 10 %	> 10 % to 35 %	> 35 %
	Artificial structures affecting the surface area of a water body	Transitional							
	Land claim (since 1968)	Coastal	% land claim area (vis-à-vis original water body extent)	0	0-5%	> 5 % to 15 %	>15 % to 35 %	> 35 % to 50 %	> 50 %
3 - Connectivity	Artificial barriers	Rivers	Modifications present [Number per 0.5km]	0	Few [1 -2 / 0.5km]		Moderate [3/ 0.5km]	Many [4+ / 0.5km]	
	Artificial modification of depth/water levels (e.g. flood banks)	Pools	Modifications present	0	Few		Moderate	Many	
	Connectivity (Seaward and Landward)	Transitional	Modifications and structures or land-use practices having an effect on migratory biota and/or	0	no/few		moderate	in general affects all	

[16] For rivers, rubble walls alongside the watercourse, that retain soil from terraced fields, are not considered as artificial modifications. Only interventions to the banks/wetted area are considered as affecting hydromorphology, where banks are not composed on natural material.

			on water and sediment transport						
	Connectivity (Landward and Alongshore)	Coastal	Structures or land-use practices having an effect on migratory biota and/or on water and sediment transport	0	no/few		moderate	in general affects all	
4 - Geology	Artificial modification of substrate	Rivers	% area with modified substrate composition	0	0-1%	> 1 % to 5 %	>5 % to 15 %	> 15 % to 30 %	> 30 %
		Pools							
		Transitional	% area subject to modified substrate (depth / composition)[17]		0-1%	> 1 % to 5 %	>5 % to 15 %	> 15 % to 30 %	> 30 %
		Coastal							
5 - Water balance	Artificial discharge regime[18]	Rivers	Anthropogenic changes to natural discharge regime	None	No or minimal artificial changes		Some changes in discharge	Significant artificial changes	
		Pools							
	Residence time/ flushing rate	Transitional	Evidence of significant artificial change in residence time/flushing rate	None	No evidence		Some evidence	Conclusive evidence	
	Artificial discharge regime[19]	Coastal	Management causing artificial changes in discharge	None	No or minimal management causing artificial changes in discharge		Some management causing artificial changes in discharge	Management causing significant artificial changes in discharge	
Total Scoring for each water body				**0**	**1-5**	**6-8**	**9-15**	**16-22**	**22 - 25**
Resulting HMWB identification				**Not HMWB**				**HMWB**	

[17] As a result of dredging activities and/or dumping of extraneous material, as well as the presence of floating and tethered structures, moorings.

[18] With reference to Table 3 in EN 14614:2004: Assessment of 'flow' through feature 'discharge regime', in terms of attributes such as Off-takes, augmentation points, water transfers, releases from hydropower dams.

[19] Considering the presence of Outfalls and intakes, defined in EN 16503:2014: Outfalls are artificial discharge structures (e.g. turbine releases from hydropower stations, discharges from sewage treatment plants, industry) whereas intakes are installations for abstracting cooling water from a TraC water body.

Following the screening for Heavily Modified Water Bodies in accordance with the above-mentioned methodology, the hydromorphological changes and associated uses are described for each water body to provide evidence of the substantially changed character of such water bodies and of the risks of failing Good Ecological Status as a result of the modifications. This exercise continues to follow, to the extent possible, the relevant WFD guidance documents[20] and includes the following main steps:

- The identification of potential Restoration Measures and their effects on the specified use and/or the wider environment.
- Should the designation as HMWB be confirmed, mitigation measures that are relevant to the hydromorphological modifications in the water bodies and that would achieve the best approximation to an ecological continuum are identified/selected. For the purpose of identification of mitigation measures, the "Guidance No 37 - Mitigation Measures Library.xlsx"[21] was consulted.
- The hydromorphological conditions resulting from the selected mitigation measures, and the associated effects on relevant Biological Quality Elements of the closest comparable water type that would respond to hydrological elements, are identified.
- Good Ecological Potential (GEP) is defined in terms of the relevant Ecological Quality Ratios or index values, as relevant.

Limitations in the processes employed in the 3rd RBMP are noted below:

- Noting that the majority of the modifications in Malta's surface water bodies are related to the historical architecture or nature conservation of the water bodies in question, 'other means' of achieving the uses driving the modifications are not considered relevant, also bearing in mind the need to protect the historical and landscape value of such sites.
- Malta has not as yet defined standards or ranges for hydromorphological conditions and physico-chemical elements that correspond to the ecological status boundaries of the Biological Quality Elements. Within this context, only the hydromorphological conditions are used in this process, based on the scores given when applying the assessment method previously, in Table 8, and as arbitrarily attributed to the different ecological boundaries. It should be stressed that this process was not verified through correlation analysis and should thus be considered preliminary. Furthermore, no reference is made to the physico-chemical parameters at this stage.
- The improvement in hydromorphological conditions as a result of mitigation measures is determined on a qualitative basis and hence should be considered preliminary.
- GEP should be treated as preliminary, to be re-evaluated in the upcoming WFD implementation cycles.

The outcome of the Heavily Modified Water Bodies Designation process is summarised in Table 9.

[20] WFD Guidance Document No. 37: Steps for defining and assessing ecological potential for improving comparability of Heavily Modified Water Bodies.

[21] Available on CIRCABC Circabc (europa.eu).

Table 9 *Outcome of Heavily Modified Water Bodies Designation process.*

HEAVILY MODIFIED WATER BODY	COMPARABLE WATER BODY TYPE	BIOLOGICAL QUALITY ELEMENT	METHODOLOGY	GEP/MODERATE BOUNDARY
Wied il-Luq (MTWC01)	Small, lowland, temporary rivers (R-M5)	Phytobenthos	IPS	0.50
Wied tal-Lunzjata (MTWC02)		Benthic Invertebrates	STAR-ICMi	0.50
Is-Salini (MTTW01)	Coastal Lagoon -Polyhaline restricted	Macroalgae and Angiosperms	R-MAQI	0.45
Il-Magħluq ta' Marsascala (MTTW02)	Coastal Lagoon - Polyhaline chocked			
Il-Ballut ta' Marsaxlokk (MTTW03)		Benthic Invertebrates	M-AMBI	0.44
Is-Simar (MTTW04)				
L-Għadira (MTTW05)	Hyperhalines (Salinity > 40 psu)			

2.1.5.1. Coastal Water Bodies MTC105 and MTC107

Coastal water bodies MTC105 and MTC107 were designated as HMWB in Malta's 2nd RBMP. Such designation was based on historical and recent (post 1967) hydromorphological alterations. These transformations have inevitably led to a change in the hydrological dynamics of water and sediments. However, as reported in the 2nd RBMP, MTC 105 and MTC 107 achieved 'Good' status across the majority of the BQEs. Such possibility to achieve Good Ecological Status would invalidate their status as HMWB, noting that the designation of HMWB is underpinned by significant hydromorphological alterations preventing the attainment of Good Ecological Status.

Consequently, the designation/delineation of HMWB in Maltese coastal waters, and the boundaries of the adjacent coastal water bodies, is updated in accordance with Article 5 of the WFD[22] in order to better reflect the risk of failing GES and the relevant hydromorphological alterations underpinning this.

The revised boundaries restrict the delineation of HMWB MTC105 and MTC107 to the inner harbour areas, re-delineating them as MTC105A, MTC105B and MTC107. The extraneous coastal water areas outside of the MTC105 and MTC107 harbours are merged with MTC104 and MTC106 respectively. The revised boundaries are shown in Figure 5, Figure 6 and Figure 7. The ecological potential of the revised HMWBs will be assessed on the basis of the upcoming monitoring processes as part of the third WFD implementation cycle.

[22] With reference to Guidance Document No 2 (2003) *Identification of Water Bodies* and Guidance Document No 4 (2003) *Identification and Designation of Heavily Modified and Artificial Water Bodies.*

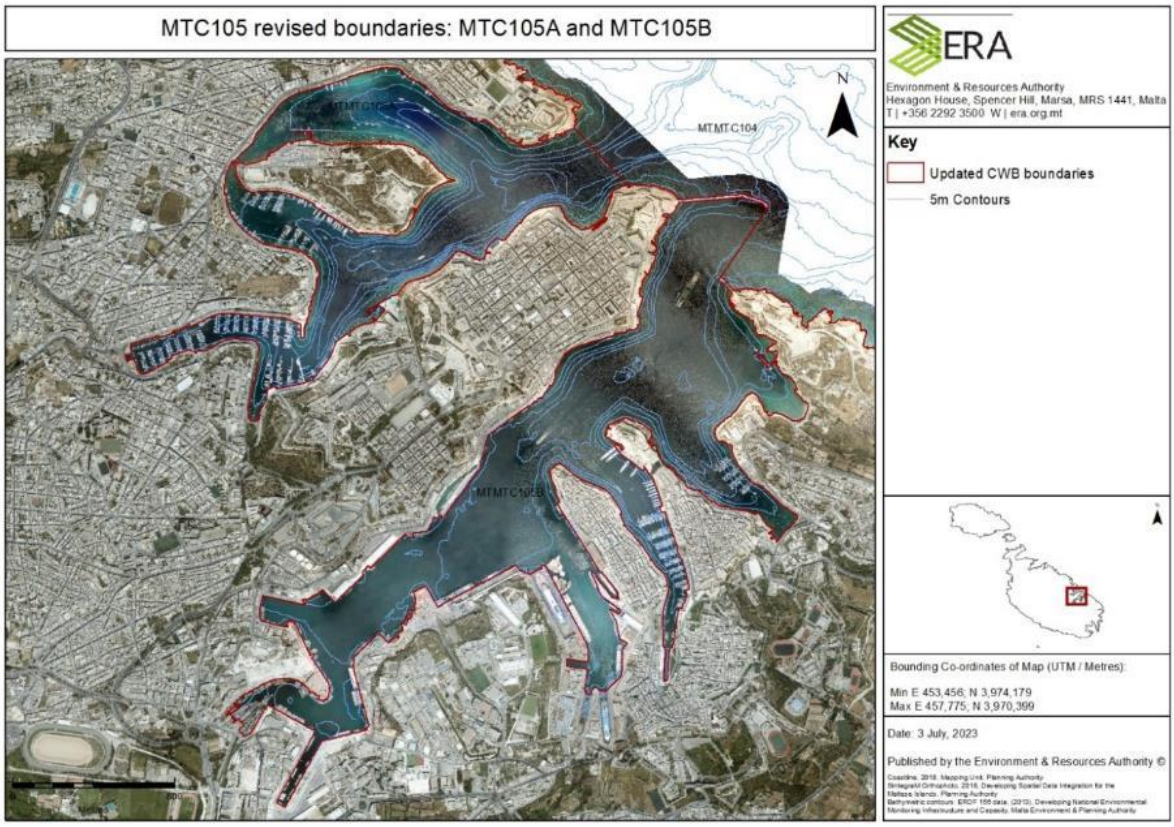

Figure 5 *Re-delineated boundaries for coastal water bodies MTC105A and MTC105B with related bathymetric contours and key morphological features.*

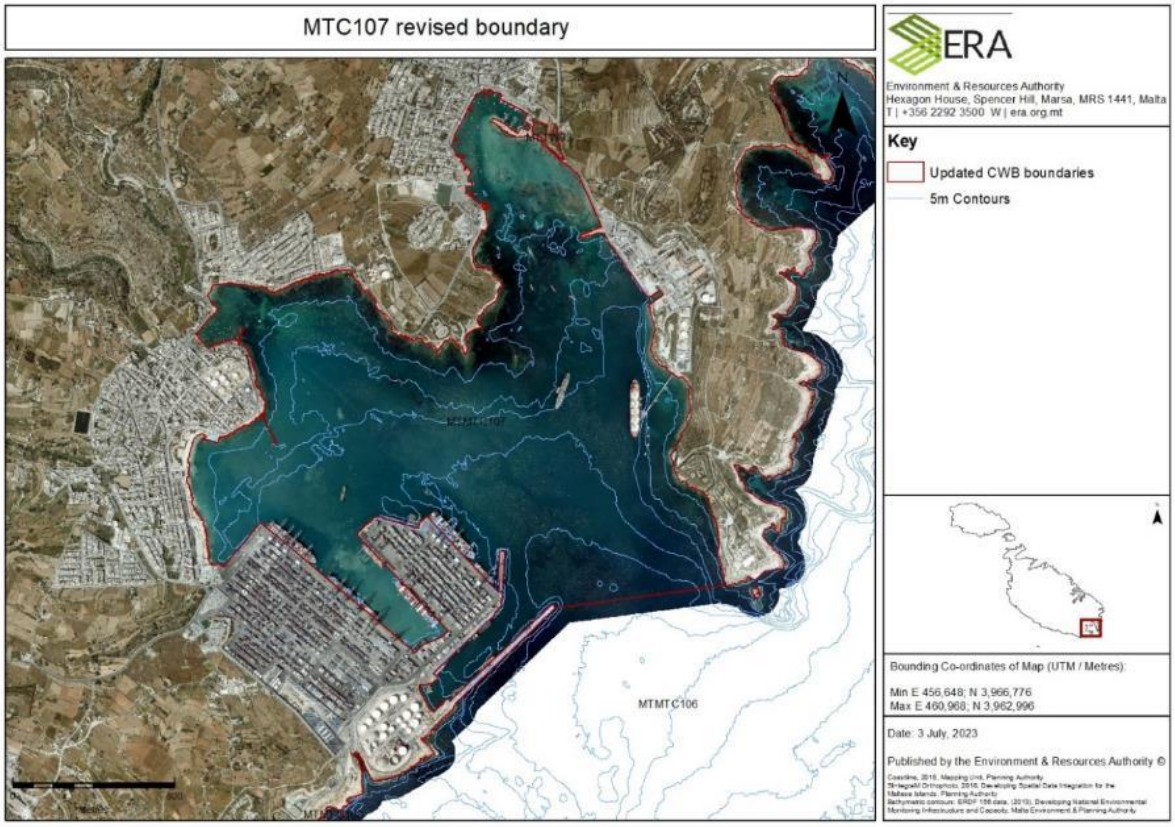

Figure 6 *Re-delineated boundaries for coastal water body MTC107 MTC105B with related bathymetric contours and key morphological features.*

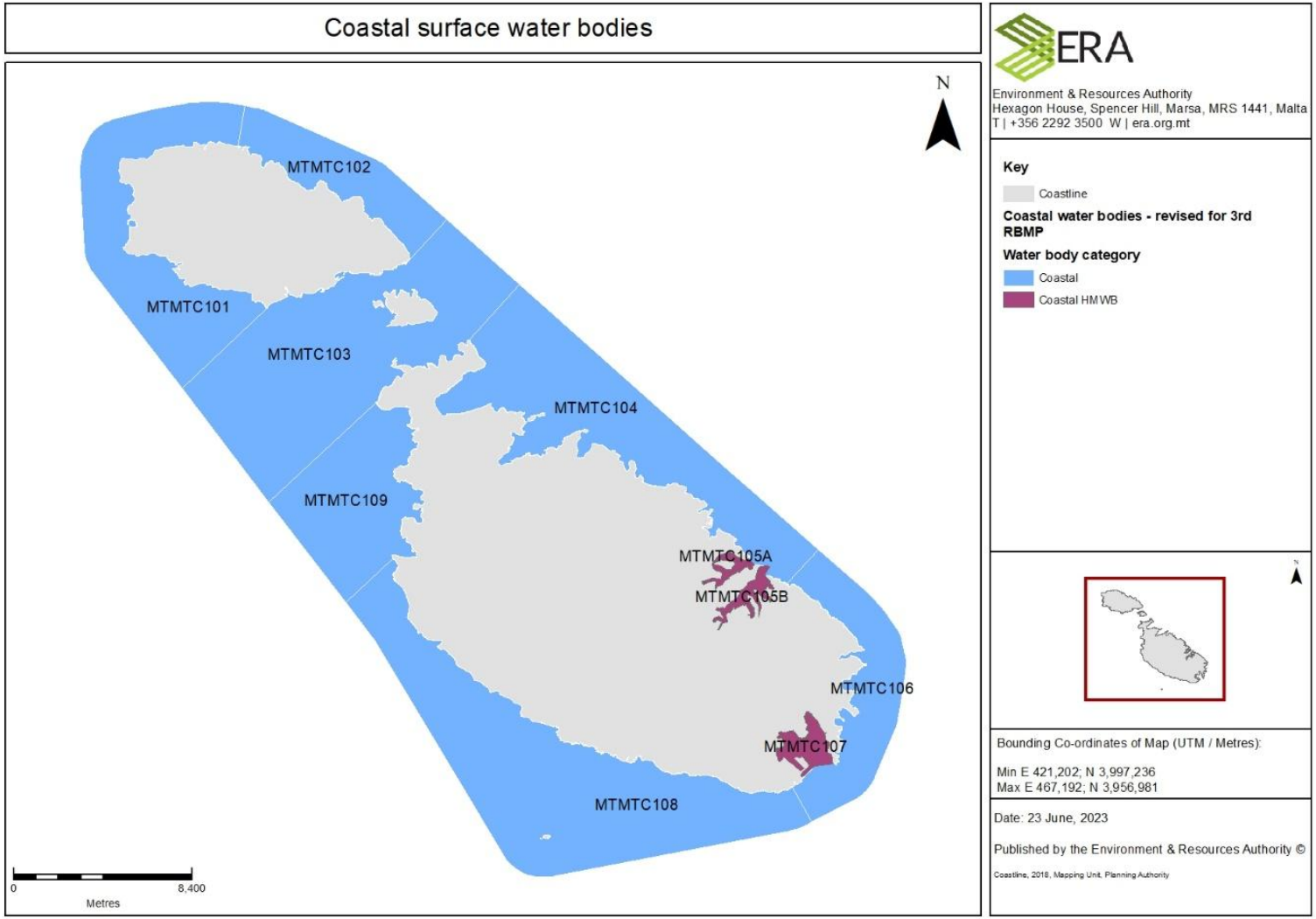

Figure 7 *Coastal water bodies as revised for 3rd RBMP.*

2.2. Groundwater Resources

The Maltese islands are formed primarily of carbonate rock, specifically limestone, and developed as a shallow submarine platform during the Oligocene and Miocene periods. Morphologically, the islands can be considered as being formed of a fractured downthrown block located between two upthrown blocks. The downthrown bloc is bounded to the North by the Għajnsielem Fault and to the South by the Victoria Fault (Table 10). These three primary subdivisions characterize the overall geology and hydrogeology of the Maltese islands: the areas north of the Għajnsielem Fault and south of the Victoria Fault are characterized by a vertical stack of the main geological formations, giving rise, where the geology permits, to a mean sea-level groundwater body which is potentially overlain by perched groundwater bodies. Between these two primary faults, depending on the geomorphological setup, the downthrown blocks lead to the formation of a number of perched or coastal groundwater bodies which are considered to be hydrogeologically distinct. The classification of groundwater bodies as outlined in the 2nd RBMP is confirmed and outlined in Figure 8.

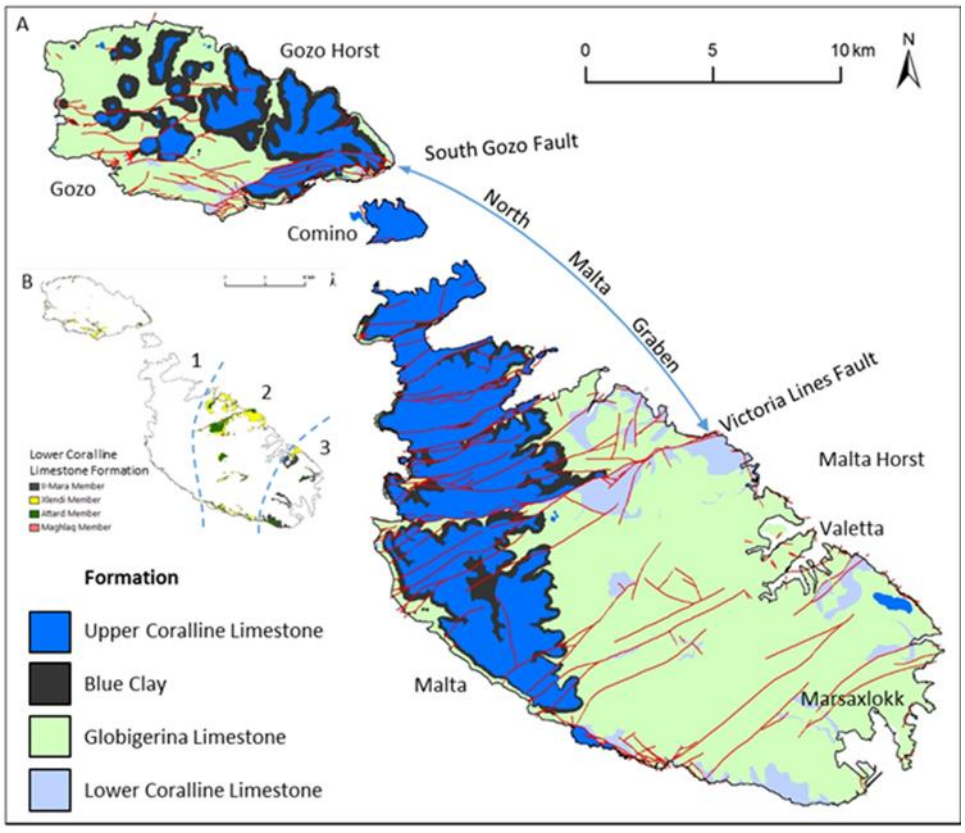

Figure 8 *Hydrogeological Structure of the Maltese Islands, outlining the main geological formations.*

Table 10 *List of groundwater bodies in the Malta River Basin District.*

GW BODY CODE	GW BODY NAME	GW BODY TYPOLOGY
MT001	Malta Mean Sea Level	Mean Sea Level
MT002	Rabat-Dingli Perched	Perched Aquifer
MT003	Mġarr-Wardija Perched	Perched Aquifer
MT005	Pwales Coastal	Coastal Aquifer
MT006	Miżieb Mean Sea Level	Mean Sea Level
MT008	Mellieħa Perched	Perched Aquifer
MT009	Mellieħa Coastal	Coastal Aquifer
MT010	Marfa Coastal	Coastal Aquifer
MT012	Comino Mean Sea Level	Mean Sea Level
MT013	Gozo Mean Sea Level	Mean Sea Level
MT014	Għajnsielem Perched	Perched Aquifer
MT015	Nadur Perched	Perched Aquifer
MT016	Xagħra Perched	Perched Aquifer
MT017	Żebbuġ Perched	Perched Aquifer
MT018	Victoria-Kerċem Perched	Perched Aquifer

Specific groups of groundwater bodies have been established depending on their hydrogeological characteristics, flows and capacity; as well as the prevailing geogenic and anthropogenic conditions with the aim of facilitating the implementation of the RBMPs. Based on these groupings, pressures can be better and more cohesively mapped so as to build a clearer picture of the existing challenges faced by specific groundwater bodies and the water environment in the Maltese islands as a whole. Subsequently, groupings can allow monitoring networks to be designed in such a way so as to maximize coverage and representativity. Table 11 presents a high-level description of each grouping, highlighting in particular the common factors leading to the establishment of such grouping.

Table 11 *Main characteristics of the groundwater body groups established under the RBMP.*

GROUP CODE	COMPONENT GROUNDWATER BODY	DISTINCTIVE CHARACTERISTICS
MT0_G01	Malta Mean Sea Level (MT001)	By far the largest Mean Sea Level groundwater body in the Maltese islands, spanning the entire island of Malta north up to the Pwales fault. Densely overlain with perched groundwater bodies to the West and North, with perched groundwater bodies completely absent elsewhere. This is a faulted aquifer in the West and North, particularly by the Victoria fault. The Magħlaq fault in the South is also of note. The groundwater body occurs within the Lower Coralline Limestone formation, except in the northeast and east where the less permeable Globigerina Limestone occurs locally at sea level. Because if its extent, the Malta Mean Sea Level groundwater body is subject to the highest heterogeneity in terms of aquifer land cover and pressures. Most notable are the urbanisation around the harbour area on the northeastern coast and the presence of irrigated agriculture in the western and northern regions of the aquifer.
MT0_G02	Rabat-Dingli Perched (MT002)	The largest perched groundwater body in the Maltese islands, sustained in the Upper Coralline Limestone formation by the underlying Blue Clay formation. The aquifer is formed of blocks dipping predominantly to the North and East. Land use is predominantly agricultural, with garigue outcrops occurring where the land is undisturbed.
MT0_G03	Mġarr-Wardija Perched (MT003) Miżieb Mean Sea Level (MT006) Għajnsielem Perched (MT014)	These groundwater bodies are formed within the Upper Coralline Limestone formations. They are grouped based on the presence of synclinal structures. This means that there are localised areas where the groundwater body is thicker, developing as the result of an accumulation in the trough or basin of the synclinal structure. This, as

		opposed to other perched groundwater bodies, where the groundwater body is thin with flow directions based on the dip and orientation of the underlying Blue Clay formation, finally discharging via springs or breaches in the clay layer. For the groundwater bodies in this group, groundwater quality and quantity can be monitored through the use of monitoring wells. For other perched groundwater bodies effective monitoring can only occur through the quantitative and qualitative assessment of springs. In the case of Miżieb, the groundwater body includes an area of increased thickness that is created within a synclinal basin that dips below sea level. Furthermore, there is evidence of Blue Clay breaching in this spot, meaning that this groundwater body is vulnerable to saline up-coning. Land use is again predominantly agricultural.
MT0_G04	Pwales Coastal (MT005) Mellieħa Coastal (MT009) Marfa Coastal (MT010)	This group comprises all the coastal groundwater bodies occurring in the Maltese islands. These groundwater bodies are more responsive to pressures than other groupings and are susceptible to lateral saline intrusion. They are also small in size compared to groundwater bodies in other groupings. These groundwater bodies are contained within aquifers that are almost completely rural. In particular, in the Pwales Coastal aquifer, there is evidence of intensive irrigated agriculture practices.
MT0_G05	Mellieħa Perched (MT008) Nadur Perched (MT015) Xagħra Perched (MT016)	These perched groundwater bodies are contained within a slab of Upper Coralline Limestone resting on the Blue Clay layer. The slab dip angle and orientation determine the flow of groundwater, concentrating it into particular locations as natural spring discharge. These groundwater bodies are thin. On the surface of these aquifers there is a greater proportion of urbanisation, even though the rural area is still the most important land use.
MT0_G06	Żebbuġ Perched (MT017) Victoria-Kerċem Perched (MT018)	These perched groundwater bodies are structurally very similar to the groundwater bodies in the group MT0_G05 but are smaller in size and are less complex. Uniquely, the surface above these aquifers has a large proportion of urbanised land. Furthermore, even where there is no land sealing, we do not observe much agricultural activity. Hence, they have been grouped separately due to different surface pressures.
MT0_G07	Gozo Mean Sea Level (MT013) Comino Mean Sea Level (MT012)	Mean Sea Level groundwater bodies that are smaller than the Malta Mean Sea Level groundwater body (MT001). The Gozo Mean Sea Level groundwater body is more extensively capped with perched groundwater bodies. Furthermore, they are also well separated by valleys where the Blue Clay formation has been eroded away. The Comino Mean Sea Level groundwater body is sustained in the Upper Coralline Limestone. This effects its hydrogeological properties.

2.2.1. Further characterisation of groundwater bodies

During the course of the 2nd RBMP a number of studies were undertaken to further the existing knowledge on the groundwater environment in the Maltese islands. The description of these initiatives and their main outcomes is listed below.

1. Conceptual understanding of groundwater bodies

Through an action under the LIFE 16 IPE MT 008 project[23], the conceptual models of the following groundwater bodies were revised:

- MT001 Malta Mean Sea Level groundwater body (Figure 9)
- MT013 Gozo Mean Sea Level groundwater body
- MT016 Miżieb groundwater body
- MT014 Għajnsielem groundwater body
- MT005 Pwales groundwater body

These groundwater bodies were chosen on the basis of their importance to the public water supply, whilst the Pwales groundwater body was chosen in view of the planned development of a Managed Aquifer Recharge (MAR) scheme to address the challenges for the achievement of good status in this groundwater body.

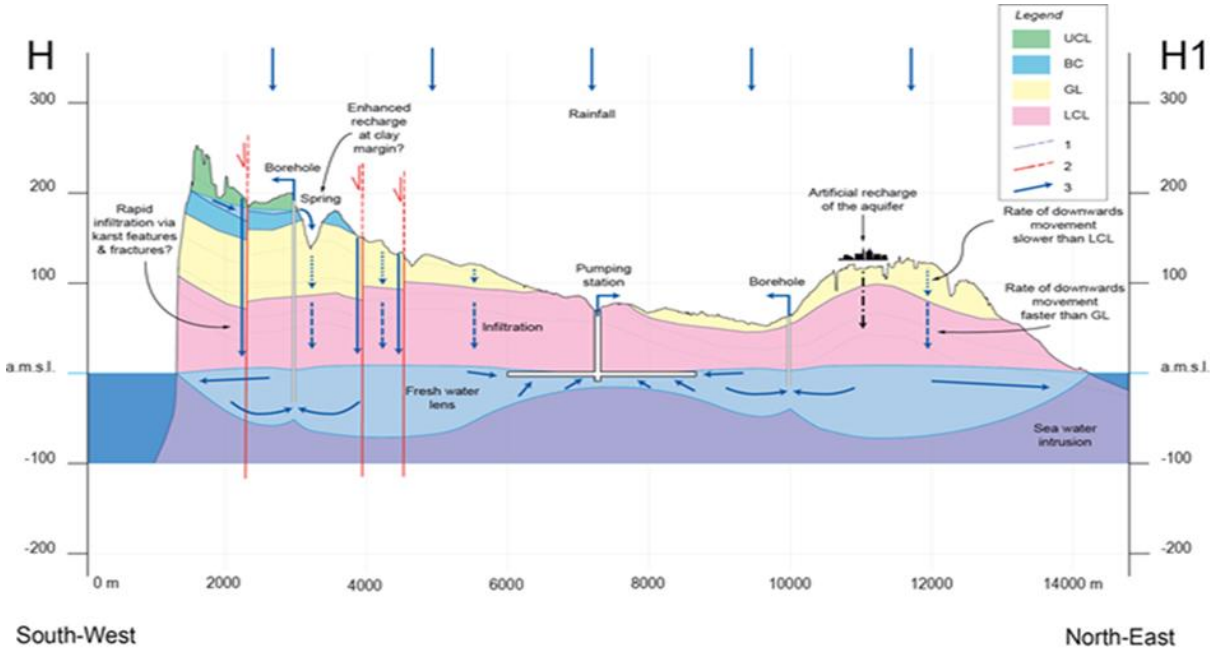

Figure 9 *Revised Conceptual Model of the Malta Mean Sea Level groundwater body (MT001).*

Furthermore, preliminary numerical models of the groundwater bodies were developed to improve the knowledge on groundwater flow dynamics in each groundwater body. The revised conceptual understanding was also used to guide the development of the national groundwater monitoring frameworks and ensure the achievement of a high level of representativity of the respective bodies of groundwater.

[23] LIFE 16 IPE MT 008: Optimising the implementation of the 2nd RBMP in the Malta River Basin District.

2. Natural Background Levels

A geochemical investigation of the Phosphorite Conglomerate layer (a geological inter-layer within the Globigerina Limestone Formation) was undertaken to assess the origin of Arsenic in groundwater in the mean sea-level aquifer systems. The investigation was also intended to increase the knowledge on the geochemical characteristics of these conglomerate layers and related impacts on natural background levels.

The outcomes of this study confirmed the presence of Arsenic containing minerals in the conglomerate layer, thus confirming the natural origin of this element. Furthermore, the presence of elements such as Cadmium and Uranium were encountered in the geochemical analysis of this sub-formation. Further studies will be undertaken during the course of the 3rd RBMP to further assess the leaching potential of these trace elements and their related environmental risk in order to guide the review of threshold values for these elements.

3. Sea-Water Intrusion Mechanisms

The nature of sea-water intrusion dynamics in the Malta MSLA were further investigated through a project initiative supported by the International Atomic Energy Agency (IAEA). This study was undertaken through the utilisation of the first deep groundwater monitoring wells forming part of the New Groundwater Monitoring Framework developed through dedicated project for the upgrading of the hydrological monitoring infrastructure co-financed from the EU Cohesion Fund.

The first conclusions from these studies indicate that the saline water underlying the fresh body of groundwater shows different characteristics to present-day seawater. In fact, deep saline water samples (underlying the freshwater lens) from the central areas of the aquifer system show characteristics of old groundwater with a long residence time in the aquifer matrix.

Further studies will be undertaken during the course of the 3rd RBMP. These studies will be key in determining the nature of sea-water intrusion and will particularly focus on identifying the relative importance of slow regional intrusion (highlighted by the presence of old-saline groundwaters) as to fast fracture-based intrusion (highlighted by young seawater). The outcomes of this study will guide the updating of the assessments of the impacts of sea-water intrusion on the mean-sea level aquifer systems.

4. Advanced characterisation of the Pwales groundwater body

A hydrogeological investigation of the Pwales groundwater body (Figure 10) was undertaken with the support of Italy's National Research Centre (CNR-IRSA). The geophysical investigation involved the undertaking of an electromagnetic induction (EMI) survey over the whole surface catchment area of the groundwater body (2 km^2) in order to better understand the hydrogeologic setting of the groundwater body, to identify the top of the bounding Blue Clay layer and to detect the freshwater/saltwater interface.

The review of the characterisation of the Pwales groundwater body represents the first phase in the implementation of a MAR scheme aimed at restoring the qualitative and quantitative status of this body of groundwater.

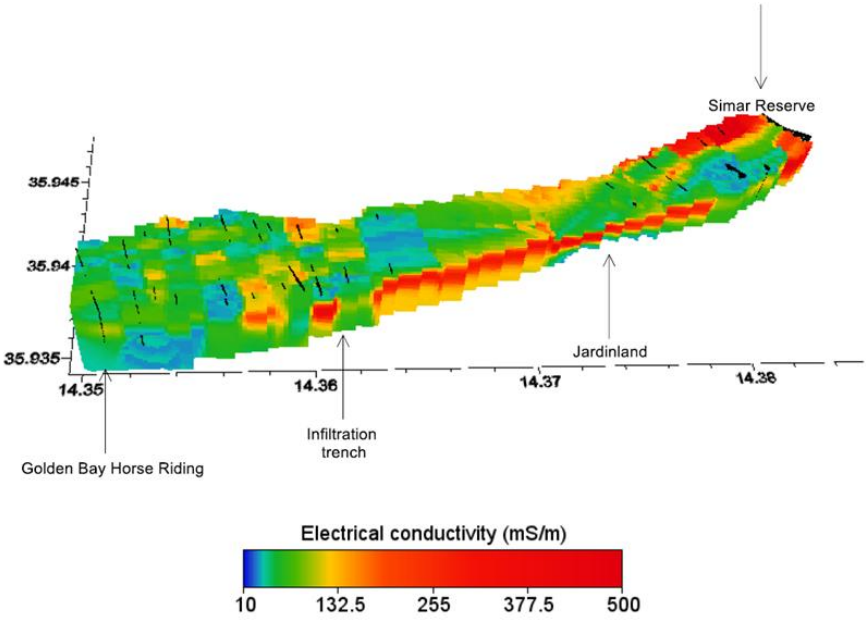

Figure 10 *3D electrical conductivity model of the Pwales Valley.*

2.2.2. Non-conventional water resources

Due to the prevailing natural water scarcity conditions, non-conventional water resources (NCWR) play an important role in the water resource base of the Maltese islands. NCWRs such as rainwater harvesting, sea-water desalination and water reclamation complement natural fresh-groundwater resources in ensuring the achievement of a high level of water security in the country.

Investments in NCWRs are intended to not only increase their water retention or production capacity, but also to ensure that these alternative resources are produced in an increasingly environmentally sustainable manner reducing inputs such as energy requirements and chemicals required for treatment.

2.2.2.1. Rainwater harvesting

Rainwater harvesting is a traditional water conservation measure, applied at both regional and user level. Effective volume is limited by storage capacity, which is constrained by land value and availability.

At the user level, households and other urban developments are required to construct a rainwater harvesting cistern at the development phase. The size of these cisterns, relative to the roof area, is

regulated under Technical Guidance F[24]. On-field reservoirs are common in the agricultural sector for harvesting rainwater runoff from country roads and therefore provide a supplementary source of irrigation water.

2.2.2.2. Sea-Water desalination

Reverse Osmosis sea-water desalination technology was introduced in Malta during the 1980's and today the country has four desalination plants. These plants are located in Ċirkewwa, Għar Lapsi and Pembroke in Malta, and Ħondoq ir-Rummien in Gozo. The total production capacity of these plants stands at around 22 Mm^3/year. Throughout the years significant investment has been undertaken to optimise the production capacity and the energy efficiency of these plants.

The four reverse osmosis plants are strategically located in different parts of the islands, so as to reduce vulnerability from contamination in the marine environment such as oil spills. Furthermore, the supply of seawater for the plants is sourced from deep beach sea-wells further reducing risks to these desalination plants from such incidents. Additionally, the water production conveyance system is being developed to enable product transfer between the distribution reservoirs associated with each desalination plant, enabling balancing of production between the plants should production from a specific plant need to be reduced for operational maintenance purposes or due to contamination incidents in the surrounding seawater.

Brines from the RO plants are discharged to the marine environment. Initial studies indicated that the impact of such discharges is limited to the first few meters from the coastline – possibly due to the small discharge volume and the quick mixing of the brines with sea-water due to marine currents and the exposed sections of the coastline where these plants are located. However, where necessary, precautions are taken such as the discharge of the Gozo RO plant being through a diffuser, to reduce risk to the nearby Posidonia beds. Detailed studies of the impact of these brine discharges on the marine environment are being undertaken and will continue during the 3rd RBMP cycle (co-financed under the LIFE 16 IPE MT 008 project) with the aim of ensuring a high level of protection to the surrounding marine environment.

2.2.2.3. Reclaimed water

The New Water programme was launched in 2018 and has seen the commissioning of three polishing plants located within the main Urban Wastewater Treatment Plants. Once all the work on the distribution system is completed, the polishing plants will have a potential production and supply capacity of 7 million m^3/year. The polishing plants are intended to improve the quality of tertiary treated wastewater to meet the requirements of Class A reclaimed water under Regulation EU 2020/741.

A dedicated distribution network is being developed in agricultural areas to enable the effective distribution of reclaimed water close to the point of use. Automated distribution points are

[24] https://bca.org.mt/files/technical-document-F-part-2.pdf

established along the distribution network which limit access to users registered with the public utility. A rising block tariff mechanism has also been established to encourage the effective and efficient use of this water and incentivise its use over natural groundwater resources.

The New Water programme has also highlighted the importance of considering wastewater as a resource and therefore of ensuring its protection. In as much, regulatory functions for the management of discharges to urban sewers are being optimised to ensure a higher level of control on discharges to such sewers and therefore a better protection of the quality of wastewater from discharges of hazardous contaminants. Additionally, the sewer network is being upgraded to limit ingress of seawater, in particular in the eastern regions of Malta where sections of the network are located below sea-level. The implementation of these actions will be continued during the course of the 3rd planning cycle, where opportunities for the optimisation of the New Water programme will be sought to ensure the establishment of New Water as a reliable supply of water for agricultural irrigation and other secondary uses.

2.2.3. National resource base

The national freshwater resource base of the Maltese islands is characterised by the importance of NCWR, which are necessary to balance the gap between the available natural freshwater resources and the national water demand – and ensure that nationalwater supply security is achieved whilst natural freshwater resources are used sustainably. This gap is bridged by desalinated water (35%), harvested rainwater (9%), and reused water (2%) (Figure 11). This is necessary due to the lack of availability of natural freshwater resources which the Maltese islands experience as a result of their semi-arid Mediterranean climate and the high-water demand driven by the highest population density in the European Union.

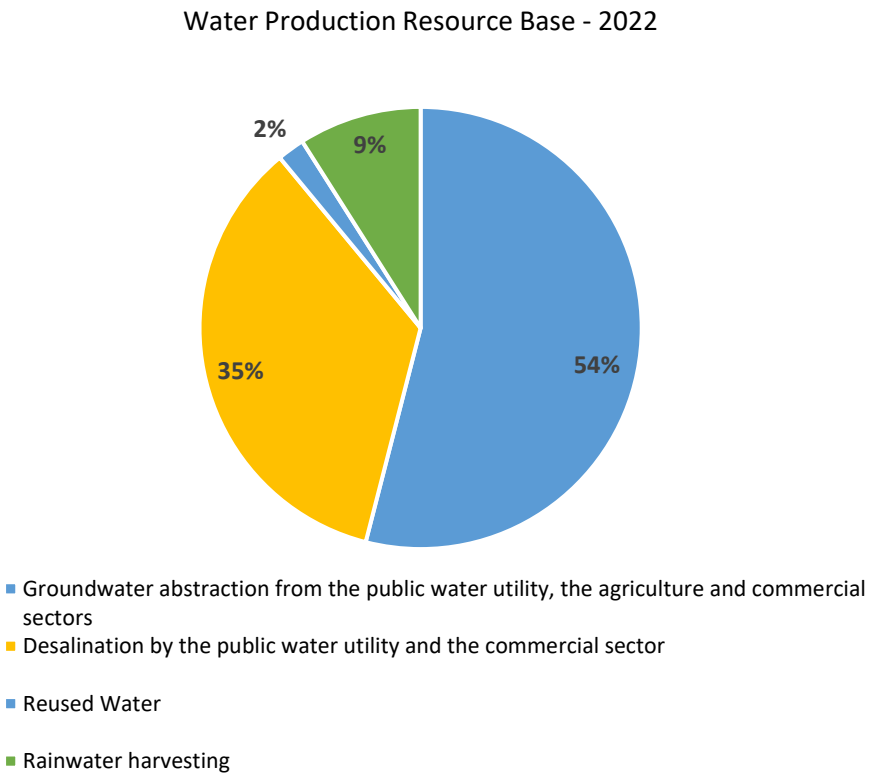

Figure 11 *The estimated share of the Water Production Resource Base in 2022.*

3. Pressures and impacts

The main drivers leading to pressures on Malta's water resources are linked to the demographic and economic characteristics of the islands which show consistent increase in population and sustained economic growth throughout the years. These two factors are resulting in a general increase in pressures on all categories of water bodies. While water management regimes are geared to address such pressures and associated impacts, climate change effects are expected to increase the vulnerability of Malta's waters to the drivers and associated pressures. This is particularly related to increased intense drought periods, resulting in increased water demand and lower availability of water in surface water bodies, and the concentration of rainfall in a smaller number of high intensity events, resulting in reduced natural recharge of groundwater.

Furthermore, groundwater in the Maltese islands is vulnerable to human activities occurring within its surface catchment area. The high population density and mixed land-use scenario prevailing over the surface of the islands place potentially contaminating activities operating side by side in an intensive landscape. The situation is further compounded by the fractured carbonate environment which limits the protective cover of the unsaturated zone, particularly in the case of the perched aquifer systems. These conditions are reflected in the quality of Malta's groundwater, which highlights that the activities (prominently agricultural) occurring on the surface are introducing nutrients resulting in the most important status failing parameter. However, other parameters indicative of different anthropogenic activities, are also detected in groundwater.

From a quantitative perspective, the high population density and associated demand for water coupled with the semi-arid conditions limiting the availability of natural water resources, lead to a high pressure on the available groundwater resources, since the natural supply is not sufficient to meet the national demand. As a result, over abstraction and the degradation in status of Malta's groundwaters' occurs. The impacts of over abstraction are exacerbated in the mean sea-level aquifer systems. Due to their specific hydrogeological setting, over abstraction in these groundwater bodies leads to sea-water intrusion, where the bounding saline waters rise to physically replace the abstracted groundwater, leading to the progressive salinization of the aquifer systems. Hence, quantitative pressures for these aquifer systems are inherently linked with qualitative ones.

The 3rd River Basin Management Plan reviews the drivers and associated pressures, with a view to identify the significant anthropogenic pressures on water bodies that need to be addressed as part of the Programme of Measures planned for third cycle of implementation.

3.1. Drivers and associated pressures on surface water bodies

The main drivers that may affect Malta's water bodies are listed in Annex 1 to this document, together with a description of the pressures that such drivers exert on the water bodies. Other pressures have been screened out as not applicable to Malta's waters, such as those linked to forestry, mining, and hydropower, while certain pressures – such as dams, barriers, and locks - are only applicable to specific water bodies in the local context.

From the list of main drivers and associated pressures, the most relevant pressures on Malta's surface water bodies are associated with:

- diffuse sources of pollution
- point sources of pollution
- hydromorphological modifications
- biological pressures

The relative significance by driver, for these pressures are included in Table 12 for inland surface and transitional water bodies and in Table 13 for surface coastal water bodies. These pressures are investigated further with a view to determine their significance. This will ensure that management processes and financial resources are geared to address significant issues as part of the upcoming implementation plan. The assessment of pressures and impacts is described in further detail in the Technical Document "Surface Water Bodies: Pressures and Impacts".

Significant pressures are those that contribute to impacts that may result in the failing of an objective of the WFD water bodies. In this regard, the identification of significant pressures takes into consideration the potential impact of such pressures on the objectives of water bodies, through a combination of expert judgement and use of available data.

Table 12 *Relevant Pressures and related drivers for transitional and inland surface and transitional water bodies.*

RELEVANT PRESSURE	DRIVER	APPORTIONMENT	RATIONALE
Diffuse sources of pollution	Agriculture	78%	Land use area used as proxy
	Urban Development	22%	
Morphological alterations including flow diversion	Agriculture[25]	66%	Qualitative in terms of the use of the morphological modifications in the water body
	Other[26]	33%	
Biological pressures	Other[27]	100%	n/a

Table 13 *Relevant Pressures and related drivers for coastal water bodies.*

RELEVANT PRESSURE	DRIVER	APPORTIONMENT	RATIONALE
Diffuse sources of pollution	Agriculture	59.6%	Land and marine use areas used as proxy[28]
	Urban Development	33.7%	
	Other (Navigation)[29]	6.7%	
	Urban development[30]	57.9%	

[25] Draining of floodplains for agriculture; weirs & dams for water retention; stone embankments for soil retention of terraced fields – mostly historical.

[26] Nature (creation of wetlands/marshland); Historical industries (saltpans; fishponds for aquaculture).

[27] The invasive Great reed is present at all inland surface and transitional waters.

[28] Source data used: CORINE land cover; Bunkering & anchorage areas (Transport Malta); Anchoring & Moorings areas (ERA & TM for MSFD IA Update).

[29] Bunkering areas offshore & inshore (marinas, mooring areas). Port areas (quays, etc.) are included under Urban development.

[30] Includes discharges from urban wastewater treatment plants, national desalination plants, hotels & lidos, marina, and stormwater via the National Flood Relief Infrastructure.

Point Sources of Pollution	Industry[31]	27.4%	Number of discharge points from each sector as a proxy.
	Fisheries and Aquaculture[32]	7.4%	
	Energy[33]	7.4%	
Morphological alterations	Transport[34]	57.6%	Length of artificial coastline linked to driver[35]
	Urban development	37.0%	
	Fisheries and aquaculture[36]	3.6%	
	Energy[37]	1.0%	
	Other (historical, Industry)	0.8%	

3.1.1. Diffuse sources of pollution

Rainwater runoff from agricultural land and urban areas is considered to be the main source of diffuse pollution for all surface waters. An assessment of these pressures has been carried out based on the spatial extent of the diffuse sources of pollution, primarily using land cover data[38] within the water body catchments (Figure 12, Figure 13, Figure 14)[39]. The significance of the diffuse sources of pollution and the affected water bodies is listed in Table 14.

[31] IED & Non IED plants with discharge to sea (Bulk fuel storage, Vessel maintenance); contaminated/abandoned sites at the coast.

[32] Aquaculture farms (operational).

[33] Non hydropower (Power stations).

[34] Breakwaters, quays, jetties & slipways, irrespective of whether for fisheries, recreational or commercial use. However, if linked to urban or tourism development (hotel, marina), driver has been indicated as Urban Development

[35] Source data: Artificial coastline, 2018 (Planning Authority).

[36] Marsaxlokk promenade from Il-Magħluq to hard standing (noting primary use within this bay).

[37] Power stations.

[38] Corine Land cover 2018, amalgamated into main types (Agriculture, Urban, Urban/Industry, Quarries); natural land is not considered as a diffuse source of pollution (hence N/A).

[39] The individual water bodies' catchments were delineated based on the catchments defined in the LIFE 16 IPE MT 008 geoportal and amended with reference to modeled stream data from the same portal, the WFD water body boundaries, and the 2018 Sintagram Orthophoto and Digital Terrain Model.

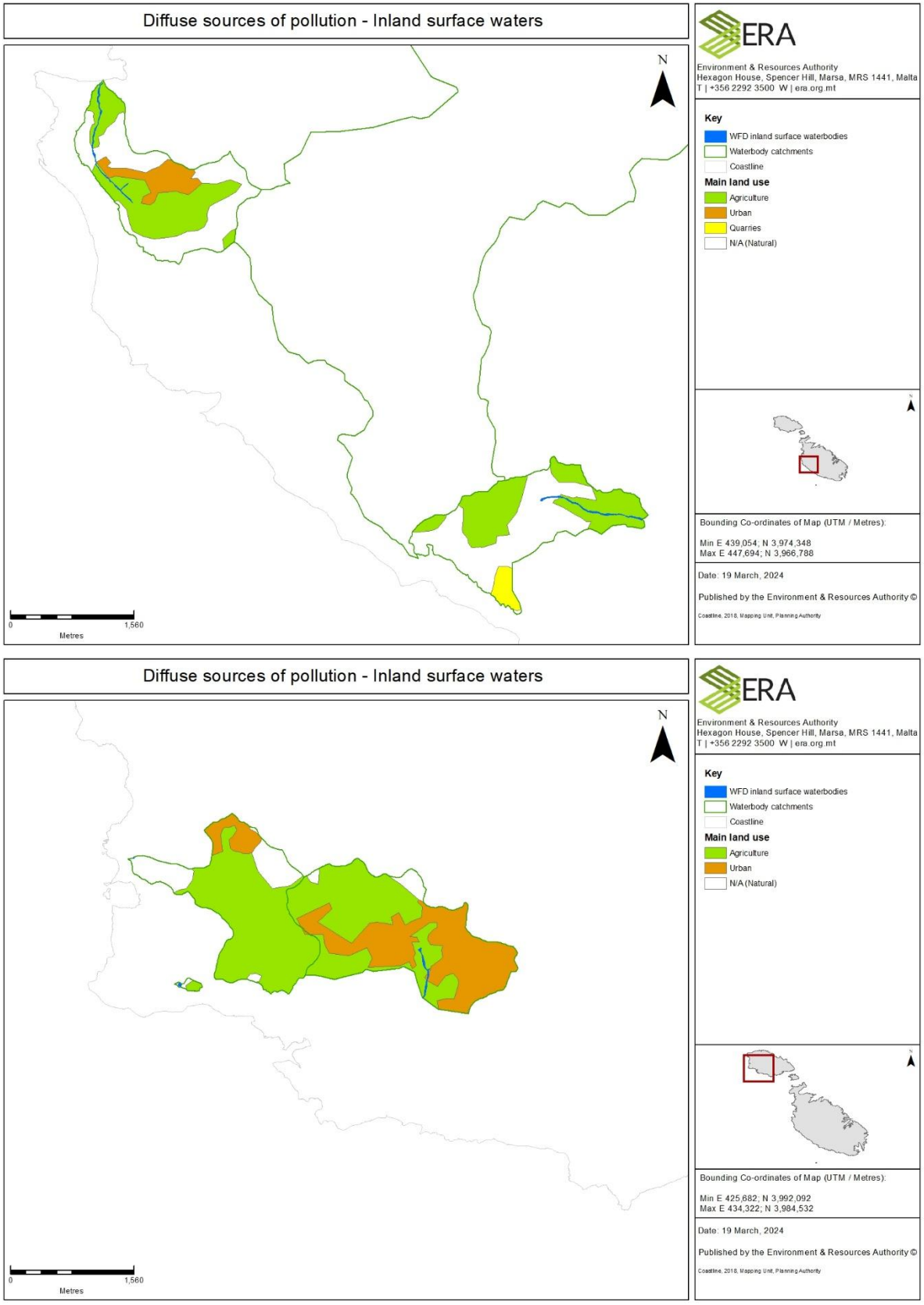

Figure 12 *Diffuse sources (land cover) within the catchments of Wied tal-Baħrija, Wied il-Luq, Wied tal-Lunzjata, Il-Qattara and l-Għadira ta' Sarraflu.*

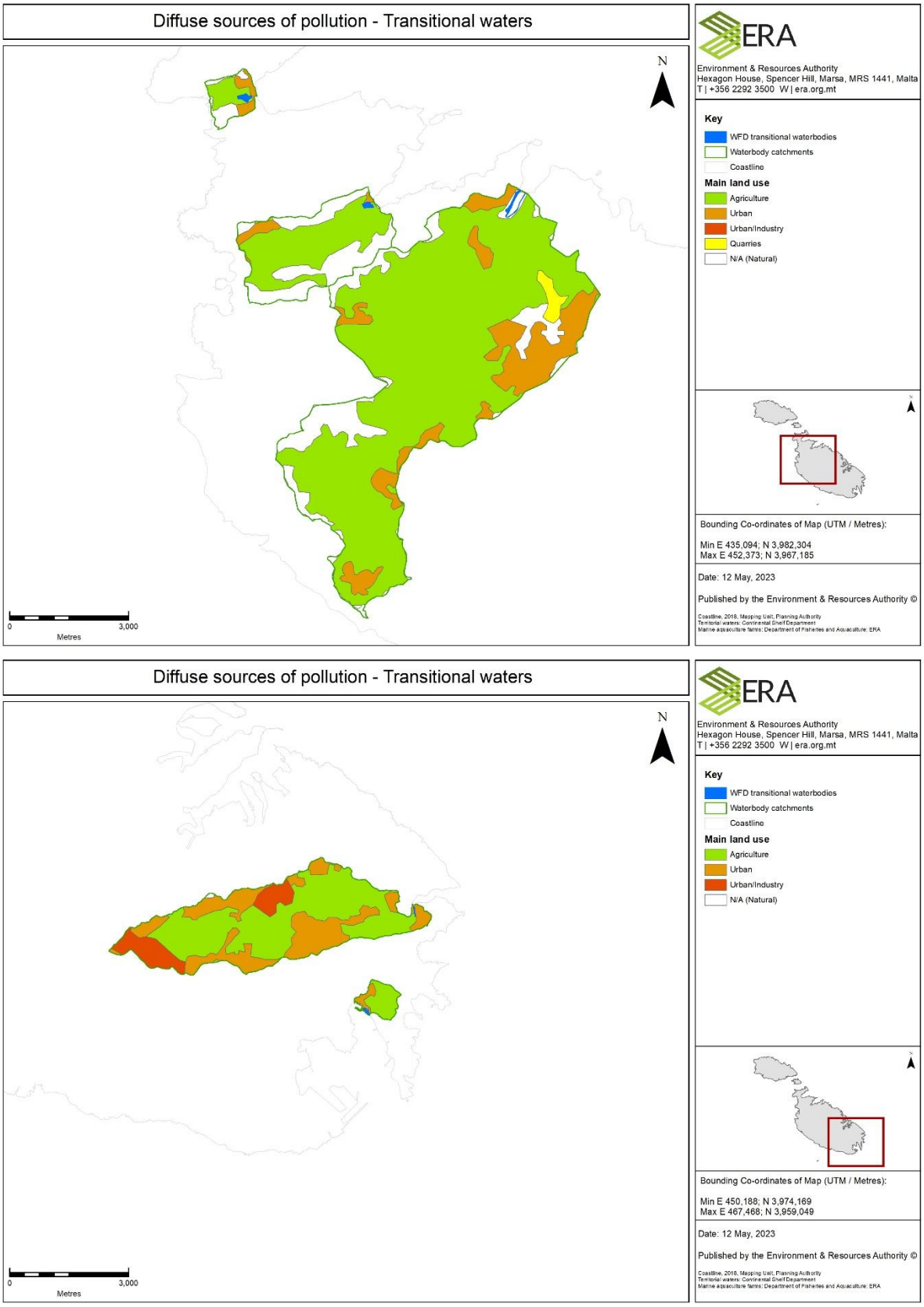

Figure 13 *Diffuse sources (land cover) within the catchments of Is-Simar, l-Għadira, Is-Salini, Il-Magħluq ta' Marsascala and Il-Ballut ta' Marsaxlokk.*

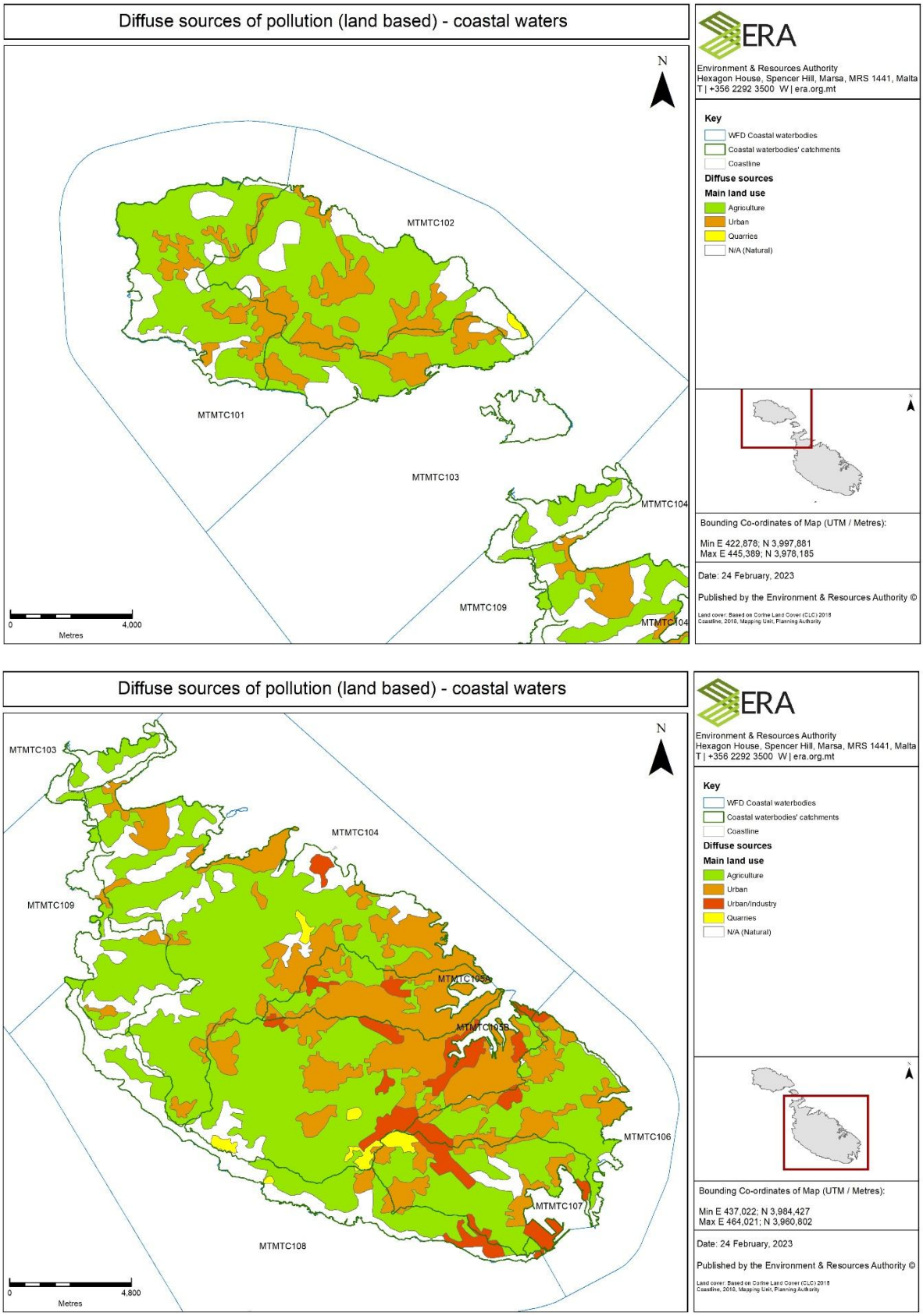

Figure 14 *Diffuse sources (land cover) within the catchments of the coastal water bodies.*

Table 14 *Significance of diffuse sources of pollution and affected water bodies.*

SIGNIFICANT PRESSURE	DRIVER	IMPACT	WATER BODIES AFFECTED	POTENTIAL CHANGE IN STATUS OF WATER BODY	PROTECTED AREA OBJECTIVES	INTENSITY ASSESSMENT CRITERIA[40]
Diffuse sources of pollution	Agriculture	High nutrient levels and associated change in physico-chemical parameters	Watercourses: Wied tal-Baħrija; Wied Il-Luq and Wied tal-Lunzjata	Shift in aquatic flora and invertebrate fauna communities leading to deterioration of ecological status	Water body may exceed nitrate levels as stipulated by the Nitrates Directive [>50 mg/l]	• % area coverage of agricultural land within catchment • Nitrates > 50mg/l *Significant if cover > 40% and nitrates levels > 50 mg/l*
Diffuse sources of pollution	Urban run-off; Transport	Chemical pollution: toxic substances in water and sediment.	Watercourses: Wied tal-Baħrija; Wied Il-Luq and Wied tal-Lunzjata	Direct impacts on aquatic flora and invertebrate fauna communities, leading to deterioration of ecological status	N/A	• % area coverage of urban/industrial land within catchment • Number of urban/ industrial contaminants detected through monitoring *Significant if:* - *cover > 15% and urban/ industrial contaminants present (inland surface and transitional waters)* - *cover > 25% and urban/ industrial contaminants present (coastal waters)*
			Freshwater Pools: Il-Qattara; L-Għadira ta' Sarraflu			
			Transitional Water Bodies: Is-Salini, Il-Magħluq ta' Marsascala, Il-Ballut ta' Marsaxlokk, Is-Simar, L-Għadira			
			Coastal Water Bodies: Il-Port ta' Marsamxett (MTC105A), Il-Port il-Kbir (MTC105B), Ix-Xgħajra – Bengħajsa (MTC106 and Il-Port ta' Marsaxlokk (MTC107)			
	Navigation[41]		Coastal Water Bodies: Il-Mellieħa – Il-Kalkara (MTC104), Il-Port ta' Marsamxett (MTC105A), Il-Port il-Kbir (MTC105B) and Il-Port ta' Marsaxlokk (MTC107)			• Number of oil spill incidents[42] • Occurrence of medium/ large spill *Significant if at least 1 medium/ large scale spill or more than 2 minor spills per annum in reporting period*

[40] % land cover based on 2018 CORINE land cover within the water body's catchment area. Contaminants: priority substances detected through monitoring in water and/or sediment (as applicable).

[41] Bunkering areas, including ports and marinas.

[42] For the period 2012-2018 (Data source: Transport Malta for MSFD Initial Assessment Update 2020).

3.1.2. Point sources of pollution

Point sources of pollution are only relevant to coastal water bodies. No point discharges are permitted or otherwise authorised in inland surface water bodies and transitional waters.

Coastal waters, on the other hand, are subject to point sources of pollution that are both marine and land based. Activities considered as point sources of pollution include land-based installations that have a discharge to sea, contaminated sites located at the coast, and marine aquaculture farms. The installations being considered are potential point sources of chemical pollution, organic pollutants and/or nutrient pollution, depending on the activity in question.

Noting that the risks associated with point discharges depend on the nature of the effluent being discharged, the assessment for significance considered a 'risk weighting' of all the point sources. This ensured that the assessment reflects the relative risk of chemical or nutrient pollution from the different activities. In terms of chemical pollution risk, the highest weightings have been assigned to IED installations; mid-range weightings to non-IED installations, urban wastewater treatment plants, the National Flood Relief Project (NFRP) storm water discharges, and contaminated sites; while a low or zero weighting has been assigned to, aquaculture installations, other installations such as the national desalination plants and hotels (pools backwash, reverse osmosis brine reject, chiller cooling waters). The assessment of pressures from point sources of pollution and related significance per water body is shown in Table 15.

Table 15 *Significance of point sources of pollution and affected water bodies.*

SIGNIFICANT PRESSURE	DRIVER	IMPACT	WATER BODIES AFFECTED	POTENTIAL CHANGE IN STATUS OF WATER BODY	PROTECTED AREA OBJECTIVES	INTENSITY ASSESSMENT CRITERIA
Point sources of pollution	Urban wastewater Aquaculture Other (NFRP)	Nutrient and organic pollution: High nutrient levels and associated change in physico-chemical parameters	Coastal Water Bodies: Il-Fliegu ta' Kemmuna (MTC103), Il-Mellieħa – Il-Kalkara (MTC104), Ix-Xgħajra – Bengħajsa (MTC106) and Il-Qammieħ – Fomm ir-Riħ (MTC109)	Shift in aquatic flora and invertebrate fauna communities leading to deterioration of ecological status	Water body may exceed nitrate levels as stipulated by the Nitrates Directive [>50 mg/l]; Higher nutrient levels may result in the deterioration of seabed habitats for which marine protected areas were designated. Potential deterioration of bathing Water Quality	Number of sites and risk weighting for discharges of nutrients

Point sources of pollution	Urban wastewater IED plants Non IED plants Contaminated sites or abandoned industrial sites Other (NFRP)[43]	Chemical pollution: Presence of toxic substances in water and sediment	Coastal Water Bodies: Il-Port il-Kbir (MTC105B), Ix-Xghajra – Benghajsa (MTC106), Il-Port ta' Marsaxlokk (MTC107)	Direct impacts on aquatic flora and invertebrate fauna communities, leading to deterioration of ecological status	N/A	Number of sites and risk weighting for discharges of toxic substances

3.1.3. Hydromorphological alterations

Hydromorphological modifications in Malta's surface water bodies were detailed as part of the characterisation process. However, they are being included with the assessment of pressures to determine significance and water bodies at risk from such pressure. This will also inform the monitoring requirements for hydromorphological elements.

Most of the surface water bodies have been subject to hydromorphological alterations, with the degree varying from slight to extensive/severe – and hence significant:

- In the case of watercourses, the main driver of hydromorphological alterations is agriculture, albeit many of the modifications are of historical origin, including the retaining walls built along the watercourse banks for maintaining terraced fields within the valleys and low weirs and dams built to ensure rainwater runoff within the valleys was retained as long as possible.
- The hydromorphological changes to the transitional water bodies include various drivers, mostly linked to historical uses of the water bodies or the wider catchment, or the development of the water bodies themselves as nature reserves. Urban development, transport, aquaculture, and agriculture have also contributed to these alterations.
- Hydromorphological alterations of coastal waters are primarily driven by transport, namely artificialisation of the coast for navigation purposes (breakwaters, jetties, slipways, etc).

The assessment of pressures from hydromorphological alterations and related significance per water body is shown in Table 16.

[43] National flood relief project – stormwater discharge (105a, 105b, 106).

Table 16 *Significance of hydromorphological alterations and affected water bodies.*

SIGNIFICANT PRESSURE	DRIVER	IMPACT	WATER BODIES AFFECTED	POTENTIAL CHANGE IN STATUS OF WATER BODY	PROTECTED AREA OBJECTIVES	INTENSITY ASSESSMENT CRITERIA
Physical alteration of channel/bed/riparian area/shore	Agriculture[44]	Modified flow regime, loss of connectivity, loss of habitat	Watercourses: Wied Il-Luq and Wied tal-Lunzjata	Changes in composition of aquatic ecosystems and dependent terrestrial ecosystems, leading to deterioration of ecological status	Non-achievement of Natura 2000 objectives (as relevant to the bodies in question through changes in species composition)	• Artificial structures affecting the banks • Artificial modification of substrate • Channelisation / Artificial alteration to path • Artificial structures affecting the shoreline/banks • Artificial structures affecting the surface area of a water body Significant if "*Extensively to severely modified*"
	Other[45]		Transitional Water Bodies: Is-Salini, Il-Magħluq ta' Marsascala, Il-Ballut ta' Marsaxlokk, Is-Simar and L-Għadira			
	Transport (Navigation)[46]; Other[47]		Coastal Water Bodies: Il-Port ta' Marsamxett (MTC105A), Il-Port il-Kbir (MTC105B), Il-Port ta' Marsaxlokk (MTC107)			
Dams, barriers, and locks	Agriculture	Loss of connectivity, modified flow regime and habitat	Watercourses: Wied tal-Lunzjata		N/A	• Artificial barriers Significant if "*Extensively to severely modified*"
Flow diversion	Other[48]	Modified flow regime and habitat	Watercourses: Wied il-Luq		Non-achievement of Natura 2000 objectives	• Artificial discharge regime Significant if "*Extensively to severely modified*"
Hydrological alteration	Agriculture [49]; Other[50]	Modified flow regime, loss of connectivity, loss of habitat	Transitional Water Bodies: Is-Salini, Il-Magħluq ta' Marsascala, Il-Ballut ta' Marsaxlokk, Is-Simar and L-Għadira		Non-achievement of Natura 2000 objectives	• Connectivity (Seaward and Landward) • Artificial change in residence time/flushing rate
Hydromorphological alteration - Physical	N/A	Loss of habitat	Transitional Water Bodies:			• % of water body lost > 10%

[44] Retaining walls for terraced fields; channelling; sealing of bed.

[45] Historical modifications linked to creation of fishponds (Il-Magħluq ta' Marsascala, Il-Ballut ta' Marsaxlokk) and salt pans (Is-Salini); morphological changes to create wetlands / saltmarsh (Is-Simar, l-Għadira, Il-Ballut ta' Marsaxlokk).

[46] Main driver for all hydromorphological alteration to coastal water bodies.

[47] Urban development (marinas, promenades, pitches and pools, hotels).

[48] Historical modifications to spring flows.

[49] Historical draining of flood plains in water body catchment for agriculture (Is-Salini, Is-Simar, l-Għadira).

[50] Engineered/artificially modified flow into/out of water body.

loss of whole or part of the water body[51]			Il-Ballut ta' Marsaxlokk			considered significant[52]

3.1.4. Biological pressures

Biological pressures relate to the introduction of species which could potentially threat the functioning of ecosystems and displace local water dependent species. While assessment of the significance of this pressure can be based on the number of the introduced species, in general information on the actual impacts of such species is scarce, especially for coastal/marine waters. In inland surface waters, the coverage of non-indigenous flora, such as the Great Reed (*Arundo donax*) along watercourses, provides direct evidence of the extent of the impact and hence the significance of the biological pressure. Assessment of the pressure significance is thus primarily based on expert judgement.

The assessment of biological pressures and related significance per water body is shown in Table 17.

Table 17 *Significance of biological pressures and affected water bodies.*

SIGNIFICANT PRESSURE	IMPACT	WATER BODIES AFFECTED	POTENTIAL CHANGE IN STATUS OF WATER BODY	PROTECTED AREA OBJECTIVES	INTENSITY ASSESSMENT CRITERIA
Introduced species and diseases – *Arundo donax*	Substitution of native species; alteration of flows (as a result of water needs	Watercourses: Wied tal-Baħrija; Wied Il-Luq and Wied tal-Lunzjata	Alteration of habitats leading to deterioration of ecological status	Non-achievement of Natura 2000 objectives	% of watercourse length dominated by *A. donax*
Introduced species and diseases[53] - fauna	Substitution of native species; food competition	Freshwater Pools: L-Għadira ta' Sarraflu		N/A	Number of Invasive Alien Species
Introduced species and diseases – Marine Non Invasive Species (NIS)	Substitution of native species (impacts still to be assessed)	All coastal water bodies		Non-achievement of Natura 2000 objectives	Number of Invasive Alien Species

51 Coastal erosion.

52 Reflects the thresholds used as for the physical modifications criteria "Artificial structures affecting the surface area of a water body", as well as the Habitats Directive's status boundaries in relation to the 'area' parameter, which refers to a maximum of 10% loss below the favourable reference area.

53 Domestic ducks at Is-Salini; various aquatic Invasive Alien Species (IAS) at L-Għadira ta' Sarraflu (Mosquito fish, pool sliders, Levant frog).

3.2. Drivers and associated pressures on groundwater bodies

The ingress of anthropogenic surface contaminants to the groundwater environment can occur through two main mechanisms, classified as direct and indirect. Direct ingress refers to situations where the point of entry is within the saturated zone and hence the contaminants by-pass the unsaturated zone. Such situations can occur, for example, when contaminants are released in a borehole. Indirect ingress refers to situations where the point of ingress is at the surface or at shallow depth, and therefore contaminants have to pass through the unsaturated zone before reaching the groundwater environment (saturated zone). This provides a certain level of protection and pollution control through the mitigation measures associated with the unsaturated zone.

The direct discharge of contaminants, that is the discharge of contaminants directly in the saturated zone is prohibited by law in the Maltese Islands (SL549.155). Direct discharge to groundwater is not considered as an important threat to groundwater quality, with limited evidence of the possible occurrence of such practices. Potential direct discharges relate to the discharge of brine reject from small-scale inland desalination plants, which practice however is also considered as an illegal activity under the legislation SL549.155. Action is taken by the Regulatory Authorities whenever instances of direct discharge to groundwater are encountered. Indirect discharges of contaminants mainly result as a side-effect of existing legal land-use activities. Such activities include urban areas, industrial and commercial activity, and agriculture (Figure 15). In fact, SL549.15 also precludes the indirect discharge of contaminants from activities resulting in their deliberate (unmanaged) disposal. Indirect discharges can also be classified as point or diffuse sources, with point sources relating to contamination occurring from a single specific area, whilst diffuse sources relate to contamination occurring across a broader area.

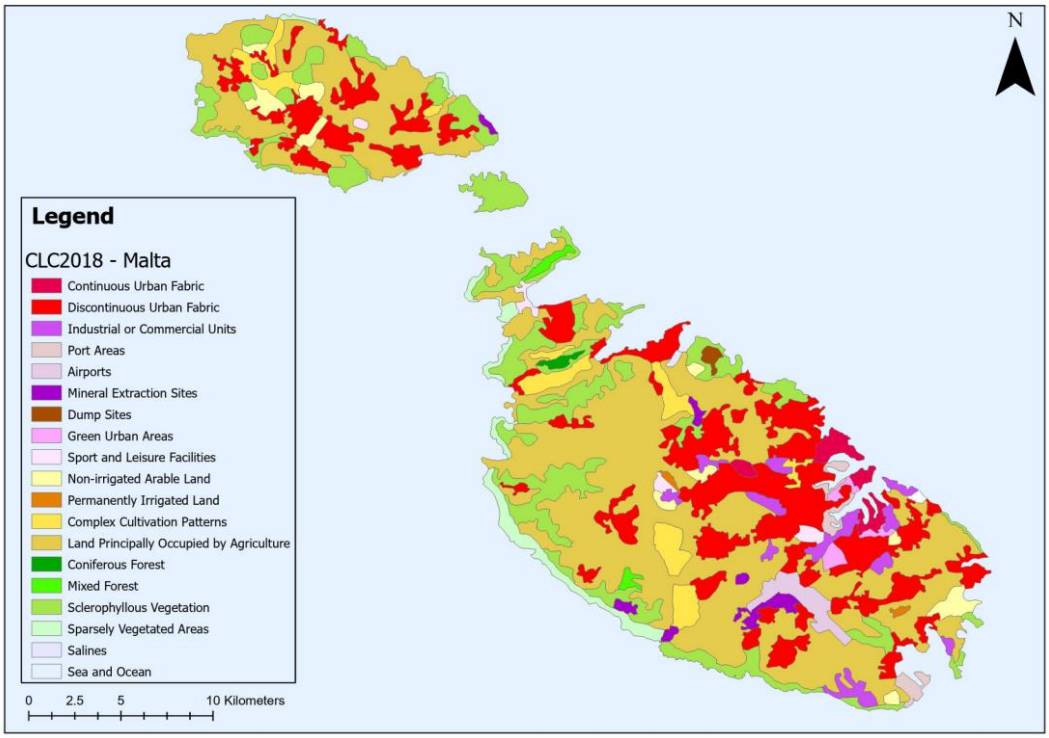

Figure 15 *Main Land Use Characteristics of the Maltese Islands.*

Groundwater quality in the Maltese islands reflects the main land uses at the surface, with nutrient contamination identified as the main status failing parameter. Nutrients can originate from different sources, in addition to agriculture, including leakages from the wastewater network. However, studies undertaken on the source-tracing of nutrients in groundwater using natural isotopes of nitrogen and oxygen in nitrate identified agricultural activities (overfertilization in arable agricultural practices) as the primary source of this contamination. Additionally, the presence of urban contaminants, such as pharmaceuticals and derivatives of personal care products, as well as industrial contaminants has been determined in groundwater, indicating the impact of urban activities. These contaminants are generally considered as arising from diffuse activities and have not been traced to specific point activities.

3.2.1. Quantitative pressures

The semi-arid Mediterranean climate of the Maltese islands and the relatively high demand for water are important pressures on groundwater resources. The main impact of such pressures is over abstraction, that is the withdrawal of a volume of groundwater which exceeds the mean annual recharge. This generally results in lowering groundwater levels and therefore lower yields in abstraction sources or natural spring systems.

However, in the Mean Sea Level aquifer systems, over abstraction also results in the replacement of freshwater by the bounding saline water, resulting in the gradual salinisation of the aquifer systems. This is a major impact on groundwater quality, as evidenced by monitoring data. Main abstractors from the Mean Sea Level aquifer systems include the Water Services Corporation, the agricultural sector, and the commercial sector (including industry and private water suppliers).

3.2.2. Outcome of Pressures and Impacts Analysis on groundwater bodies

Table 18 presents a summary of the risk assessment undertaken at the level of each body of groundwater with the aim of reviewing the determination of the “at risk” groundwater bodies. The Miżieb and Comino bodies of groundwater were added to the “at risk” list on the basis of abstraction and point-source contamination respectively.

Table 18 *Identification of “at risk” bodies of groundwater.*

GWB-CODE	GWB-NAME	RISK REVIEW 2009	RISK REVIEW 2015	RISK REVIEW 2022	SIGNIFICANT PRESSURES			
					POINT SOURCE POLLUTION	DIFFUSE SOURCE POLLUTION	WATER ABSTRACTION	SEA-WATER INTRUSION
MT001	Malta Mean Sea Level	At Risk	At Risk	At Risk	X	X	X	X
MT002	Rabat-Dingli Perched	At Risk	At Risk	At Risk	X	X	X	
MT003	Mġarr-Wardija Perched	At Risk	At Risk	At Risk	X	X	X	
MT005	Pwales Coastal	At Risk	At Risk	At Risk		X	X	X

MT006	Miżieb Mean Sea Level	Not at Risk	Not at Risk	At Risk		X	X	X
MT008	Mellieħa Perched	At Risk	At Risk	At Risk		X		
MT009	Mellieħa Coastal	At Risk	At Risk	At Risk		X		X
MT010	Marfa Coastal	At Risk	At Risk	At Risk		X		X
MT012	Comino Mean Sea Level	Not at Risk	Not at Risk	At Risk	X	X		X
MT013	Gozo Mean Sea Level	At Risk	At Risk	At Risk	X	X	X	X
MT014	Għajnsielem Perched	At Risk	At Risk	At Risk		X	X	
MT015	Nadur Perched	At Risk	At Risk	At Risk		X		
MT016	Xagħra Perched	At Risk	At Risk	At Risk		X		
MT017	Żebbuġ Perched	At Risk	At Risk	At Risk		X		
MT018	Victoria-Kerċem Perched	At Risk	At Risk	At Risk		X		

Table 19 translates the risk assessment to the specific risk objectives outlined under the Water Framework Directive, namely:

- Risk to achieving Quantitative Status,
- Risk to achieving Qualitative Status,
- Risk to protecting the use of the groundwater body as a source of water intended for human consumption, and
- Risk to the status of associated surface water systems.

Table 19 *Classification of Risk to Good Groundwater Status.*

GWB-CODE	GWB-NAME	AT RISK OBJECTIVES			
		QUANTITATIVE STATUS	QUALITATIVE STATUS	USE (DRINKING WATER)	ASSOCIATED SW BODIES
MT001	Malta Mean Sea Level	X	X	X	
MT002	Rabat-Dingli Perched		X		X
MT003	Mġarr-Wardija Perched		X	X	
MT005	Pwales Coastal		X		
MT006	Miżieb Mean Sea Level	X	X	X	
MT008	Mellieħa Perched		X		
MT009	Mellieħa Coastal		X		
MT010	Marfa Coastal		X		
MT012	Comino Mean Sea Level		X		
MT013	Gozo Mean Sea Level	X	X	X	
MT014	Għajnsielem Perched		X		
MT015	Nadur Perched		X		
MT016	Xagħra Perched		X		
MT017	Żebbuġ Perched		X		
MT018	Victoria- Kerċem Perched		X		X

3.3. Inventory of Emissions, Discharges and Losses

Article 5 of Directive 2008/105/EC on environmental quality standards in the field of water policy, as amended by Directive 2013/39/EU, requires Member States to establish an inventory of emissions, discharges and losses of all priority substances and pollutants listed in Part A of Annex 1 of the aforementioned directive, for all river basin/water catchment districts lying within their territories.

In the Maltese Islands, discharges to water bodies are subject to an environmental permitting process and to date such discharges are restricted to coastal waters, with no releases being allowed in inland surface, transitional and groundwaters. Discharge permits are complemented with the best available techniques and monitoring practices to ensure that the status of coastal waters is maintained. Annual Environmental Reports are requested as part of the mentioned permits, for which operators are requested to provide the relevant emissions data. The current inventory builds on such processes and is further complemented by the related European Pollutant Release and Transfer Register (E-PRTR data). Other important data sources that contribute to the inventory include the surface water monitoring processes, data on chemical products authorised for use and emissions via diffuse sources.

3.3.1. Substances of relevance to the River Basin District

In line with CIS Guidance Document No. 28, an inventory of emissions, discharges and losses is compiled by following a two-step analysis process, primarily by assessing the current relevance of the substances and further in-depth analysis for those substance that are found to be relevant to the RBD. The first selection round was based on the following data sources:

- Surface water monitoring data,
- European Pollutant Release and Transfer Register data,
- Industry types that discharge to surface waters,
- Air emissions data; and
- Characterisation exercise of relevant contaminants in the local context.

Pathways considered for the purpose of this inventory are indicated in Table 20.

Table 20 *Sources and pathways of pollutants considered for the compilation of the inventory.*

SOURCES OF POLLUTANTS	PATHWAY	RELATED DATA SOURCES
Point sources	N/A (direct)	• Compliance monitoring of emissions as part of the authorisation process.
Agriculture	Soil	• Authorisation of Plant Protection Products and Biocides • Residues of pesticides in food.
	Impermeable Surfaces	• Monitoring at relevant catchment nodes to capture pollutants originating from diffuse sources including monitoring of stormwater at relevant points.

Transportation	Impermeable Surfaces	• Monitoring at relevant catchment nodes to capture pollutants originating from diffuse sources, including monitoring of stormwater at relevant points.
	Atmospheric depositions (air emissions)	• Air quality monitoring.
Households and industry	Sewer system/ urban wastewater treatment plants	• Monitoring at relevant nodes in sewerage network. • Monitoring of emissions from urban wastewater treatment plants.
	Atmospheric depositions (air emissions)	• Monitoring of emissions to air.

On the basis of the above, the following criteria were used to compile the inventory:

- The substance causes a failure of good chemical status in at least one water body.
- Monitoring results show the presence of the priority substance in our waters and hence potential risks associated with such substances.
- Compliance monitoring of emissions show releases of priority substances from permitted point discharges, including discharges from urban wastewater treatment plants.
- Monitoring at representative points of the sewerage network[54] show presence of substances used by industry and other activity in Malta.
- Monitoring of relevant catchment nodes show presence of priority substances which may reach waters through diffuse inputs.
- Authorisation processes and assessment of pesticide residues in food confirm the use of plant protection products in Malta.

3.3.2. Approaches for relevant substances

A more detailed analysis using a tiered approach is performed on the relevant substances identified above. The aim of such detailed analysis is to provide to the extent possible further estimates of emissions, discharges and losses from point and diffuse sources, and where possible loads transported in rivers.

Tier 1: Point Source Information

An estimation of load from point discharges is calculated using data made available by operators through the environmental permitting system. While noting the uncertainties and limitations within the data sources, this exercise determines whether the point source for a particular substance is present or absent together with an estimation of annual loads. An estimation of the load of these priority substances was possible for permitted emissions of point sources as per WISE SoE Emissions data.

[54] Monitoring of sewerage network carried out by the Water Services Corporation as part of the EU funded project LIFE 16 IPE MT 008.

Tier 2: *Riverine load approach*

The riverine load approach cannot be fully applied in view of the current data limitations. This approach was primarily applied on the basis of data on concentrations of contaminants in:

- Inland surface water bodies as part of the WFD monitoring network.
- Additional catchment areas which were monitored for pollution from diffuse sources[55] including watercourses in major rural and urban catchments.
- Stormwater as collected prior to the discharge point.

As previously indicated no point discharges from industrial operators are permitted or otherwise authorised in inland surface water bodies. Therefore, any presence of contaminants in catchment areas is primarily linked to diffuse sources of pollution.

Malta has initiated studies as part of the Floods Directive, related to long-term future water resource protection and management. As part of the study, measured information on rainfall, runoff, windspeed, solar radiation and evaporation within each catchment will be sought, followed by an assessment of the relationships between rainfall, runoff, recharge, and evapotranspiration. The findings of this study coupled with contaminant monitoring data will contribute to the application of the Riverine load approach as part of the upcoming WFD implementation cycle.

3.3.3. List of relevant priority substances

The relevant substances identified through the above-mentioned approaches and listed in application of the above-mentioned criteria are listed in Table 21 together with the relevant justification for inclusion.

This list, coupled to information on the relevance of other substances at the scale of the River Basin District is used to determine the list of substances, including River Basin Specific Pollutants (RBSP), to be monitored and used for the classification of chemical status of surface waters.

Table 21 *List of substances of relevance to the Malta River Basin District.*

CRITERIA	SUBSTANCES
The substance causes a failure of good chemical status in at least one water body.	Brominated diphenylethers; Di(2-ethylhexyl)-phthalate (DEHP); Fluoranthene; Lead (and its compounds); Nickel (and its compounds); Benzo(a)pyrene.
Monitoring results show the presence of the priority substance in our waters and hence potential risks associated with such substances.	Anthracene; Benzene; Dichloromethane; Diuron; Naphthalene; Pentachlorophenol; Dioxin and dioxin-like compounds; Simazine; Tetrachloroethylene; Trichloromethane.
Compliance monitoring of emissions show releases of priority substances from permitted point discharges, including discharges from urban wastewater treatment plants.	Anthracene; Benzene; Benzo-a-pyrene (and other Polyaromatic hydrocarbons); C10-C13 chloroalkanes; Cadmium (and its compounds); Fluoranthene; Lead (and its compounds); Mercury (and its compounds); Naphthalene; Nickel (and its compounds); Dioxin and dioxin-like compounds; Tributyltin compounds (Tributyltin cation); Trichlorobenzenes.

[55] Carried out as part of the EU funded project LIFE 16 IPE MT 008.

Monitoring at representative points of the sewerage network show presence of substances used by industry and other activity in Malta.	Benzene; Benzo-a-pyrene (and other Polyaromatic hydrocarbons); Cadmium (and its compounds); Di(2-ethylhexyl)-phthalate (DEHP); Fluoranthene; Lead (and its compounds); Nickel (and its compounds); Pentachlorophenol; Trichloromethane;
Monitoring of relevant catchment nodes show presence of priority substances which may reach waters through diffuse inputs.	Anthracene; Cadmium (and its compounds); Di(2-ethylhexyl)-phthalate (DEHP); Dichloromethane; Fluoranthene; Lead (and its compounds); Naphthalene; Nickel (and its compounds); Trichloromethane; Benzo(g,h,i)perylene; Hexachlorobutadiene; Perfluorooctane sulfonic acid and its derivatives.
Authorisation processes and assessment of pesticide residues in food confirm the use of plant protection products in Malta.	Aclonifen, Chlorpyrifos; Cypermethrin; Diuron; Quinoxyfen.
Additional criteria: • Lack of robust data to exclude the relevance of these contaminants to Malta's water bodies at this stage (precautionary approach)	Pentachlorobenzene, Dicofol, Dichlorvos.

3.3.4. Data gaps and needs

A number of data gaps and needs have been identified during the development of this inventory, which resulted in deviations from the recommended approach of CIS Guidance Document 28:

The data on some substances is limited and/or inconsistent which limits the estimation of loads.

- The methodologies used for emission data may vary between operators, causing difficulties inestimation of loads for specific substances.
- The estimation of water flows does not cover all catchment areas; therefore, riverine loads could not be calculated at this stage.

Further development of the inventory is also pending the completion of data collection processes that are being undertaken as part of the LIFE 16 IPE MT 008 project, whereby wastewater quality is being monitored to identify risk areas in relation to wastewater collection, and the characterisation of diffuse sources of pollution is being undertaken at specific locations which may be affected by such pollution sources. Both processes will provide information, not only on the relevance of the contaminants, but also on the sources and pathways of such chemicals, thus informing regulatory processes.

4. Protected areas and safeguard zones

4.1. Register of Protected Areas

Protected areas of relevance to the WFD are those sites lying within the Maltese Catchment District for which special protection is required under specific Community legislation, either for the protection of the surface water or groundwater or for the conservation of habitats and species directly depending on water. The WFD sets objectives in relation to these protected areas, whereby Member States are required to achieve compliance with any standards and objectives set through the protection of such areas.

A summary of such areas, as relevant to the WFD water bodies, is provided in Table 22 and the spatial extent of these areas is shown in Figure 16.

These encompass:

- Areas designated for the abstraction of water intended for human consumption[56].
- Nutrient-sensitive protected areas designated under the Urban Wastewater Treatment Directive[57] or the Nitrates Directive [58].
- Areas designated as bathing waters under the Bathing Water Directive[59].
- Areas designated pursuant for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under the Habitats Directive[60] and the Birds Directive[61].

Reporting on these protected areas pursuant to the requirements of their respective Directives is available on the European Environment Agency's Eionet Central Data Repository[62].

56 Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption.
57 Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment.
58 Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources.
59 Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC.
60 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
61 Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.
62 https://cdr.eionet.europa.eu/.

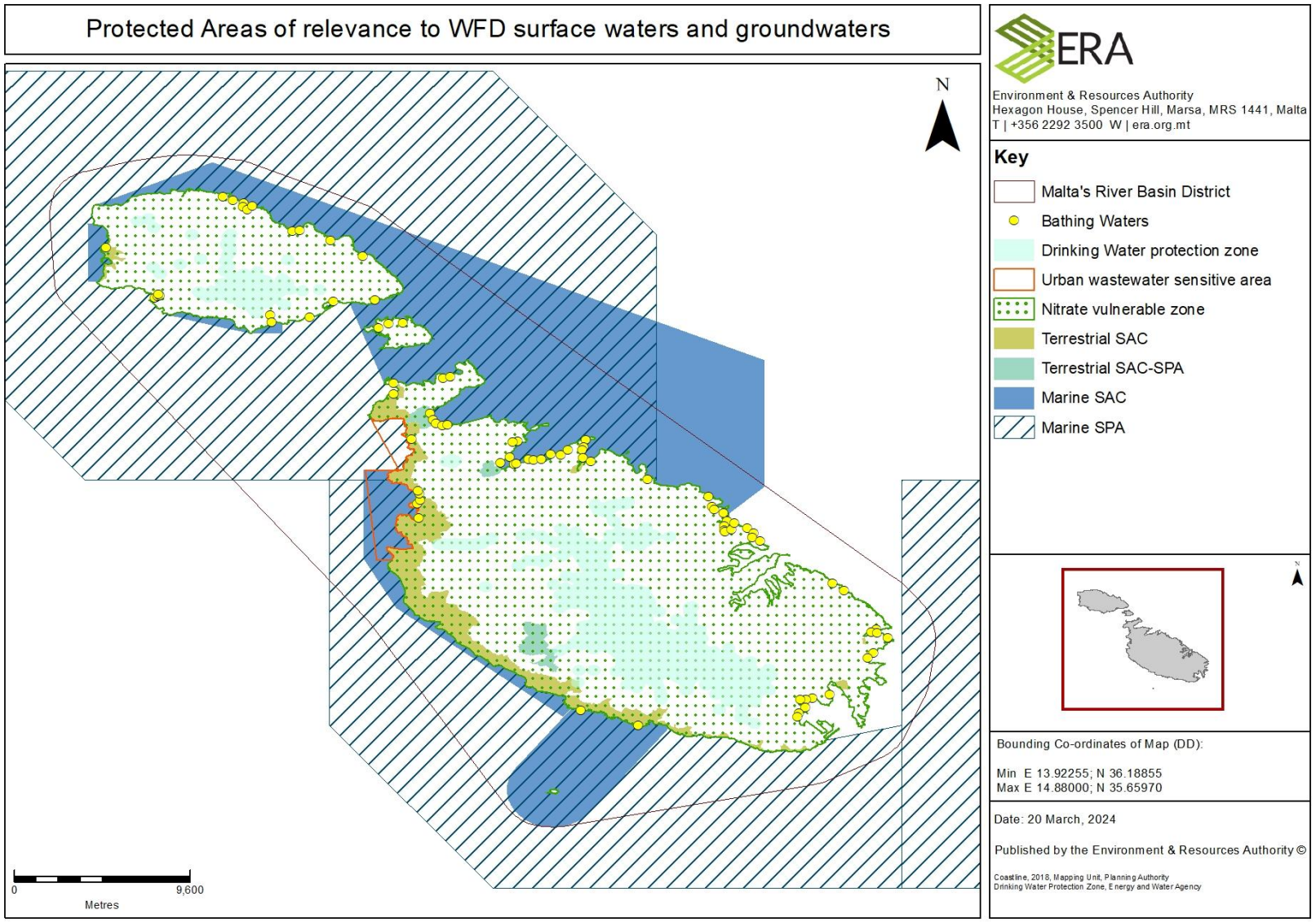

Figure 16 *Protected areas of relevance to surface waters and groundwaters within Malta's River Basin District.*

Table 22 *Protected areas of relevance to groundwaters and surface waters.*

PROTECTED AREA TYPE	LEGISLATION	SITES	ENVIRONMENTAL OBJECTIVE
Areas designated for the abstraction of water intended for human consumption	Water Framework Directive (2000/60/EC) and Drinking Water Directive 2020/2184/EU)	Drinking Water Protected Areas	Maintaining quality of source waters.
Nitrate Vulnerable Zone	Nitrates Directive (91/676/EEC)	The whole of the Maltese Islands is designated as a Nitrate Vulnerable Zone by virtue of Legal Notice 233 of 2004	Reduce water pollution caused by nitrates from agricultural sources and prevent any further quality deterioration in these waters. The Nitrates Directive sets a threshold of 50mg/l of nitrates in groundwater. For freshwaters, in particular those intended for abstraction of drinking water (not relevant for Malta), the Directive refers to the Drinking Water Directive.
Urban wastewater Sensitive Area	Urban Waste Water Treatment Directive (91/271/EEC)	Qammieħ Point till Ras ir-Raħeb	Protection of waters at risk from eutrophication from discharges of urban wastewater. The designation of sensitive areas under this Directive is linked to stricter treatment requirements for urban wastewater. The designation of nutrient sensitive area under UWWTD in Malta is currently being revised.
Bathing Waters	Bathing Waters Directive (2006/7/EC)	Official bathing zones[63]	Maintaining quality status of bathing waters – to maintain 'excellent' or 'good' bathing water quality standards.
Marine Special Areas of Conservation	Habitats Directive (92/43/EEC)	MT0000101 Żona fil-Baħar bejn Rdum Majjiesa u Għar Lapsi MT0000102 Żona fil-Baħar fl-Inħawi ta' Għar Lapsi u ta' Filfla MT0000103 Żona fil-Baħar fl-Inħawi tad-Dwejra (Għawdex) MT0000104 Żona fil-Baħar bejn Il-Ponta tal-Ħotba u Tal-Fessej (Għawdex) MT0000105 Żona fil-Baħar bejn Il-Ponta ta' San Dimitri (Għawdex) u Il-Qaliet	Maintenance / Improvement of conservation status of the marine Annex I habitat (1110/1120/1170/8330). Site-specific conservation objectives have been set to ensure contribution of the protected area to the achievement of the Favourable Conservation Status of marine habitats. https://era.org.mt/wp-content/uploads/2023/02/MPAs-Conservation-Objectives-and-Measures_final_Feb2023.pdf
		MT0000101 Żona fil-Baħar bejn Rdum Majjiesa u Għar Lapsi MT0000105 Żona fil-Baħar bejn Il-Ponta ta' San Dimitri (Għawdex) u Il-Qaliet	Improvement / maintenance of conservation status of Annex II water-dependent aquatic species (*Steromphala nivosa*). Site-specific conservation objectives have been set to ensure contribution of the protected area to the achievement of the Favourable Conservation Status of marine

[63] Available on https://healthservices.gov.mt/en/environmental/Health-Inspectorate/WRAU/Pages/Official-Bathing-Zones.aspx

PROTECTED AREA TYPE	LEGISLATION	SITES	ENVIRONMENTAL OBJECTIVE
			species https://era.org.mt/wp-content/uploads/2023/02/MPAs-Conservation-Objectives-and-Measures_final_Feb2023.pdf
Terrestrial Special Areas of Conservation	Habitats Directive (92/43/EEC)	MT0000006 Is-Simar (limiti ta' San Pawl il-Baħar) MT0000007 Is-Salini MT0000014 Il-Ballut ta' Marsaxlokk MT0000015 L-Inħawi tal-Għadira MT0000018 L-Inħawi tal-Buskett u tal-Girgenti MT0000019 L-Inħawi tad-Dwejra u tal-Qawra, inkluż Ħaġret il-General MT0000023 Il-Magħluq tal-Baħar MT0000024 Rdumijiet ta' Malta: Ir-Ramla taċ- Ċirkewwa sal-Ponta ta' Bengħisa	Maintenance / Improvement of conservation status of the water-dependent Annex I habitat (1150/1310/1410/1420/92A0/92D0/ 3140). Site-specific conservation objectives for these protected areas are being revised.
		MT0000006 Is-Simar (limiti ta' San Pawl il-Baħar) MT0000007 Is-Salini MT0000015 L-Inħawi tal-Għadira MT0000023 Il-Magħluq tal-Baħar	Improvement / maintenance of conservation status of Annex II water-dependent aquatic species (*Aphanius fasciatus*). Site-specific conservation objectives for these protected areas are being revised.
Marine Special Protection Area	Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC)	MT0000108 Żona fil-Baħar fil-Lvant MT0000111 Żona fil-Baħar fil-Lbiċ MT0000112 Żona fil-Baħar madwar Għawdex	Maintaining suitable habitat for seabirds (feeding, resting) to achieve protection of seabird species in line with the Birds Directive. Site-specific conservation objectives have been set to ensure contribution of the protected area to the protection of seabird species. https://era.org.mt/wp-content/uploads/2023/02/MPAs-Conservation-Objectives-and-Measures_final_Feb2023.pdf
Terrestrial Special Protection Area		MT0000006 Is-Simar (limiti ta' San Pawl il-Baħar) MT0000015 L-Inħawi tal-Għadira	Maintaining suitable habitat for birds present at the site (breeding / migration) to achieve protection of seabird species in line with the Birds Directive. Site-specific conservation objectives for these protected areas are being revised.

4.2. Drinking water safeguard zones

The following bodies of groundwater are identified as being utilised by the Water Services Corporation (Malta's public water utility) for the production of drinking water:

- Malta Mean Sea Level
- Miżieb Mean Sea Level
- Gozo Mean Sea Level
- Mġarr-Wardija Perched

In as much all bodies of groundwater utilized for the production of drinking water qualify under the definition of "Drinking Water Protected Areas" requiring an added level of protection to safeguard the quality of the source water. With the enactment of the recast of the Drinking Water Directive (Directive EU 2020/2184) catchment area risk management plans will be prepared for these groundwater bodies with the aim of providing further focus to the application of protective measures. The drinking water risk management plans will be drafted during the course of the third river basin planning cycle.

As required under the WFD (Directive 2000/60/EEC), groundwater safeguard zones have also been established within the catchment areas of these groundwater bodies. Safeguardzones provide the opportunity for the application of more intensive groundwater protection measureswithin a more limited area. This is of particular relevance to Malta where due to the high population density and associated economic and agricultural activities, the catchment areas of these groundwaterbodies can be considered to present a mixed land-use scenario with urban, industrial, agricultural, andnatural areas operating side by side.

Groundwater safeguard zones are defined on the basis of the radii of influence around groundwater abstraction stations. Radii of influence define the zone in the surface of the water table within which the groundwater flow direction is towards the abstraction point. Modelling of the development of this zone of influence under the hydrogeological conditions experienced in Malta, and the abstraction rates practiced by the Water Services Corporation outlines a maximum zone of influence defined by the 300m radius from the abstraction point (Figure 17). Based on this information a four-tiered safeguard zone has been established:

- Zone 1: defined by the 100 m radius of influence around all public groundwater abstraction stations.
- Zone 2: defined by the 200 m radius of influence around all public groundwater abstraction stations.
- Zone 3: defined by the 300 m radius of influence around all public groundwater abstraction stations.
- Zone 4: based on the merged radii of influence around groundwater abstraction sources intended for human consumption.

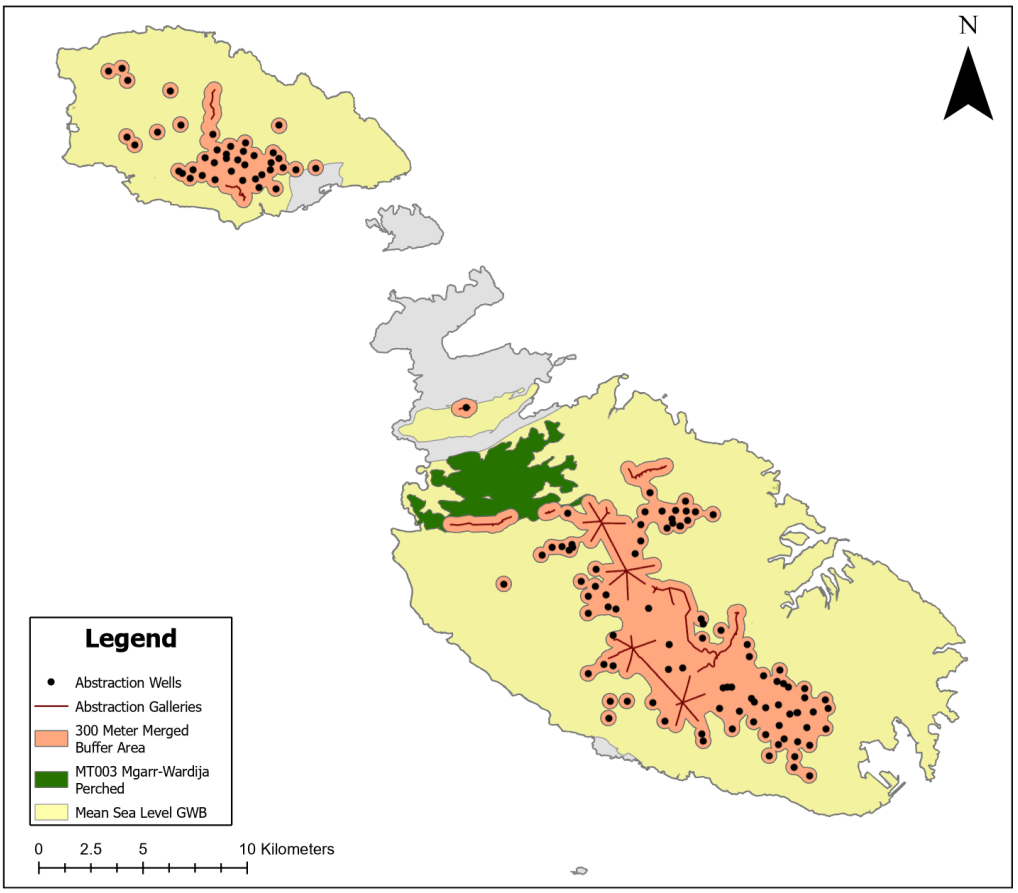

Figure 17 *The spatial extent of groundwater safeguard zones 1 – 3.*

The development of specific land-use activities within the groundwater safeguard zones is prohibited through specific Planning and Design Guidance Documents issued by the Planning Authority. Such Planning and Design Guidance Documents regulate the conditions for the development of activities such as animal husbandry farms, cemeteries, and fuel stations. Within this process the limits of the Groundwater Safeguard Zones are publicly available on the Planning Authority's Map Server (https://pamapserver.pa.org.mt/).

Additionally, groundwater safeguard zones are considered by the Environment and Resources Authority in the evaluation of applications for environmental permits. It is further noted that from a land-use perspective the 100 m, 200 m, 300 m, and merged safeguard zones cover 4%, 10%, 18% and 23% respectively of the surface catchment areas of the groundwater bodies used for the abstraction of water intended for human consumption within the Malta River Basin District. Groundwater protection policies are therefore applied to a significant proportion of the catchment area of these bodies of groundwater.

4.3. Nitrate Vulnerable Zones

The general objectives of the Nitrates Directive are to reduce water pollution caused by nitrates from agricultural sources and prevent any further quality deterioration in these waters. The legislation

provides for the identification of waters polluted by nitrates from agricultural sources, and of land areas contributing to the nitrate pollution which are designated as Nitrate Vulnerable Zones (NVZs). A code of good agricultural practice to protect waters from pollution by nitrates is to be established and implemented on a voluntary basis by farmers, while action programmes are to be established in relation to NVZs.

All of Malta was designated as a Nitrate Vulnerable Zone in 2004, and a Code of Good Agricultural Practice (CoGAP) developed, in conjunction with the drafting of a National Nitrates Action Plan (NAP) by the then Ministry for Resources and Rural Affairs in 2011. Malta's Nitrates Action Programme was given legal effect by the Nitrates Action Programme Regulations (SL 549.66) and is considered the key action towards Malta's achievement of the Nitrates Directive obligations.

Monitoring of nitrates in waters has been integrated in the WFD monitoring programme. The latest reporting pursuant to the Nitrates Directive[64] indicates that Malta's coastal waters are generally oligotrophic in nature and are thus not subject to nitrogen input that may result in eutrophication. The no-deterioration trends are expected to persist in the future, also in view of the measures that are in place as part of the implementation of the Nitrates Directive.

As part of the WFD operational groundwater quality monitoring network developed in Malta, nitrate concentrations are monitored in all fifteen (15) groundwater bodies in the Malta River Basin District. There is a minimum of one monitoring station for each groundwater body, with an overall average monitoring density of one station, roughly every 8 square kilometres (for the smaller groundwater bodies, the monitoring density is even higher). There is a total of 30 monitoring stations in the four biggest groundwater bodies, Malta Mean Sea Level, Rabat-Dingli Perched, Mġarr-Wardija Perched and Gozo Mean Sea Level, which together cover a combined 90% of the land area of the Malta River Basin District. All monitoring stations are sampled every six months, the results of which, contribute towards the qualitative status assessment of the groundwater bodies in the Malta RBD.

4.4. Urban wastewater sensitive areas

The general objective of the Urban Waste Water Treatment Directive (UWWTD) is to protect the environment from the adverse effects of sewage discharges from urban and industrial conglomerates.

Sensitive areas designated under the UWWTD are those waters which are considered vulnerable to eutrophication if they are receiving areas for urban wastewater discharges and fall under specified categories. In Malta, all receiving areas for discharges of urban wastewater are coastal waters, and hence consideration of sensitive areas is in relation to "areas where further treatment is necessary to comply with other Council Directives such as the Directives on fish waters, on bathing waters, on shellfish waters, on the conservation of wild birds and natural habitats, etc."

The first set of UWWTD nutrient sensitive sites of the Maltese Islands were designated through Legal Notice 120/2005 'Urban Waste Water Treatment (Amendment) Regulations, 2001' and subsequently

[64] https://rod.eionet.europa.eu/countrydeliveries?spatialId=25&actDetailsId=106

revised through the 2nd RBMP, where one area was retained. The UWWTD sensitive areas are currently under revision on the basis of targeted monitoring processes in coastal waters.

4.5. Bathing waters

The purpose of the Bathing Water Directive 2006/7/EC is to preserve, protect and improve the quality of the environment and to protect human health by complementing the Water Framework Directive. A requirement of the Bathing Water Directive is to achieve specific mandatory water quality standards for the protection of bathers, and the bathing waters are quality classified according to the two microbiological parameters (*Escherichia coli* and intestinal enterococci) defined in the Bathing Water Directive.

There are 87 designated bathing waters, which are found in all of Malta's coastal waters except the two ports of Marsamxett and the Grand Harbour. All of Malta's bathing waters were reported to be in line with the minimum quality standards of the Directive in 2022[65], thus classified "sufficient" or better, with 94.3% of the bathing waters classified as excellent. Table 23 provides a summary of the state of bathing waters in 2022 per WFD waterbody.

Table 23 *Status of bathing waters in the season of 2022 per WFD waterbody.*

WFD COASTAL WATERBODY	BATHING WATER QUALITY
MTMTC101	5 Excellent
MTMTC102	10 Excellent
MTMTC103	12 Excellent
MTMTC104	33 Excellent, 2 Good, 2 Sufficient
MTMTC105a	N/A
MTMTC105b	N/A
MTMTC106	8 Excellent
MTMTC107	6 Excellent; 1 Sufficient
MTMTC108	2 Excellent
MTMTC109	6 Excellent

The 3rd RBMP will contribute to maintaining the quality status of bathing waters, both in terms of complementary monitoring and relevant measures addressing potential pressures.

4.6. Sites pursuant to the Habitats and Birds Directive

There have been several changes since the 2nd RBMP in relation to Special Areas of Conservation (SAC) areas designated for the protection of habitats and species pursuant to the EU Habitats Directive, and Special Protected Areas (SPAs) designated for the protection of seabirds under the EU Birds Directive. Several marine sites were designated in 2016 for the three seabirds that breed in the Maltese Islands: The Scopoli's Shearwater (*Calonectris diomedea*), the Yelkouan Shearwater

[65] Bathing water coutry factsheet. Malta. June 2023. European Environment Agency.

(*Puffinus yelkouan*) and the European Storm Petrel (*Hydrobates pelagicus*)[66]. Additional areas were designated in 2018, both inshore and offshore, for the protection of cave and reef habitats. All these sites have been adopted as part of the Natura 2000 network[67]. The water-related condition of the sites designated pursuant to the above legislation is provided below.

Marine Special Areas of Conservation

With the exception of MTC106 and the three heavily modified water bodies (MTC105A, MTC105B, MTC107), all the coastal water bodies overlap SACs designated due to the presence of *Posidonia* beds (1120) and reefs (1170). Four of the SACs in question are also designated for submerged or partially submerged sea caves (8330), and three for sandbanks which are slightly covered by sea water all the time (1110). An overview of the conservation status of the habitats as per the sites Standard Data Forms (SDFs), is provided below:

- Habitat 1110 is reported to be in excellent and good conservation status in terms of structure and functions and restoration possibilities in MT0000101 and MT0000105 but are of average or reduced conservation in MT0000104.
- Habitat 1120, which is also a priority habitat, is reported to be in excellent or good conservation status, in terms of its structure and functions and restoration possibilities, in all the protected areas except for MT0000104 in which such status is of average or reduced conservation.
- Habitat 1170 is reported to be in good conservation status, in terms of structure and functions and restoration possibilities.
- Habitat 8330 is reported to be in excellent or good conservation status in terms of structure and functions and restoration possibilities.

In addition, two of the marine SACs - MT0000101 and MT0000105 – have been designated for the Maltese top-shell (*Steromphala nivosa*), a marine gastropod endemic to the Maltese Islands. The SDFs for these two sites indicate the Conservation criteria, i.e. the degree of conservation of the features of the habitat which are important for the species concerned and possibilities for restoration, as excellent / good for *Steromphala nivosa*.

Malta's 3rd RBMP will be aiming towards maintenance of good status for all four Annex I habitats and the excellent/good habitat for *Steromphala nivosa*, while improving the conservation status of the seagrass habitats in MT0000104, which habitats overlap coastal water body MTC103.

Marine Special Protection Areas

Except for the three heavily modified water bodies (MTC105A, MTC105B, MTC107), all the coastal water bodies overlap SPAs, so designated due to their importance for the three seabird species that

[66] Offshore areas were also designated for the loggerhead turtle (*Carretta carretta*), the bottlenose dolphin (*Tursiops truncatus*).

[67] Commission Implementing Decision (EU) 2020/96 of 28 November 2019 adopting the thirteenth update of the list of sites of Community importance for the Mediterranean biogeographical region (notified under document C (2019) 8583).

breed in our islands, as explained above. The SPAs in question are MT0000112 (Żona fil-Baħar ta' madwar Għawdex) and MT0000111 (Żona fil-Baħar tal-Lbiċ), which encompass various coastal water bodies, as well as MT0000108 (Żona fil-Baħar tal-Lvant) which partially overlaps two coastal water bodies in the southeast.

The SDF criteria of Conservation[68] have been assessed to be of average or reduced conservation status in all three SPAs (for the three seabird species). Nevertheless, knowledge on the ecological functions of the sites in question is very limited at this stage. In view of this, the Site-Specific Conservation Objectives (SSCO) for the marine SPAs[69] are seeking the maintenance of existing seabird populations within the sites in question, pending further knowledge on the required improvements through studies on the ecological functions of the sites.

The 3rd RBMP will seek to contribute to maintaining the marine habitat for the three seabird species in line with the conservation objectives for these SPAs.

Terrestrial Special Areas of Conservation and Special Protection Areas

All five transitional waters, three water courses and one freshwater pool are located within terrestrial N2K sites. Aquatic or riparian habitats, listed in Annex I of the Habitats Directive, are found in all these waterbodies except one watercourse (Wied tal-Lunzjata). Two of the transitional water bodies - Is-Simar and L-Għadira – are also SPAs in which the wetland areas provide habitat for several migratory bird species especially waders[70], rails, bitterns, moorhens, and reed-associated warblers.

An overview of the conservation status of the water-dependant habitats, as per the sites SDFs, is provided below, together with the status of the Annex II fish species *Aphanius fasciatus* for which some of these sites have also been designated.

Transitional waters

The water-dependent Annex I habitats within the N2K sites hosting the five transitional waters are reported as in good conservation status or average/reduced conservation status.

- Habitat 1150 (Coastal lagoons) is the primary habitat for four of the WFD water bodies (is-Salini, il-Magħluq ta' Marsascala, is-Simar, and l-Għadira), found at all four sites and covering the greater part of the designated WFD water bodies within them. It is considered to be in good conservation status in all of these water bodies except for Il-Magħluq ta' Marsascala, where it is considered to be in average or reduced conservation status.
- Habitat 1310 (*Salicornia* and other annuals colonising mud and sand) is present at three sites, where it is in good status at is-Salini and l-Għadira, and average or reduced status at il-Ballut ta' Marsaxlokk.

[68] Degree of conservation of the features of the habitat which are important for the species concerned and possibilities for restoration.

[69] ERA (2023) Conservation objectives and measures for Malta's marine Natura 2000 sites. Available online.

[70] In Għadira site.

- Habitat 1410 (Mediterranean salt meadows), present at three sites, is in good status at il-Ballut ta' Marsaxlokk and l-Għadira, and in average or reduced status at il-Magħluq ta' Marsascala.
- Habitat 1420 (Mediterranean and thermo-Atlantic halophilous scrubs), found at three sites, is in good status at il-Ballut ta' Marsaxlokk and l-Għadira, and in average or reduced conservation status at is-Salini.
- Habitat 92D0 (Southern riparian galleries and thickets) is found at Is-Salini, where it is reported as in average or reduced conservation status.
- Habitat 3170 (Mediterranean temporary ponds) is found at Is-Simar, where it is reported as in good status.

The water-dependent Annex II species *Aphanius fasciatus* (1152) is present at four of these sites, where it is in excellent or good conservation status, apart from il-Magħluq ta' Marsascala in which site the species is considered to be in average or reduced conservation status.

Watercourses

The riparian habitat *Salix alba* and *Populus alba* galleries (92A0) is present within the two N2K sites associated with Wied il-Luq and Wied tal-Baħrija. In both sites this habitat is reported as being in average or reduced conservation status. There are no Annex I water-dependent habitat types associated with Wied tal-Lunzjata.

Pools

Water-dependent Annex I habitat types found at il-Qattara, within the N2K site SAC Dwejra-Qawra (MT0000019), includes Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (3140) and Southern riparian galleries and thickets (92D0), which are both reported to be in good conservation status.

In view of the above, Malta's 3rd RBMP will be aiming towards seeking maintenance or improvement of the conservation status of the water-dependent habitats and water-dependent species within the inland surface water bodies and transitional water bodies.

5. Monitoring Networks

5.1. Surface Water Monitoring Networks

The monitoring network and processes for surface waters as reported through Malta's 2nd RBMP are hereby being updated and revised on the basis of lessons learnt from the implementation of monitoring during the second cycle, data collected and the revised assessment of pressures and impacts on such water bodies.

The monitoring processes for the inland surface and transitional water bodies have been updated based on lessons learnt through the implementation of the second cycle's monitoring programme through Negotiated Procedure NP02/2021[71]. The location of almost all monitoring stations has been revised, considering site-specific conditions, and amalgamating the locations for monitoring of biological and supporting quality elements as much as possible for improved coherence.

The updated monitoring processes are geared towards the application of WFD-compliant assessment systems while seeking to address lacunae in terms of the ecological assessment of these water bodies. The design of the monitoring programme will enable a robust assessment of confidence in the assessment process, testing of the applicability of the assessment methodologies to Maltese waters and development of ecological status boundaries and associated boundaries for physico-chemical parameters.

Surveillance monitoring will be carried out for one year for all surface water bodies, with changes to the number and location of the monitoring stations in order to be more representative of the water bodies, including the new delineations for the coastal surface waters, thus enabling an assessment of the overall surface water status. The surveillance monitoring network targets assessment of changes in natural conditions as well as changes from widespread anthropogenic activities. Operational monitoring is envisaged for surface water bodies which in accordance with the pressure and impact assessment process are considered to be at risk from significant pressures.

In terms of monitoring frequencies, the monitoring processes meet the minimum frequencies stipulated in the WFD and Directive 2013/39/EU (Environmental Quality Standards Directive). The monitoring programme for the 3rd RBMP is presented in the following sections, per water body type. The overall monitoring network is depicted in Figure 18 and described in further detail in the Technical Document "Surface Water Bodies: Monitoring Network". This Technical Document provides details on the general approach towards the updating of the monitoring network, the quality elements, and parameters (including list of priority substances and RBSP) to be monitored, as well as the monitoring frequencies.

[71] Monitoring commenced in November 2021, following a number of delays linked to the procurement process, particularly two unsuccessful open tender procedures.

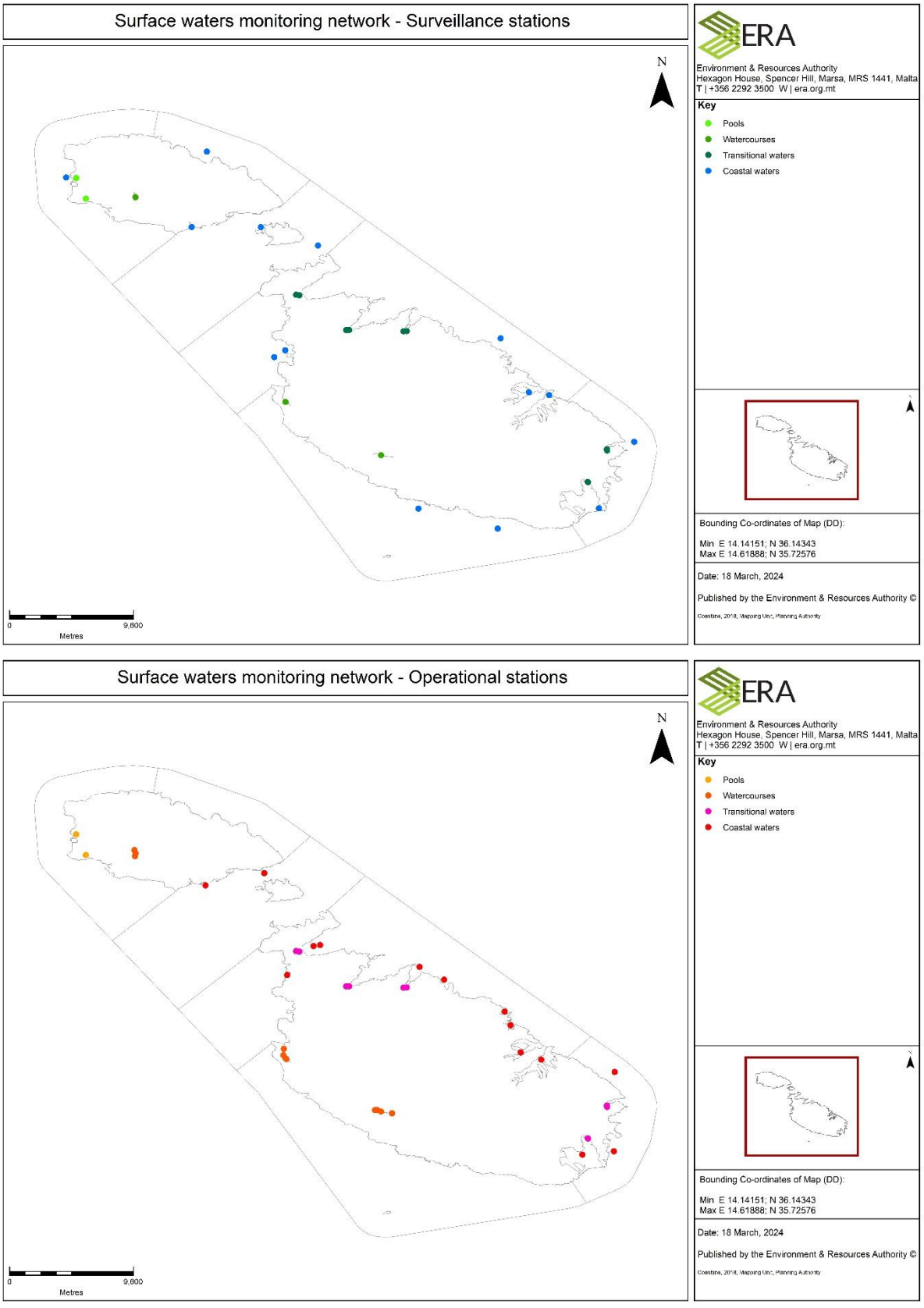

Figure 18 Surveillance and Operational Monitoring networks for surface water bodies.

5.1.1. Watercourses

In relation to surveillance monitoring in watercourses, one monitoring station within the middle stretch of each water body is being considered as sufficiently representative for water courses, in view of the small scale of these water bodies and the overall agricultural context in which they are located. The surveillance monitoring station was selected considering the spatial distribution and pathways of pollution sources, site sensitivity as well as logistical aspects such as accessibility and the prolonged presence of water throughout the year.

For other parameters, such as the aquatic flora and benthic invertebrates BQEs as well as supporting hydromorphological parameters relating to continuity and morphology[72], monitoring will be carried out on a wider spatial scale along stretches of the watercourse and/or water body level.

In relation to operational monitoring, three additional stations have been identified per water body - one each for the upper, middle, and lower reaches so as to better assess the impacts from the significant pressures along different sections of the watercourses and the effects of measures to be implemented in a spatially and temporally phased approach.

The surveillance and operational monitoring networks for the watercourses are presented in Table 24 and Table 25 respectively.

While monitoring frequencies for the quality elements will be sought as per minimum WFD frequencies, specific hydromorphological elements in watercourses will be monitored as follows:

- Quantity and dynamics of water flow: continuous monitoring at the surveillance monitoring station and monthly monitoring at the operational monitoring stations for at least one year during the implementation cycle.
- Structure and substrate of the channel bed: structure and substrate of the channel bed in watercourses will be carried out on a monthly basis for at least one year.

This monitoring network will also contribute to the assessment of the achievement of objectives for the Natura 2000 site incorporating Wied il-Luq and Wied tal-Baħrija water bodies (MT0000018 and MT0000024), the impacts on water-related requirements of these protected areas and the achievement of the objectives of the Nitrates Directive.

[72] River depth and width variation; structure of the riparian zone.

Table 24 *Surveillance Monitoring Network for watercourses (MTWC01, MTWC02, MTWC03).*

MONITORING LOCATION	QUALITY ELEMENTS	PARAMETERS	ASSESSMENT METHODOLOGY[73] (WHERE RELEVANT)
One point for water body (Middle section)	Biological	• Aquatic flora: ***Phytobenthos***	• Specific Pollution-sensitivity Index (IPS)
	Hydromorphological	• Quantity and dynamics of water flow • Substrate of channel bed	
	Chemical and physico-chemical elements	• Thermal conditions • Oxygenation conditions • Salinity • Acidification status • Nutrient conditions • Priority Substances • River Basin Specific Pollutants	
All water body / Selected Stretches / Other	Biological	• Benthic Invertebrates • Aquatic flora: ***Macrophytes***	• STAR – ICMI • Taxonomic composition and abundance/cover[74]
	Hydromorphological	• Water stream continuity • Watercourse depth and width variation • Channel bed structure • Structure of the Riparian Zone • Connection to groundwater[75]	

Table 25 *Operational Monitoring Network for watercourses.*

WATER BODY	SIGNIFICANT PRESSURE	BIOLOGICAL QUALITY ELEMENTS RESPONDING TO THE PRESSURE IN QUESTION[76]	
Wied tal-Baħrija MTWC01	Diffuse pollution (Agriculture)	Biological	• Aquatic flora: ***Phytobenthos*** • Benthic Invertebrates
		Physico-chemical elements	
		Chemical Elements	
	Diffuse pollution (urban runoff)	Biological	• Benthic Invertebrates
		Physico-chemical elements	
		Chemical Elements	
Wied il-Luq MTWC02 and Wied tal-Lunzjata MTWC03	Diffuse pollution (Agriculture)	Biological	• Aquatic flora: ***Phytobenthos*** • Benthic Invertebrates
		Physico-chemical elements	
		Chemical Elements	
	Diffuse pollution (urban runoff)	Biological	• Benthic Invertebrates
		Physico-chemical elements	
		Chemical Elements	
	Hydromorphological alterations	Biological	• Benthic Invertebrates
		Hydromorphological	• Quantity and dynamics of water flow • Substrate of channel bed

[73] All methodologies indicated need to be verified in terms of their applicability, also in relation to reference conditions.

[74] Application of the multi-metric indices applied by other Mediterranean countries to be tested, or national method developed.

[75] 'Connection to groundwater' will be monitored in synergy with the groundwater monitoring network.

[76] Same methodologies as per surveillance monitoring network.

5.1.2. Freshwater Pools

The two freshwater pools that have been designated as WFD water bodies are both very small: 0.0001 km^2 (Il-Qattara) and 0.044 km^2 (L-Għadira ta' Sarraflu). Hence, one monitoring point per water body is considered to be sufficiently representative in terms of both surveillance and operational monitoring. The location of the monitoring stations was selected considering accessibility as well as bathymetry.

Monitoring stations will be used for chemical monitoring and ecological monitoring of benthic invertebrates and phytoplankton, as well as supporting physiochemical and selected hydromorphological parameters. For other parameters, such as the aquatic flora and other supporting hydromorphological parameters, monitoring will not be linked to one monitoring location and the spatial scope will reflect the overall water body.

The surveillance and operational monitoring networks for the two pools are presented in Table 26 and Table 27 respectively. This monitoring network will also contribute to the assessment of the achievement of objectives for the Natura 2000 site incorporating Il-Qattara water body (MT0000019), the impacts on water-related requirements of these protected areas and the achievement of the objectives of the Nitrates Directive.

Table 26 *Surveillance Monitoring Network for freshwater pools (MTSW01 and MTSW02).*

MONITORING LOCATION	QUALITY ELEMENTS	PARAMETERS	ASSESSMENT METHODOLOGY[77] (WHERE RELEVANT)
One point for water body	Biological	• Phytoplankton • Aquatic flora: ***Phytobenthos*** • Benthic Invertebrates	• Mediterranean Assessment System for Reservoirs Phytoplankton • Specific Pollution-sensitivity Index (IPS) • QAELS index
	Hydromorphological	• Quantity and dynamics of water flow • Residence time	
	Chemical and physico-chemical elements	• Transparency • Thermal conditions • Oxygenation conditions • Salinity • Acidification status • Nutrient conditions • Priority Substances • River Basin Specific Pollutants	
All water body / perimeter	Biological	• Aquatic flora: ***Macrophytes***	• Aquatic flora Spanish assessment method
	Hydromorphological	• Pool depth variation • Quantity, structure, and substrate of pool bed • Structure of the pool perimeter/shore • Connection to groundwater	

[77] All methodologies indicated need to be verified in terms of their applicability, also in relation to reference conditions.

Table 27 *Operational Monitoring Network for freshwater pools.*

WATER BODY	SIGNIFICANT PRESSURE	BIOLOGICAL QUALITY ELEMENTS RESPONDING TO THE PRESSURE IN QUESTION[78]	
Il-Qattara MTSW01 and L-Għadira ta'Sarraflu MTSW02	Diffuse pollution (urban runoff)	Biological	• Phytobenthos
		Physico-chemical elements	
		Chemical Elements	

5.1.3. Transitional waters

All five transitional water bodies are heavily modified, as described in the characterisation process. Due to the significant morphological alterations and diffuse sources of pollution, these water bodies are all at risk of failing good ecological potential, as described in assessment of pressures and impacts.

The monitoring station network has been updated from that presented in the 2nd RBMP, based on expert opinion and in consultation with the Natura 2000 site managers, and subsequently tested during the implementation of the 2nd RBMP monitoring programme. Consideration was given to the individual characteristics within the water bodies (such as seasonal water level and salinity fluctuations), as well as access logistics and - within sites that are Special Protected Areas (SPAs) - minimising disturbance to birds.

In relation to surveillance monitoring, one monitoring station is considered to be sufficient, given the water bodies' small size. However, an additional station has been retained for monitoring phytoplankton and supporting physico-chemical parameters per water body, so as to cater for the varying conditions in the distinctive basins/channels. Surveillance monitoring of macroalgae and angiosperms, as well as the other hydromorphological parameters will be carried out on a wider spatial scale, i.e. at multiple stations within the water bodies and/or water body level.

Locations for monitoring of the fish fauna are not being defined in view that the locations will need to be adapted as necessary from season to season and guided by visual observations on the presence of *Aphanius fasciatus* within the water body as well as expert opinion on the habitat characteristics preferred by killifish. This approach builds on experience gained during the second cycle. In the case of Is-Salini and il-Magħluq ta' Marsascala, the sampling locations were subject to change during the implementation of the monitoring programme, in view of the difficulties encountered during sampling at these two sites[79].

In relation to operational monitoring, the same stations used for surveillance monitoring will be used to monitor specific parameters that are considered as most indicative of the impacts within the water

[78] Same methodologies as per surveillance monitoring network.

[79] *Aphanius fasciatus* was observed but only trapped during the summer surveys at Il-Magħluq ta' Marsascala, while the fish was never recorded / observed in the Sukkursi channel during the monitoring episodes.

bodies resulting from hydromorphological modifications. These stations are considered as suitably representative of the related pressures in view of the small scale of the water bodies and the extensive hydromorphological modifications that these have been subject to.

The surveillance and operational monitoring networks for transitional waters are presented in Table 28 and Table 29 respectively. Noting that all transitional water bodies are designated Natura 2000 sites, this monitoring network will also contribute to the assessment of the achievement of objectives for the Natura 2000 network, the impacts on water-related requirements of these protected areas and the achievement of the objectives of the Nitrates Directive.

Table 28 *Surveillance Monitoring Network for Transitional Waters (MTTW01, MTTW02, MTTW03, MTTW04, MTTW05).*

MONITORING LOCATION	QUALITY ELEMENTS	PARAMETERS	ASSESSMENT METHODOLOGY[80] (WHERE RELEVANT)
Monitoring stations in each basin/channel (as relevant)	Biological	• Phytoplankton • Benthic Invertebrates • Fish Fauna	• Method to be developed[81] • Multivariate AZTI's Marine Biotic Index (M-AMBI) • Catch per Unit Effort; population size.
	Hydromorphological[82]	• Water Level • Quantity, structure, and substrate of the bed • Freshwater flow	
	Chemical and physico-chemical elements	• Transparency • Thermal conditions • Oxygenation conditions • Salinity • Nutrient conditions • Priority Substances • River Basin Specific Pollutants	
All water body (representative sampling sites) / perimeter	Biological	Aquatic flora: ***Angiosperms and Macroalgae***	• Macrophyte Quality Index (R-MAQI)
	Hydromorphological	• Depth variation • Structure of the intertidal zone	

[80] All methodologies indicated need to be verified in terms of their applicability, also in relation to reference conditions.

[81] The following parameters to be included: Chlorophyll-a concentration (µg/l); Composition and abundance (cells/l) of phytoplanktonic assemblage and density (number of cells/l) of pico-phytoplankton (<3 microns) and nano-phytoplankton (>3 microns).

[82] While 'Tidal Regime' as one of the hydromorphological elements listed by the WFD is not relevant to Maltese transitional water bodies.

Table 29 *Operational Monitoring Network for transitional water bodies.*

WATER BODY	SIGNIFICANT PRESSURE	BIOLOGICAL QUALITY ELEMENTS RESPONDING TO THE PRESSURE IN QUESTION[83]	
All transitional water bodies	Diffuse pollution (urban runoff)	Biological	• Benthic Invertebrates
		Chemical Elements	
	Hydromorphological alterations	Biological	• Phytoplankton • Aquatic flora: ***Angiosperms and Macroalgae***
		Hydromorphological Elements	
		Physico-chemical elements	

5.1.4. Coastal Surface Waters

The coastal waters monitoring network has been updated to reflect the assessment of pressures and impacts, the risks for water bodies to fail good status and the revised WFD water body boundaries. No changes in terms of the monitoring methodologies proposed in the 2nd RBMP are being sought.

Due to the very low tidal range in the Mediterranean, 'tidal regime' as a parameter for hydromorphological quality elements is not relevant to Malta's coastal water bodies. Monitoring of morphological conditions (depth variation and structure and substrate of the coastal bed) and hydrological elements (currents and waves) will still be sought; however, such monitoring will be linked to specific areas subject to anthropogenic disturbance that could be relevant for the status classification of the water body.

The surveillance and operational monitoring networks for coastal water bodies are presented in Table 30 and Table 31 respectively. This monitoring network will also contribute to the:

- Assessment of the achievement of objectives for the Natura 2000 site in relation to coastal Marine Protection Areas (Directive 92/43/EEC and Directive 2009/147/EU).
- Assessment of the achievement of the objectives of the Nitrate Vulnerable Zone pursuant to the Nitrates Directive (91/676/EEC).
- Assessment of water quality to contribute to the implementation of the Bathing Water Quality Directive (2006/7/EC).

[83] Same methodologies as per surveillance monitoring network.

Table 30 *Surveillance Monitoring Network for coastal water bodies.*

MONITORING LOCATION	QUALITY ELEMENTS	PARAMETERS	ASSESSMENT METHODOLOGY
Monitoring station/s in each coastal water body	Biological	• Phytoplankton • Aquatic flora: ***Macroalgae*** • Aquatic flora: ***Angiosperms*** • Benthic Invertebrates	• Chlorophyll-a • CARLIT • PREI • BENTIX
	Chemical and physico-chemical elements	• Transparency • Thermal conditions • Oxygenation conditions • Salinity • Nutrient conditions • Priority Substances • River Basin Specific Pollutants	
Relevant locations within coastal water bodies (linked with anthropogenic disturbance)	Hydromorphological	• Depth Variation • Structure and substrate of the coastal bed • Direction of dominant currents • Wave exposure	

Table 31 *Operational Monitoring Network for coastal waters.*

WATER BODY	SIGNIFICANT PRESSURE	BIOLOGICAL QUALITY ELEMENTS RESPONDING TO THE PRESSURE IN QUESTION[84]	
MTC104 MTC105A MTC105B MTC106 MTC107	Diffuse pollution (urban runoff)	Biological	• Benthic Invertebrates • Aquatic flora: ***Angiosperms***
		Physico-chemical Elements	
		Chemical Elements	
MTC103 MTC104 MTC105A MTC105B MTC106 MTC107 MTC109	Point Sources	Biological	• Benthic Invertebrates
		Physico-chemical Elements	
		Chemical Elements	
MTC105A MTC105B MTC107	Hydromorphological alterations	Biological	• Phytoplankton
		Hydromorphological Elements (linked only to relevant anthropogenic disturbances)	• Depth Variation • Structure and substrate of the coastal bed • Direction of dominant currents • Wave exposure
		Physico-chemical elements	

[84] Same methodologies as per surveillance monitoring network.

5.1.5. Investigative Monitoring

During the second cycle, investigative monitoring was undertaken in transitional and inland surface water bodies in response to incidents of water discoloration or fish mortality events, for which the reason was not known, and which indicated the possibility of exceedances in the water body linked to biotoxins/algal blooms and/or chemical pollution. Three incidents were investigated during the second cycle: one at the transitional water body of Is-Salini (2017), and two at the freshwater pool l-Għadira ta' Sarraflu (2020, 2021).

In all cases, experts were contracted to carry out sampling and analysis according to terms of reference specific to the event, which included – depending on the case in question – phytoplankton composition and abundance, specific chemical pollutants, and ecotoxicology investigations (*Daphnia magna* and Luminescent bacteria tests).

The experience gained through these events is being used to formalise procedures and enable a rapid launching of investigations, although case-specific terms of reference will to some extent always be required.

5.2. Groundwater Monitoring Networks

Article 8 of the Water Framework Directive defines a requirement for the establishment of programmes for the monitoring of groundwater. These monitoring programmes are intended to provide the necessary information to enable the Environmental Objectives set out in Article 4 to be met, and enable the assessment of the groundwater quantitative status, chemical status, and the identification of significant, long-term trends.

During the course of the implementation of Malta's 2nd RBMP, a review of groundwater monitoring networks was undertaken and a project for the optimisation of these networks was designed and implemented. This project was funded under the EU Cohesion Fund and the new monitoring infrastructure was commissioned by December 2023. The new monitoring infrastructure extends the monitoring networks to all groundwater bodies in the Maltese islands, hence enabling the reliable assessment of the quantitative and qualitative status of all groundwater bodies in the Maltese islands.

The design of the monitoring networks considers the groupings established during the 1st RBMP on the basis of similar aquifer characteristics, pathway susceptibilities, pressures, and confidence in their risk assessment. The groundwater body groupings are confirmed for the 3rd RBMP and presented in Table 32.

Table 32 *Grouping of groundwater bodies based on their characteristics.*

GROUP CODE	COMPONENT GWB CODE	NAME OF COMPONENT BODIES OF GROUNDWATER
MTO_G01	MT001	Malta Mean Sea Level
MTO_G02	MT002	Rabat-Dingli Perched
MTO_G03	MT003, MT006, MT014	Mġarr/Wardija Perched, Miżieb Mean Sea Level, Għajnsielem Perched
MTO_G04	MT005, MT009, MT010	Pwales Coastal, Mellieħa Coastal, Marfa Coastal
MTO_G05	MT008, MT015, MT016	Mellieħa Perched, Nadur Perched, Xagħra Perched
MTO_G06	MT017, MT018	Żebbuġ Perched, Victoria/Kerċem Perched
MTO_G07	MT012, MT013	Comino Mean Sea Level, Gozo Mean Sea Level

5.2.1. Quantitative Status Monitoring Networks

The baseline groundwater status monitoring network is based on the measurement of "groundwater level" or "groundwater flow" depending on the hydrogeological characteristics of the particular groundwater body.

5.2.1.1. Groundwater level monitoring network

Groundwater level monitoring networks are established in the main Mean Sea Level and coastal groundwater bodies. These networks have been optimised with the addition of 22 automated monitoring stations distributed over Malta and Gozo as outlined in Table 33. This new expanded monitoring network will provide faster direct information on the quantitative status of the freshwater lenses in the MSLA through the use of telemetry. The increased spatial extent of this network will also ensure better spatial representativity which will also better guide the management of the local resource. The spatial layout of these monitoring networks is presented in Figure 19.

Table 33 *Water level monitoring stations in the Mean Sea Level aquifer systems.*

GROUNDWATER BODY CODE	GROUNDWATER BODY NAME	NUMBER OF GROUNDWATER LEVEL MONITORING STATIONS THROUGHOUT THE IMPLEMENTATION CYCLE OF THE 1ST RBMP	NUMBER OF GROUNDWATER LEVEL MONITORING STATIONS THROUGHOUT THE IMPLEMENTATION CYCLE OF THE 2ND RBMP
MT001	Malta Mean Sea Level	33	31
MT006	Miżieb Mean Sea Level	1	1
MT013	Gozo Mean Sea Level	3	3
MT008	Mellieħa Perched	0	1
MT010	Marfa Coastal	0	1
MT005	Pwales Coastal	0	2
MT012	Comino Mean Sea Level	0	4
	Total	**37**	**43**

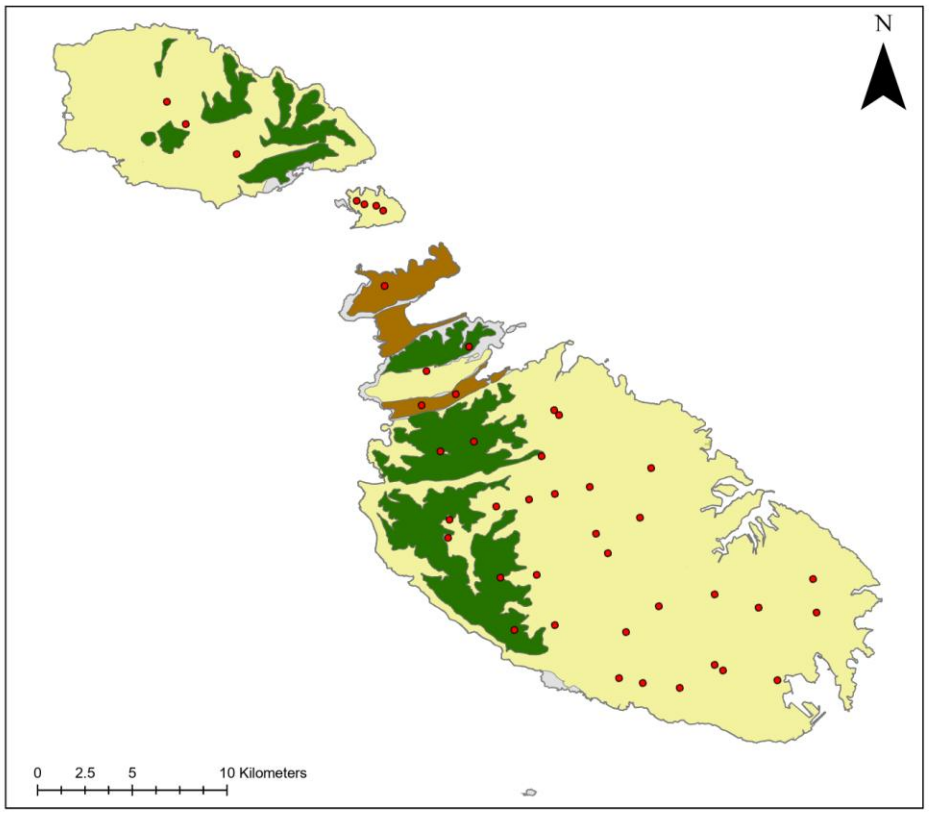

Figure 19 *Map of the existing groundwater level monitoring network across the Maltese Islands.*

5.2.1.2. Groundwater flow monitoring network

Groundwater flow monitoring networks have been recently installed in the perched groundwater bodies where due to the hydrogeological properties of these systems, which present an extremely thin saturated zone and therefore low standing water levels, it is problematic to measure level by using traditional water level measurement equipment. The quantitative status of these perched aquifer systems is measured from groundwater flowing through springs at the base of the Upper Coralline Limestone at the interface with the underlaying low permeability Blue Clay formation. The spring channels drain large areas defined by the slope of the Blue Clay formation and hence are representative of a large area of the perched aquifer system.

A monitoring network of 12 groundwater flow monitoring stations (Figure 20) was commissioned by December 2023 which will extend the groundwater quantitative monitoring to a further 7 perched groundwater bodies (Table 34). The only perched groundwater body which will not feature a quantitative monitoring station is MT017 (Żebbuġ perched) given the limited availability and very low flow conditions of the available groundwater sources which can be utilised for quantitative monitoring. This new network will be operational during the implementation cycle of the 3rd RBMP and will allow for a more reliable quantitative status of these groundwater bodies.

In addition to the main groundwater level and flow monitoring networks, two additional networks have been developed in the main mean sea-level aquifer systems which enable:

- The profiling of salinity across the freshwater lens, hence enabling the assessment of any changes within the body of freshwater present in the Mean Sea Level aquifer systems.
- The monitoring of the freshwater-saltwater interface.

Table 34 *Groundwater Flow Monitoring Network that will be implemented in the 3rd Cycle.*

GROUNDWATER BODY CODE	GROUNDWATER BODY NAME	NUMBER OF INSTALLED GROUNDWATER FLOW MONITORING STATIONS
MT002	Rabat-Dingli Perched	5
MT003	Mġarr-Wardija Perched	1
MT008	Mellieħa Perched	1
MT014	Għajnsielem Perched	1
MT016	Xagħra Perched	1
MT015	Nadur Perched	1
MT018	Victoria – Kerċem Perched	2

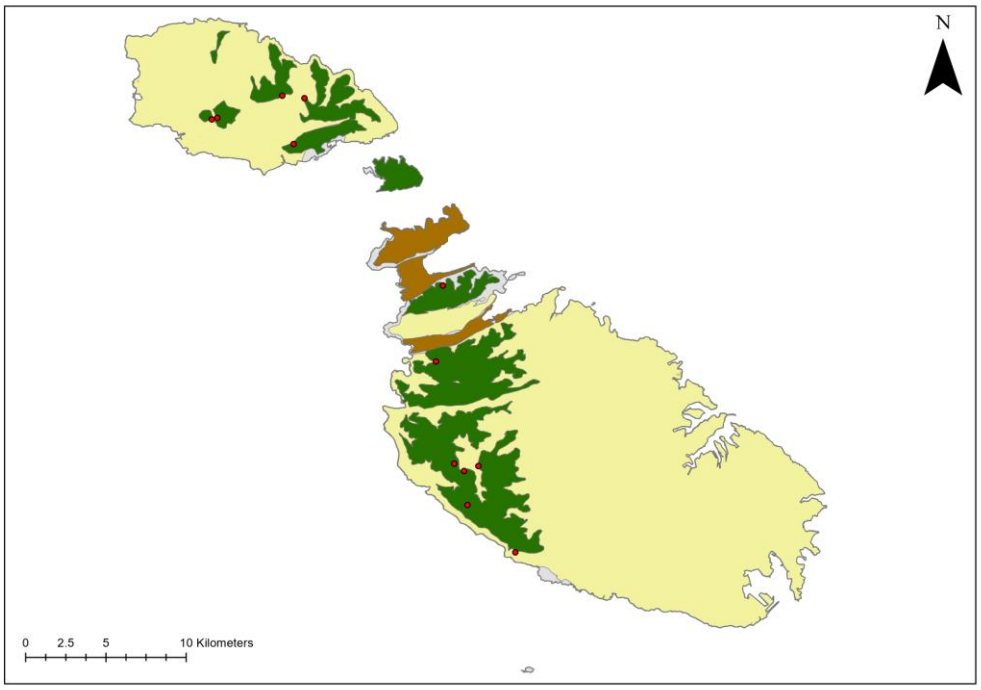

Figure 20 *Location of the groundwater flow monitoring network in the perched aquifer systems.*

5.2.1.3. Groundwater deep wells network

A network of 22 deep wells which traverse the whole freshwater zone of the Malta and Gozo MSLA and reach the underlying saline groundwater body has been developed with the aim of enabling the undertaking of electrical conductivity profiles of the Mean Sea Level groundwater bodies. This network, as shown in Figure 21, will enable the monitoring of the thickness of the freshwater zone and any variations in the transition zone, which is the zone of brackish water which separates the fresh groundwater from the underlying body of saline groundwater.

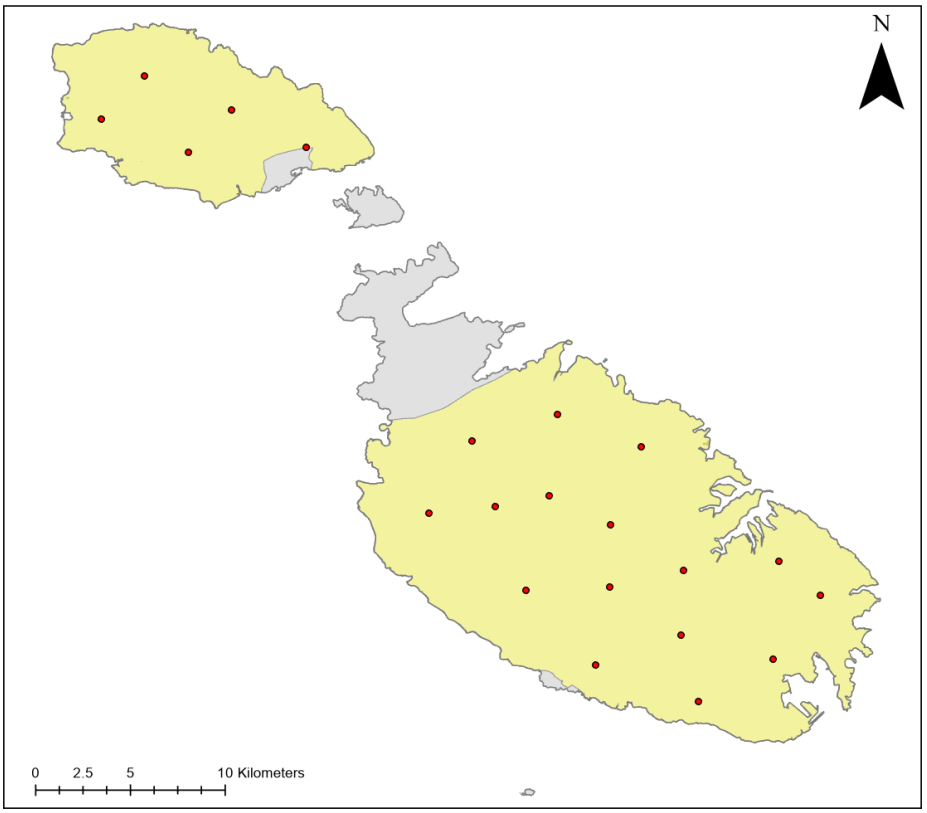

Figure 21 *Network of deep monitoring wells in the Mean Sea Level aquifer systems.*

5.2.1.4. Groundwater freshwater-saltwater interface network

Additionally, a separate network of 20 stations focusing on the development of the freshwater-saltwater interface has been developed as outlined in Figure 22. The thickness of the interface is an important component for the groundwater quantitative status assessment in coastal and island aquifer systems, since changes in the piezometric (water table) levels are expected to give rise to changes in the interface augmented by a factor of 40, as outlined in the Ghyben-Herzberg principle. This network will therefore complement the existing and newly commissioned water level monitoring networks and enable a more comprehensive and reliable assessment of groundwater quantitative status.

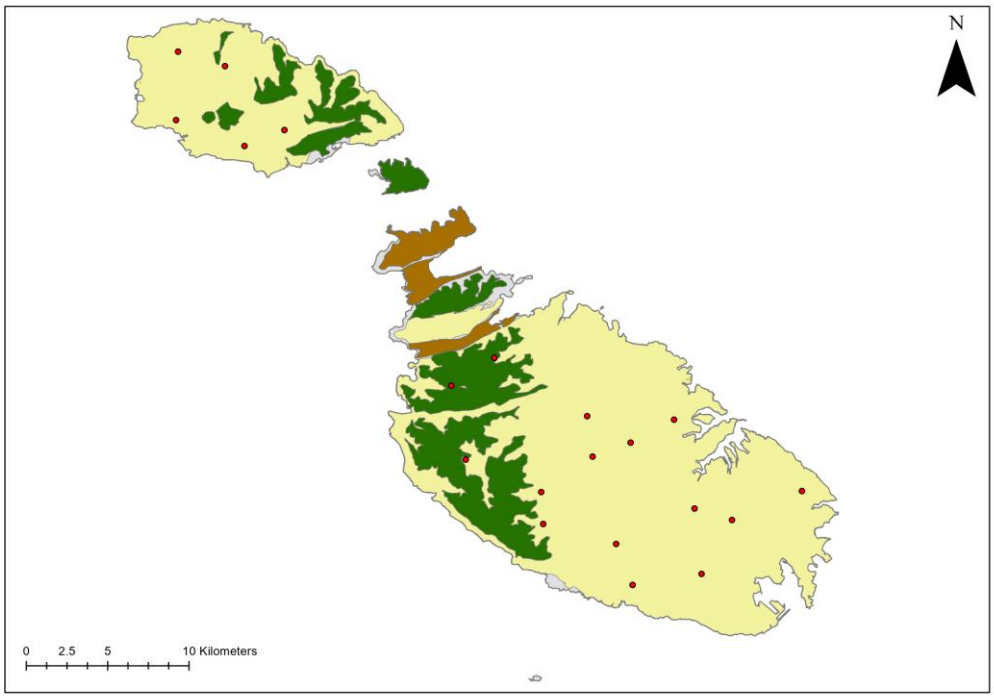

Figure 22 *Map showing the layout of the freshwater-saltwater interface monitoring network in the Mean Sea Level aquifer systems.*

5.2.2. Groundwater Qualitative Status Monitoring Network

The qualitative groundwater monitoring strategy adopted in Malta envisages a six-year cycle starting with a 'Surveillance' monitoring exercise which is then complemented by five years of 'Operational' monitoring. Qualitative status is assessed against a set of Quality Standards and Threshold Values established under the EU Groundwater Directive. The list of Quality Standards and Threshold Values effective under the 2nd RBMP is confirmed for the purpose of the 3rd RBMP.

Surveillance monitoring is required to support the validation of the risk assessment undertaken during the review of the WFD Article 5 Characterisation. This monitoring exercise, which is undertaken once every six years, entails a full qualitative analysis of the status of the groundwater body. Moreover, this monitoring programme also serves the purpose of identifying those parameters for which more frequent (operational) monitoring is required to enable the assessment for long term trends in natural conditions and in pollutant concentrations resulting from human activity.

Operational monitoring is carried out during the five-year periods between Surveillance Monitoring and can be considered as a specific monitoring exercise focused on assessing the specific identified risks to the achievement of the Directive's objectives. This monitoring exercise is carried out twice every calendar year, roughly every six months, generally in spring and autumn, and is specifically modelled for each groundwater body based on the analysis of the results of the Surveillance Monitoring programme and the assessment of pressures and impacts on the groundwater resources, undertaken in the lead-up to the formulation of the respective RBMP.

All fifteen (15) groundwater bodies in the Malta River Basin, are monitored as part of the Surveillance and Operational Monitoring programmes. There is a minimum of one monitoring station for each groundwater body, with an overall average monitoring density of one station, roughly every 8 square kilometres. For the smaller groundwater bodies, the monitoring density is even higher. There is a total of 30 monitoring stations in the four biggest groundwater bodies: Malta Mean Sea Level, Rabat-Dingli Perched, Mġarr-Wardija Perched and Gozo Mean Sea Level, which together cover 90% of the land area of the Malta River Basin District. This monitoring network, shown on a map in Figure 23 as already in place during the implementation process of the 2nd RBMP, and will also be utilised over the implementation period of the 3rd RBMP. Table 35 summarises the number of groundwater quality monitoring stations in place, for each groundwater body grouping. The list of parameters assessed in the biannual operational monitoring sessions reflects the requirements of the EU Groundwater Directive Annex I and II, as well as the parameters indicated in the voluntary watch list.

Table 35 *Number of groundwater quality monitoring stations per groundwater body grouping (applicable for both the 2nd and 3rd RBMP cycles).*

GROUP CODE	NAME OF COMPONENT BODIES OF GROUNDWATER	NUMBER OF OPERATIONAL/SURVEILLANCE GROUNDWATER QUALITY MONITORING STATIONS
MTO_G01	Malta Mean Sea Level	14
MTO_G02	Rabat-Dingli Perched	5
MTO_G03	Mġarr-Wardija Perched, Miżieb Mean Sea Level, Għajnsielem Perched	5
MTO_G04	Pwales Coastal, Mellieħa Coastal, Marfa Coastal	4
MTO_G05	Mellieħa Perched, Nadur Perched, Xagħra Perched	3
MTO_G06	Żebbuġ Perched, Victoria-Kerċem Perched	3
MTO_G07	Comino Mean Sea Level, Gozo Mean Sea Level	8

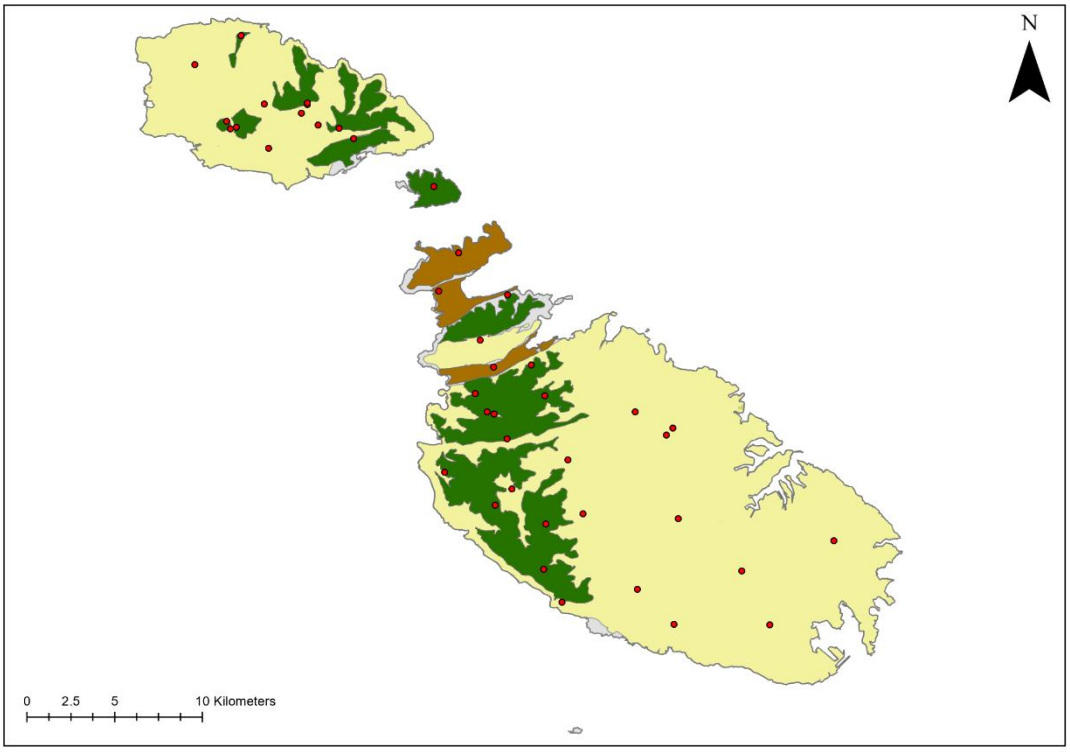

Figure 23 *Operational and Surveillance Monitoring network for Groundwater Qualitative Status.*

5.2.3. Groundwater protected area monitoring network

Monitoring of groundwater quality in Drinking Water Protected Areas will continue through the monitoring activities undertaken by the Water Services Corporation on all boreholes and pumping stations being utilised for the abstraction of groundwater intended for human consumption. These stations are currently monitored on a monthly basis for a basic list of parameters including electrical conductivity, chloride, and nitrate content.

5.2.4. Groundwater targeted monitoring networks

Targeted monitoring networks focus on potential contaminated sites and are an obligation under the environmental permit issued by the ERA for the operation of these sites. Monitoring is undertaken by the operators. A targeted monitoring network is in fact in operation in Malta around the Magħtab Landfill Area and is operated by Wasteserv. Monitoring is undertaken for a suite of parameters which was agreed with the ERA.

6. Assessment of Status

6.1. Assessment of Status: Surface Waters

6.1.1. Ecological Classification: an overview

Determination of ecological status or potential of surface water bodies is based on biological, hydromorphological and physico-chemical quality elements measured through the implementation of monitoring processes within each surface water body.

The ecological character of surface waters varies according to their different physical regimes. The quality elements used in the ecological classification of the water bodies, and the conditions required for these elements in each status class, thus depend on the water body categories and types as determined in the characterisation process of this River Basin Management Plan (RBMP). The quality elements for the classification of HMWB are those relevant to whichever of the four surface water categories the heavily modified or artificial water body most closely resembles.

When determining ecological status of WFD surface water bodies, the values of the Biological Quality Elements as defined for each water category, and as determined on the basis of the methodologies employed as part of monitoring processes, are expressed as **Ecological Quality Ratios** (EQRs). EQRs are then translated into one of the five classes of ecological status: '**high**', '**good**', '**moderate**', '**poor**' and '**bad**' status. Supporting elements, hydromorphological elements and general physico-chemical elements, are considered as part of the assessment process depending on the ecological classes assigned based on the values of the BQEs.

For water bodies designated as heavily modified, assessment of status is closely linked to the definition of Maximum Ecological Potential for the HMWB as outlined in the characterisation process of this Plan. Overall status for each WFD surface water body is based on the lower values of the relevant quality elements.

6.1.2. Limitations in the ecological classification of surface waters

The 3rd RBMP presents Malta's first comprehensive determination of the ecological status or potential of inland surface and transitional water bodies on the basis of the implemented monitoring procedures. The methodologies employed to enable this reflect primarily those adopted by other EU Member States, which are not necessarily directly applicable to Malta's scenario or water body types. Therefore, the results and the status classification should be considered to be preliminary for such waters. In cases where a reliable assessment of the BQEs could not be ensured as a result of the available monitoring data, consideration is given to the exclusion of such BQE from the status assessment process.

As outlined in the characterisation process, the establishment of reference conditions for Malta's inland surface waters was not possible due to the presence of pressures/disturbances throughout the

water bodies or due to limitations in available datasets. In order to enable the assessment of status, reference conditions established by other Member States, either for the same type of water body or for a comparable type, were used. Where type-specific conditions could not be determined due to the high natural variability associated with the BQE, such BQE was excluded from the status assessment process[85].

6.1.3. Chemical Status

Assessment of chemical status is based on the comparison of measured levels of priority substances and priority hazardous substances in the water column with the Environmental Quality Standards (EQS) stipulated in the Directive on environmental quality standards (2013/39/EU). The one-out-all-out principle is applied, with status reported as either 'Good' or 'Failing to achieve good status'. Exceedances due to substances which are considered to behave as ubiquitous Persistent Bioaccumulative and Toxic (uPBT) substances in accordance with Directive 2013/39/EU are presented separately.

While all priority substances were monitored through monthly sampling in inland surface and transitional waters, a shorter list of the most relevant priority substances was monitored in coastal waters[86]. In inland surface waters, more specifically watercourses, collection of water samples for analysis was not always possible and was dependent on the presence of water within such highly dynamic water bodies. In this regard, annual averages measured to enable comparison with Annual Average-Environmental Quality Standards (AA-EQS) were not always based on twelve water samples collected throughout one year of monitoring. In cases where only a limited number of samples was available, the results are associated with high uncertainty. In cases where AA-EQS are not set through Directive 2013/39/EU, annual averages of measured concentrations are compared to Maximum Allowable Concentration - Environmental Quality Standards (MAC-EQS), with additional notes on any exceedances from individual samples provided as necessary.

In addition to monitoring of contaminants in water, selected substances were analysed in sediment (inland and coastal) and in biota (coastal only), in accordance with the provisions of Directive 2013/39/EU. Monitoring of contaminants in sediment will enable the long-term trend analysis of the selected priority substances and will be discussed in upcoming WFD implementation cycles.

6.1.4. Overall Ecological Classification and Chemical Status

The ecological classifications and chemical status for all surface water body types are indicated in Table 36. A brief description of the assessment process for each water body type follows. The

[85] WFD Annex II Para 1.3 (vi): *Where it is not possible to establish reliable type-specific reference conditions for a quality element in a surface water body type due to high degrees of natural variability in that element, not just as a result of seasonal variations, then that element may be excluded from the assessment of ecological status for that surface water type. In such circumstances Member States shall state the reasons for this exclusion in the river basin management plan.*

[86] Annex 2 to this document refers.

assessment of status is described in further detail in the Technical Document "Surface Water Bodies: Status Assessment".

In order to provide an indication of confidence in the status classification, the raw monitoring data was accompanied by statistical estimates of errors including standard deviation, confidence limits and relative standard deviation. Such estimates were extrapolated to interpret the uncertainty in EQS and chemical status, and hence in the classification of water bodies. When interpreting the statistical estimates of errors on the basis of the raw data, consideration is also given to the nature of the datasets being used, including the frequency of data collected and the taxonomic resolution (where relevant).

Table 36 *Overall assessment of surface water bodies.*

WATER BODY	ECOLOGICAL STATUS/POTENTIAL						CHEMICAL STATUS	UNCERTAINTY
	PHYTOPLANKTON	MACROPHYTES/ ANGIOSPERMS	PHYTOBENTHOS/ MACROALGAE	MACRO INVERTEBRATES	FISH	OVERALL STATUS		
WIED TAL-BAĦRIJA MTWC01	N/A	Not assessed	Bad	Poor	N/A	Bad Ecological Status	Failing to achieve good status	Very High
WIED IL-LUQ MTWC02	N/A	Not assessed	Poor	Moderate	N/A	Poor Ecological Potential	Failing to achieve good status	Very High
WIED TAL-LUNZJATA MTWC03	N/A	Not assessed	Poor	Moderate	N/A	Poor Ecological Potential	Failing to achieve good status	Very High
IL-QATTARA MTSW01	Moderate	Not assessed	Bad	Good	N/A	Bad Ecological Status	Failing to achieve good status	Very High
L-GĦADIRA TA'SARRAFLU MTSW02	Moderate	Not assessed	Bad	Moderate	N/A	Bad Ecological Status	Failing to achieve good status	Very High
IS-SALINI MTTW01	Not assessed	Good	N/A[87]	Good	Not assessed	Good Ecological Potential	Failing to achieve good status	Very High
IL-MAGĦLUQ TA' MARSASCALA MTTW02	Not assessed	Bad	N/A[88]	High	Not assessed	Bad Ecological potential	Failing to achieve good status	Very High
IL-BALLUT TA' MARSAXLOKK MTTW03	Not assessed	Bad	N/A[89]	Good	N/A	Bad ecological potential	Failing to achieve	Very High

87 Macroalgae for transitional waters included with the macrophyte Biological Quality Element.
88 Macroalgae for transitional waters included with the macrophyte Biological Quality Element.
89 Macroalgae for transitional waters included with the macrophyte Biological Quality Element.

WATER BODY	ECOLOGICAL STATUS/POTENTIAL						CHEMICAL STATUS	UNCERTAINTY
	PHYTOPLANKTON	MACROPHYTES/ ANGIOSPERMS	PHYTOBENTHOS/ MACROALGAE	MACRO INVERTEBRATES	FISH	OVERALL STATUS		
							good status	
Is-Simar MTTW04	Not assessed	Good	N/A[90]	Good	Not assessed	Good Ecological Potential	Failing to achieve good status	Very High
L-Għadira MTTW05	Not assessed	Good	N/A[91]	Good	Not assessed	Good Ecological Potential	Failing to achieve good status	Very High
MTC101	High	High	High	N/A	N/A	High Ecological Status	Good	High
MTC102	High	Good	High	Good	N/A	Good Ecological Status	Good	High
MTC103	High	High	High	High	N/A	High Ecological Status	Good	High
MTC104	High	Good	High	High	N/A	Good Ecological Status	Good	High
MTC105	Moderate	N/A	High	High	N/A	Moderate Ecological Status	Good	High
MTC106	High	Good	High	High	N/A	Good Ecological Status	Good	High
MTC107	Good	Good	Good	High	N/A	Good Ecological Status	Good	High
MTC108	High	High	High	Good	N/A	Good Ecological Status	Good	High
MTC109	Good	High	High	Good	N/A	Good Ecological Status	Good	High

6.1.4.1. Watercourses

As outlined in the characterisation process, Malta's three WFD watercourses (Wied tal-Baħrija, Wied il-Luq and Wied tal-Lunzjata) are considered to belong to the common type identified at Mediterranean level as 'Small, lowland, temporary rivers' – R-M5. Wied il-Luq and Wied tal-Lunzjata

[90] Macroalgae for transitional waters included with the macrophyte Biological Quality Element.
[91] Macroalgae for transitional waters included with the macrophyte Biological Quality Element.

are designated Heavily Modified Water Bodies with the closest comparable water body type being R-M5.

The BQEs and the assessment methods used for the ecological classification of these water bodies are listed in Table 37. Assessment relies on the ecological status boundaries as intercalibrated for the Mediterranean eco-region, although the applicability of such boundaries to Maltese watercourses still needs to be evaluated.

Table 37 *Overview of methodologies employed to determine status of Biological Quality Elements in watercourses.*

BIOLOGICAL QUALITY ELEMENTS	RELEVANT PRESSURES	METHODOLOGY EMPLOYED/ PARAMETERS
Composition and abundance of aquatic flora	Nutrient/organic matter enrichment	*Macrophytes*: Taxonomic composition and relative abundance of vascular plants, bryophytes and macroalgae
		Phytobenthos: Specific Pollution-sensitivity Index (IPS)
Composition and abundance of benthic invertebrate fauna	Nutrient/organic matter enrichment; Hydromorphological elements	STAR – ICMI
Composition, abundance, and age structure of fish fauna	Not applicable (no fish fauna present in Malta's watercourses)	

Intercalibration of assessment methodologies for macrophytes was not achieved for river type R-M5 and assessment of this BQE for Malta's watercourses was not possible as a result of the absence of reference conditions. Assessment of ecological status was thus primarily based on phytobenthos and benthic invertebrates. National datasets for these two Biological Quality Elements are not considered to represent undisturbed or reference conditions and reference values defined by other Mediterranean Member States for temporary rivers (R-M5) are used[92] to enable ecological classification of Malta's watercourses.

While Malta has not as yet established standards against which levels of general physico-chemical parameters can be assessed, mean concentrations of N-NO_3 show significant deviations from the benchmark conditions (>20 mg/l) and this is consistent with the poor/bad ecological status/potential. Same applies to N-NH4 at Wied tal-Lunzjata (MTWC03).

All five RBSP which were assessed in relation to the set Environmental Quality Standards[93] did not exceed such standards in Malta's WFD watercourses. The priority substances which exceeded EQS on the basis of water samples collected monthly[94] from January 2022 – January 2023, are listed in Table 38. On the basis of the above, the overall ecological status/potential and chemical status of Malta's watercourses are shown in Figure 24 and Figure 25.

92 https://www.gazzettaufficiale.it/eli/id/2011/02/07/011G0035/sg

93 SEPA (2020). Supporting Guidance (WAT-SG-53): Environmental Quality Standards and Standards for Discharges to Surface Waters. https://www.sepa.org.uk/media/152957/wat-sg-53-environmental-quality-standards-for-discharges-to-surface-waters.pdf.

94 Samples collected monthly where possible, due to the intermittent nature of the watercourses – in cases where sampling was not possible, the annual average is calculated on the basis of the available samples.

Table 38 *Annual averages (in µg/l) of Priority Substances in the water column which exceeded the Environmental Quality Standards as set in Directive 2013/39/EU in Malta's watercourses.*

PRIORITY SUBSTANCE	WIED TAL-BAĦRIJA MTWC01	WIED IL-LUQ MTWC02	WIED TAL-LUNZJATA MTWC03
NON-UBIQUITOUS PBT SUBTANCES			
(12) Di(2- ethylhexyl)-phthalate (DEHP) – AA-EQS: 1.3 µg/l	**34.88** ***(high uncertainty)***	<EQS *(high uncertainty)*[95]	**5.84** ***(high uncertainty)***
(20) Lead and its compounds – AA-EQS: 1.2 µg/l	**2.61** ***(high uncertainty)***	**4.50** ***(high uncertainty)***[96]	**1.48** ***(high uncertainty)***
(23) Nickel and its compounds AA-EQS: 4 µg/l	**5.53** ***(high uncertainty)***	**20.88** ***(high uncertainty)***[97]	**5.89** ***(high uncertainty)***
SUBSTANCES BEHAVING AS UBIQUITOUS PBT			
(5) Brominated diphenylethers MAC-EQS: 0.14 µg/l	**6.13** ***(high uncertainty)***	<EQS *(high uncertainty)*[98]	<EQS *(high uncertainty)*

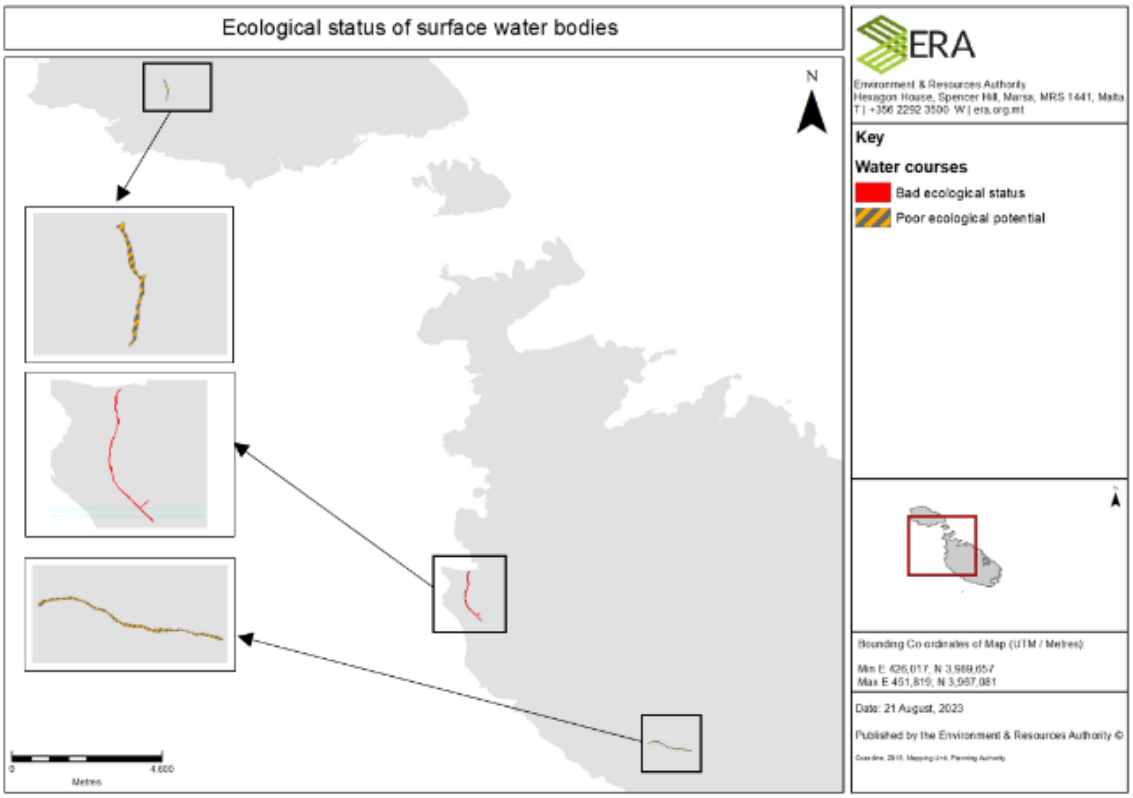

Figure 24 *Overall ecological status of Malta's watercourses (Insets not to scale).*

95 Based on few samples.
96 Based on few samples.
97 Based on few samples.
98 Based on few samples.

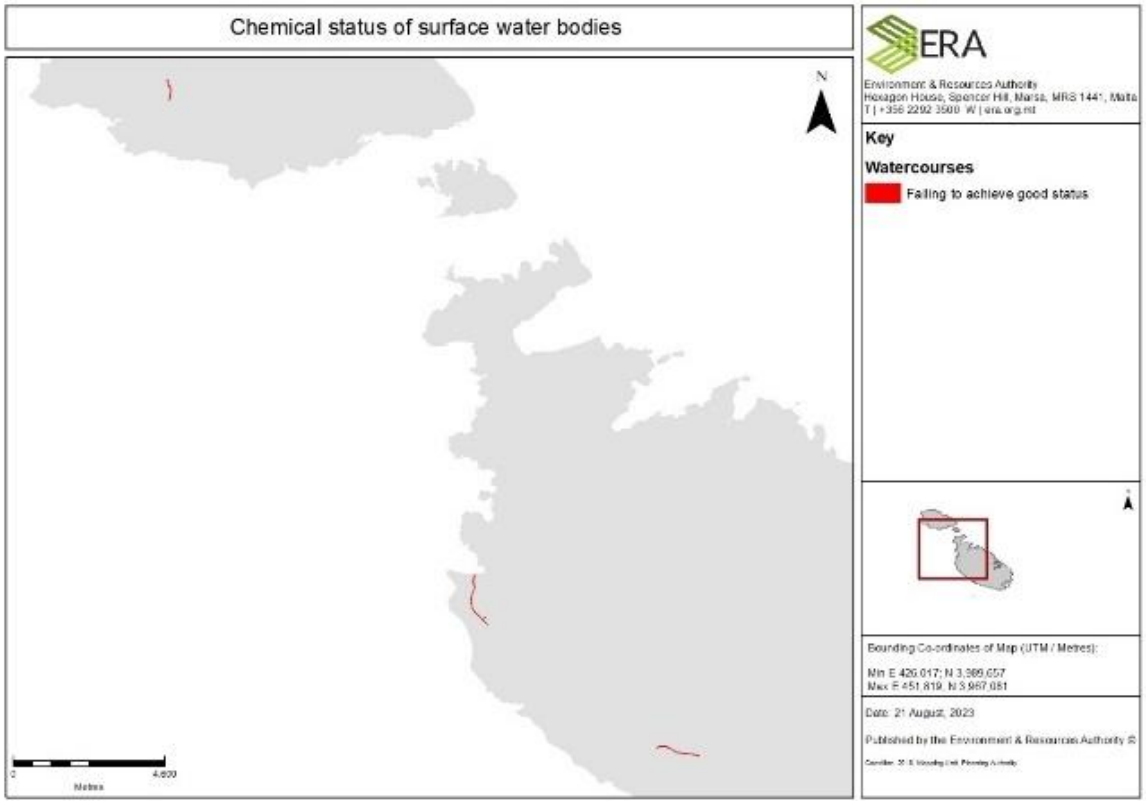

Figure 25 *Overall chemical status of Malta's watercourses.*

6.1.4.2. Pools

Malta's freshwater pools, Il-Qattara and L-Għadira ta' Sarraflu, do not fit common types of 'lakes' as identified in the Mediterranean eco-region, and this has presented challenges in the ecological classification of such water bodies. Monitoring and assessment were undertaken for the BQE on the basis of the methodologies as indicated in Table 39.

Table 39 *Overview of methodologies employed to determine status of Biological Quality Elements in pools.*

BIOLOGICAL QUALITY ELEMENTS	RELEVANT PRESSURES	METHODOLOGY EMPLOYED
Composition, abundance, and biomass of phytoplankton	Nutrient/organic matter enrichment	"New Mediterranean Assessment System for Reservoirs Phytoplankton" (NMASRP)
Composition and abundance of other aquatic flora	Nutrient/organic matter enrichment; Hydromorphological elements	*Macrophytes*: Aquatic flora Spanish assessment method
	Nutrient/organic matter enrichment	*Phytobenthos*: Specific Pollution-sensitivity Index (IPS)
Composition and abundance of benthic invertebrate fauna	Nutrient/organic matter enrichment	QAELS index
Composition, abundance, and age structure of fish fauna	Not applicable (no indigenous fish fauna present in Malta's pools)	

Ecological classification was possible for phytoplankton, phytobenthos and benthic invertebrates:

- For phytoplankton, status boundaries used by other Mediterranean countries for modified lakes (L-M8) were used. This resulted in very high uncertainties, noting that Malta's natural water bodies are compared with status boundaries for modified water bodies. Therefore, the outcome of this status assessment is indicative.
- Phytobenthos were assessed in relation to the reference conditions and status boundaries of moderate/high alkalinity lakes for which a cross-geographical intercalibration process was undertaken. The results however should be interpreted with caution primarily because of the limited datasets available over two monitoring periods and the questionable applicability of the status boundaries established within a different eco-region, which raises doubts on the comparability of the lakes in question.
- For benthic invertebrates, it was not necessary to calculate the ratio between the index values and those of reference conditions to determine ecological classifications. Such index is thus considered appropriate for Malta's freshwater pools for which reference conditions are still unknown. Limitations are associated with the low number of macroinvertebrate species associated with Malta's freshwater pools and the use of quality coefficients determined by Boix *et al. (*2005)[99] for the Northeastern Iberian Peninsula.

No standard or ranges of values have been established for general physico-chemical parameters in pools which would be consistent with good status. However, the mean values of these parameters in the freshwater pools are not indicative of poor water quality or high nutrient conditions. This data scenario does not seem to be consistent with the ecological classification of the BQE, especially since most of the BQEs respond to nutrient levels. This matter will be investigated further in the upcoming WFD implementation cycle.

All five RBSP that were assessed in relation to the set EQS[100] did not exceed such EQSs in either of the pools. The priority substances which exceeded Environmental Quality Standards in Malta's WFD freshwater pools on the basis of water samples collected monthly from January 2022 – January 2023, are listed in Table 40.

On the basis of the above, the overall ecological status and chemical status of Malta's pools are shown in Figure 26 and Figure 27.

[99] Boix, D., Gascón, S., Sala, J., Martinoy, M., Gifre, J., & Quintana, X. D. (2005). A new index of Water Quality Assessment in Mediterranean wetlands based on crustacean and insect assemblages: The case of catalunya (ne iberian peninsula). *Aquatic Conservation: Marine and Freshwater Ecosystems*, *15*(6), 635–651. https://doi.org/10.1002/aqc.750.

[100] SEPA (2020). Supporting Guidance (WAT-SG-53): Environmental Quality Standards and Standards for Discharges to Surface Waters. https://www.sepa.org.uk/media/152957/wat-sg-53-environmental-quality-standards-for-discharges-to-surface-waters.pdf.

Table 40 *Annual averages (in µg/l) of Priority Substances in the water column which exceeded the Environmental Quality Standards as set in Directive 2013/39/EU in Malta's freshwater pools.*

PRIORITY SUBSTANCE	IL-QATTARA MTSW01	L-GĦADIRA TA'SARRAFLU MTSW02
NON-UBIQUITOUS PBT SUBTANCES		
(12) Di(2- ethylhexyl)- phthalate (DEHP) – AA-EQS: 1.3 µg/l	**4.58** ***(high uncertainty)***	**5.78** ***(high uncertainty)***
(20) Lead and its compounds – AA-EQS: 1.2 µg/l	**3.44** ***(high uncertainty)***	**<EQS** ***(high uncertainty)***
(23) Nickel and its compounds AA-EQS: 4 µg/l	**6.69** ***(high uncertainty)***	**5.46** ***(high uncertainty)***
SUBSTANCES BEHAVING AS UBIQUITOUS PBT		
(5) Brominated diphenylethers MAC-EQS: 0.14 µg/l	<EQS *(low uncertainty)*	**4.84** ***(high uncertainty)***

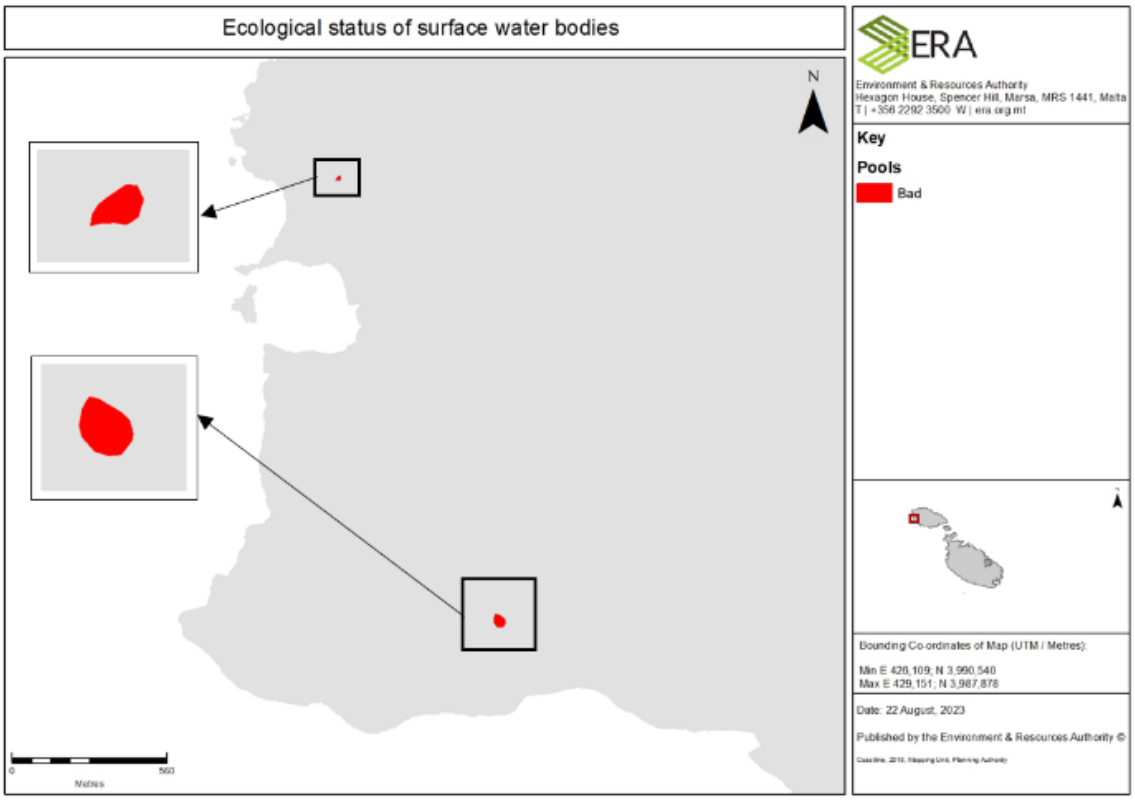

Figure 26 *Overall ecological status of Malta's freshwater pools (Insets not to scale).*

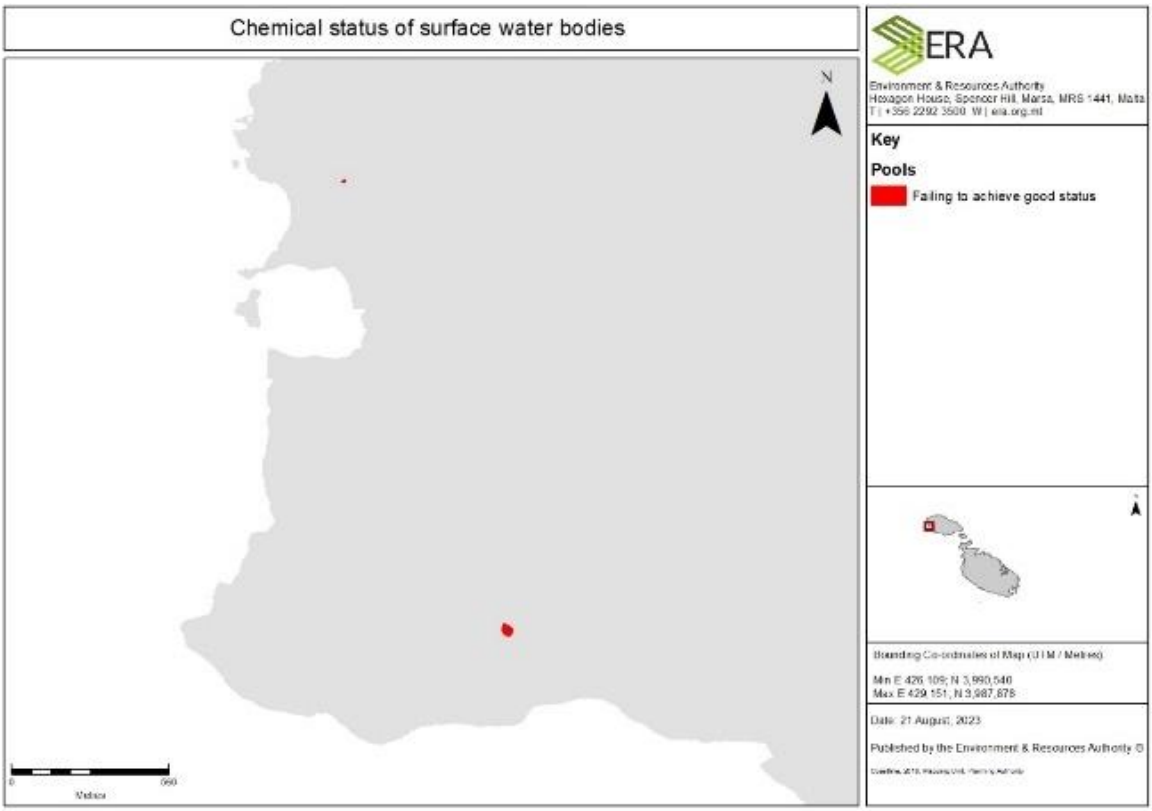

Figure 27 *Overall chemical status of Malta's freshwater pools.*

6.1.4.3. Transitional Waters

All transitional waters in Malta, Is-Salini, Il-Magħluq ta' Marsascala, Il-Ballut ta' Marsaxlokk, Is-Simar and L-Għadira) are Heavily Modified Water Bodies with status assessment resulting in the determination of their ecological potential. The BQEs and associated methodologies used for such purpose are included in Table 41.

Ecological classification is based on macrophytes and benthic invertebrates. Phytoplankton and fish fauna were excluded due to inadequate data collection processes and the variability in fish populations, respectively. The closest comparable water bodies used for the purpose of assessing ecological potential in transitional waters were "Coastal Lagoons - Polyhaline Restricted" and "Coastal Lagoons - Polyhaline Chocked".

The assessment of both macrophytes and benthic invertebrates in three of the transitional water bodies resulted in good/high ecological status, which is not expected for heavily modified water bodies. On the other hand, the limitations in the application of the methodologies for Malta's transitional water bodies should be acknowledged and this will be re-evaluated through the upcoming monitoring cycle. For example, with respect to benthic invertebrates, a very low number of species were sampled, rendering the calculation of the index much less robust.

Table 41 *Overview of methodologies employed to determine status of Biological Quality Elements in transitional water bodies.*

BIOLOGICAL QUALITY ELEMENTS	RELEVANT PRESSURES	METHODOLOGY EMPLOYED/ PARAMETERS
Composition, abundance, and biomass of phytoplankton	Nutrient/organic matter enrichment	Chlorophyll-a
Composition and abundance of other aquatic flora	Nutrient/organic matter enrichment; Hydromorphological elements	Macrophyte Quality Index (R-MAQI)
Composition and abundance of benthic invertebrate fauna	Nutrient/organic matter enrichment	Multivariate AZTI's Marine Biotic Index (M-AMBI)
Composition and abundance of fish fauna	Hydromorphological elements	Catch per Unit Effort; population size; Individual length; indicative reproductive rate

A qualitative overview of the values of physico-chemical parameters in the transitional water bodies is not indicative of poor water quality overall. On the other hand, three transitional water bodies (MTTW01, MTTW04 and MTTW05) show low levels of dissolved oxygen. This could be attributed to low water circulation in such water bodies and could thus affect those BQEs that respond to hydromorphological conditions. This requires further investigation as part of the third implementation cycle of the WFD.

RBSPs were monitored on a quarterly basis in the water column at one monitoring station per WFD transitional water body. Exceedances of the set EQS were reported for chromium and manganese in MTTW02, MTTW03, MTTW04 and MTTW05. Effects of such exceedances on the ecological potential of the transitional water bodies cannot be determined at this stage, also because none of the BQEs employed for the purpose of assessment of the status would specifically respond to toxic effects from chemicals. At this stage, such exceedances are noted for further investigation (also as part of the Programme of Measures) in the third WFD implementation cycle.

The priority substances which exceeded EQSs in Malta's WFD transitional waters on the basis of water samples collected monthly from January 2022 – January 2023[101], are listed in Table 42. On the basis of the above, the overall ecological potential and chemical status of Malta's transitional waters are shown in Figure 28 and Figure 29.

[101] MTTW03 (Ballut ta' Marsaxlokk) was dry from April 2022 – August 2023, therefore annual averages were calculated on the basis of seven monthly samples.

Table 42 *Annual averages (in µg/l) of Priority Substances in the water column which exceeded the Environmental Quality Standards as set in Directive 2013/39/EU in Malta's transitional water bodies.*

PRIORITY SUBSTANCE [102]	IS-SALINI MTTW01	IL-MAGĦLUQ TA' MARSASCALA MTTW02	IL-BALLUT TA' MARSAXLOKK[103] MTTW03	IS-SIMAR MTTW04	L-GĦADIRA MTTW05
NON-UBIQUITOUS PBT SUBTANCES					
(12) Di(2-ethylhexyl)-phthalate (DEHP) – AA-EQS: 1.3µg/l	**4.39** ***(high uncertainty)***	**3.47** ***(high uncertainty)***	**9.72** ***(high uncertainty)***	**24.82** ***(high uncertainty)***	**34.76** ***(high uncertainty)***
(15) Fluoranthene - AA-EQS: 0.0063µg/l	<EQS *(high uncertainty)*	<EQS *(high uncertainty)*	<EQS *(high uncertainty)*	**0.0242** ***(high uncertainty)***	<EQS *(high uncertainty)*
(20) Lead and its compounds – AA-EQS: 1.3µg/l	**3.98** ***(high uncertainty)***	<EQS *(high uncertainty)*	**17.52** ***(high uncertainty)***	**7.42** ***(high uncertainty)***	**3.10** ***(high uncertainty)***
(23) Nickel and its compounds - AA-EQS: 8.6µg/l	**10.13** ***(high uncertainty)***	<EQS *(high uncertainty)*	**16.17** ***(high uncertainty)***	<EQS *(high uncertainty)*	<EQS *(high uncertainty)*
SUBSTANCES BEHAVING AS UBIQUITOUS PBT					
(5) Brominated diphenylethers - MAC-EQS: 0.014 µg/l	<EQS *(low uncertainty)*	<EQS *(low uncertainty)*	**0.299**[104] ***(high uncertainty)***	**0.024**[105] ***(high uncertainty)***	**0.019**[106] ***(high uncertainty)***
(28) Benzo(a)pyrene AA-EQS: 0.00017 µg/l	<EQS *(low uncertainty)*	<EQS *(low uncertainty)*	**0.00208** ***(high uncertainty)***	<EQS *(low uncertainty)*	<EQS *(low uncertainty)*

[102] It should be noted that some parameters were analysed at a Limit of Quantification that is greater than 30% of the AA-EQS. Such parameters (e.g. Dicofol) are not being included in the assessment process.

[103] MTTW03 (Ballut ta' Marsaxlokk) was dry from April 2022 – August 2023, therefore annual averages were calculated on the basis of seven monthly samples.

[104] One sample throughout the whole monitoring year exceeded MAC-EQS.

[105] One sample throughout the whole monitoring year exceeded MAC-EQS.

[106] One sample throughout the whole monitoring year exceeded MAC-EQS.

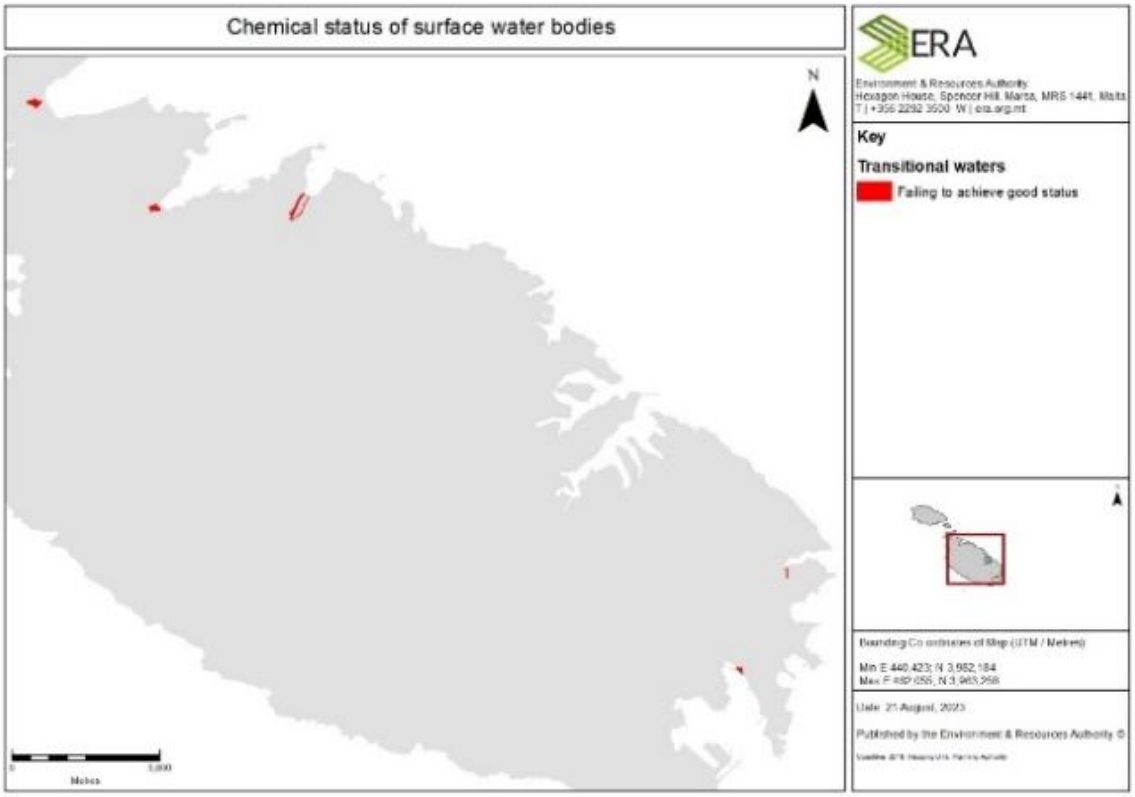

Figure 28 *Overall chemical status of Malta's transitional waters.*

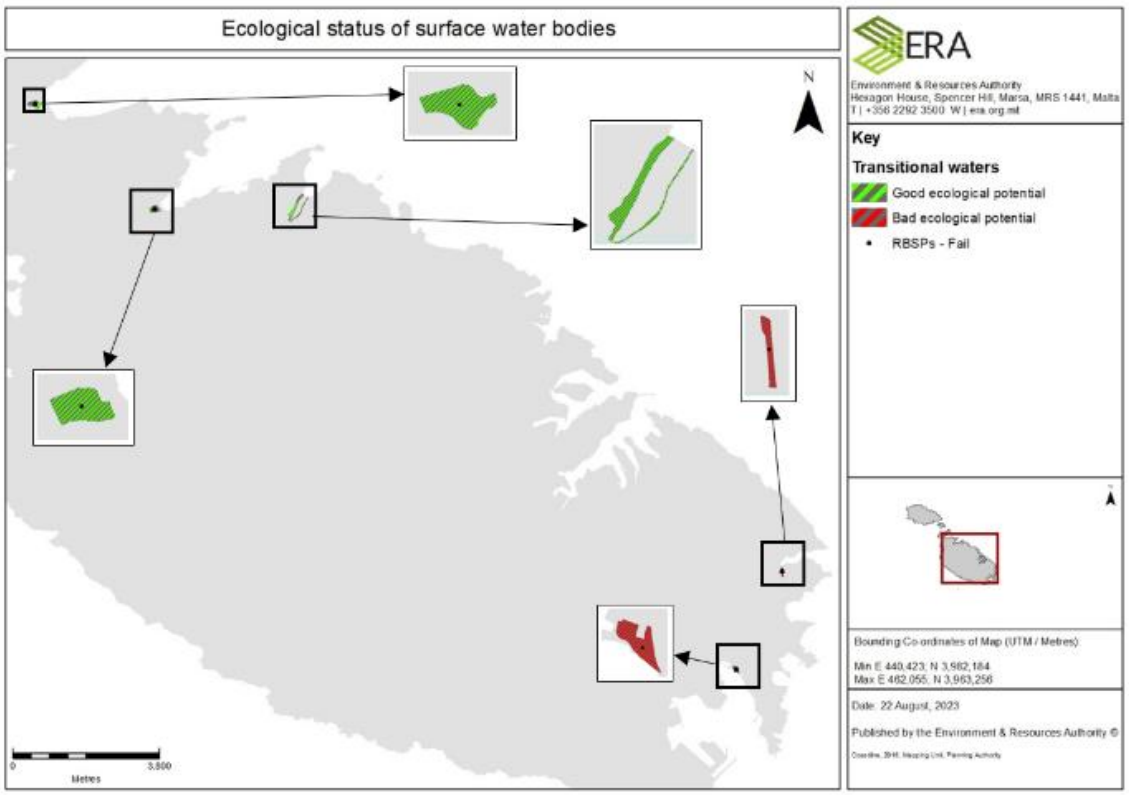

Figure 29 *Overall ecological status of Malta's transitional waters (Insets not to scale).*

6.1.4.4. Coastal (Marine) waters

The 3rd RBMP presents an update to the ecological classification of the nine coastal water bodies as reported by Malta's 2nd RBMP. All four BQEs were monitored in all nine coastal water bodies[107] during the period 2017-2019 as per Table 43. The ecological boundaries used for the ecological classification of all four BQEs have been successfully intercalibrated, with the intercalibration for phytoplankton and benthic invertebrates pending the publication of the Commission Decision on the WFD intercalibration process.

Table 43 *Overview of methodologies employed to determine status of Biological Quality Elements in coastal water bodies.*

BIOLOGICAL QUALITY ELEMENTS	RELEVANT PRESSURES	METHODOLOGY EMPLOYED/ PARAMETERS
Composition, abundance, and biomass of phytoplankton	Nutrient/organic matter enrichment; Hydromorphological elements	Chlorophyll-a concentration
Composition and abundance of other aquatic flora	Nutrient/organic matter enrichment; Hydromorphological elements	*Macroalgae:* cartography of littoral rocky-shore communities
		Angiosperms: Posidonia oceanica Rapid Easy Index (PREI)
Composition and abundance of benthic invertebrate fauna	Nutrient/organic matter enrichment	BENTIX

The two heavily modified coastal water bodies (MTC105 and MTC107) are assessed in terms of ecological status, pending assessment of ecological potential following re-delineation of these two water bodies. With respect to the natural coastal water bodies, there was a reduction in the ecological classification for three water bodies from 'High' status to 'Good Status' (MTC102, MTC104 and MTC109); an improvement in ecological status for MTC106 from 'Moderate' to 'Good' status; and maintenance of 'High' and 'Good' status for MTC101, MTC103 and MTC108. Further monitoring on the basis of the revised monitoring programme as part of the 3rd RBMP is considered necessary to confirm such trends in ecological classifications.

Coastal water bodies MTC101 and MTC103 have been assigned a 'high' ecological status. In terms of hydromorphological conditions, MTC101 is considered to be near natural and subject only to minor modifications, thus supporting the 'high' status of this water body. MTC103 on the other hand, is considered to be moderately modified – hence the high ecological classification of this water body may need to be verified through the upcoming monitoring procedures.

Physico-chemical parameters were assessed on the basis of the TRIX (Trophic) index. Such an index was based on monitoring data collected in each coastal water body in 2021. The results of the index are considered to be consistent with the 'High' and 'Good' status classification of the coastal water bodies, although some discrepancies are noted. For example, nutrient conditions for MTC103 are indicated as 'Good' on the basis of the TRIX index, while this water body is being assigned a 'High' ecological status on the basis of the BQEs. Noting also that this water body is subject to moderate

[107] With the exception of *Posidonia oceanica* in MTC105, where angiosperms are absent, and benthic invertebrates in MTC101 due to the lack of a suitable monitoring station.

hydromorphological modifications, the assigned ecological status needs to be subject to further evaluation.

All ten RBSPs as defined in Malta's 2nd RBMP were monitored and assessed in coastal water bodies. The annual averages were compared with Environmental Quality Standards for marine waters[108]. Chromium and zinc were the only RBSPs to exceed the AA-EQS in seven coastal water bodies. Effects of such exceedances on the ecological status/potential of the coastal water bodies cannot be determined at this stage, also because none of the Biological Quality Elements employed for the purpose of assessment of the status would specifically respond to toxic effects from chemicals. At this stage, such exceedances are noted for further investigation (also as part of the Programme of Measures) in the third WFD implementation cycle.

None of the priority substances as monitored in the water column of coastal water bodies (Annex 2) exceed the Annual-Average Environmental Quality Standards as set in Directive 2013/39/EU. This implies that all coastal water bodies have achieved Good Chemical Status. However, it should be noted that those chemicals which in accordance with Article 3 of Directive 2013/39/EU should be monitored and assessed in biota[109], are not being included in this assessment process. This is because a suitable indicator species for coastal waters still needs to be determined, together with its sampling strategy.

On the basis of the above, the overall ecological potential and chemical status of Malta's coastal waters are shown in Figure 30 and Figure 31.

[108] SEPA (2020). Supporting Guidance (WAT-SG-53): Environmental Quality Standards and Standards for Discharges to Surface Waters. https://www.sepa.org.uk/media/152957/wat-sg-53-environmental-quality-standards-for-discharges-to-surface-waters.pdf.

[109] For the substances numbered 5, 15, 16, 17, 21, 28, 34, 35, 37, 43 and 44 in Part A of Annex I, Member States shall apply the biota EQS laid down in Part A of Annex I.

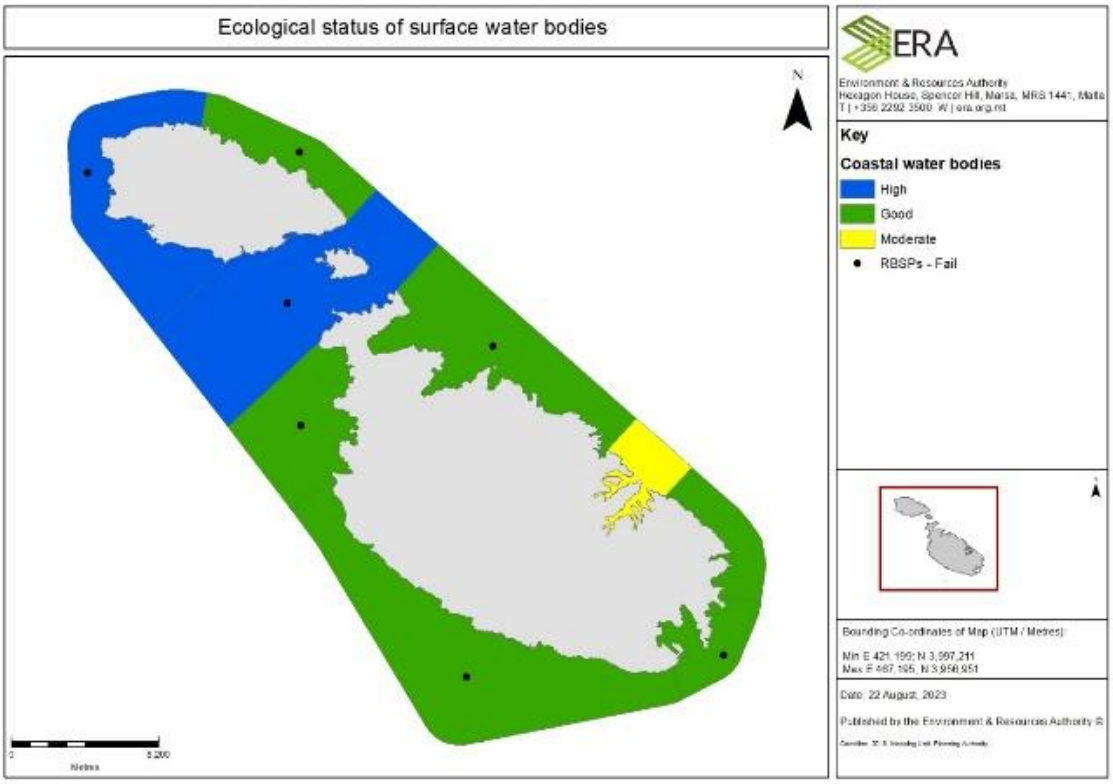

Figure 30 *Overall ecological status of Malta's coastal water bodies.*

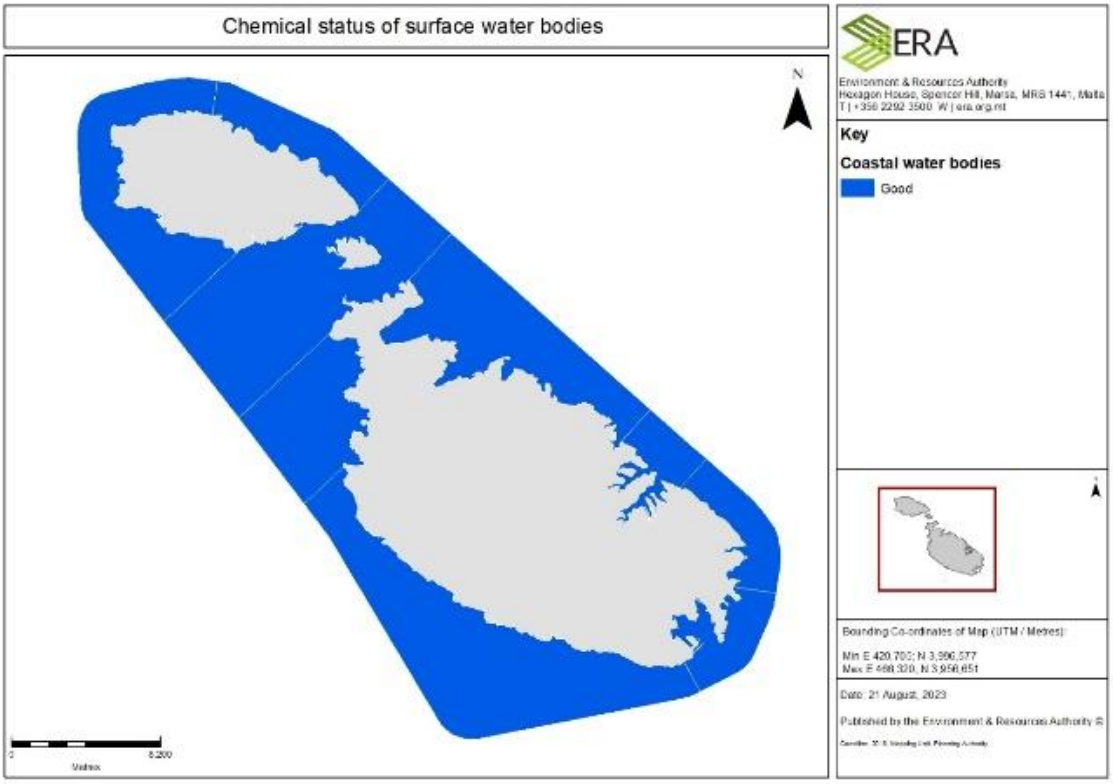

Figure 31 *Overall chemical status of Malta's coastal water bodies.*

6.2. Assessment of groundwater

The status of a groundwater body is defined according to two main considerations:

- The quantitative status, where good status entails that the mean annual abstraction is less than the mean annual recharge (replenishment).
- The chemical (Qualitative) Status, where good status entails that the quality of groundwater is lower than established quality standards and threshold values.

Assessments leading to the drafting of the 3rd RBMP are based on direct data collated through the groundwater (quantity and quality) monitoring networks managed by the Energy and Water Agency, confirm that:

- The two main groundwater bodies, namely the Malta and Gozo Mean Sea Level aquifer systems are in poor quantitative status (being over-abstracted).
- All groundwater bodies are classified in poor chemical status, with the main failing parameter being nitrate, primarily derived from agricultural sources, whilst 11 groundwater bodies also fail due to the presence of chlorides, one of the indicators of saline water intrusion.

6.2.1. Groundwater Quantitative Status Assessment

Groundwater quantitative status has been assessed at the level of each groundwater body, through the utilisation of a water balance model. Water balance models compare the mean annual inflow (natural and artificial recharge) with outflows (abstraction and natural discharge) (Table 44).

Table 44 *Water Balance assessments for each groundwater body in the Malta River Basin District.*

GWB CODE	GWB NAME	SIZE (km²)	INFLOW (m³)	OUTFLOW (m³)	BALANCE (m³)	STATUS
MT001	Malta Mean Sea Level	216.6	35,600,000	38,857,986	-3,257,986	Poor Status
MT002	Rabat-Dingli Perched	22.6	4,926,800	2,055,570	2,871,230	Good Status
MT003	Mġarr-Wardija Perched	13.7	2,986,600	1,173,336	1,813,264	Good Status
MT005	Pwales Coastal	2.8	324,800	143,190	181,610	Good Status
MT006	Miżieb Mean Sea Level	5.2	603,200	554,500	48,701	Good Status
MT008	Mellieħa Perched	4.5	981,000	17,390	963,610	Good Status
MT009	Mellieħa Coastal	2.9	336,400	161,690	174,710	Good Status
MT010	Marfa Coastal	5.5	638,000	276,020	361,980	Good Status
MT012	Comino Mean Sea Level	2.7	313,200	100,640	212,560	Good Status
MT013	Gozo Mean Sea Level	65.8	12,570,000	13,805,815	-1,235,815	Poor Status

MT014	Għajnsielem Perched	2.7	588,600	308,030	280,570	Good Status
MT015	Nadur Perched	5.0	1,090,000	562,560	527,440	Good Status
MT016	Xagħra Perched	3.0	654,000	403,840	250,160	Good Status
MT017	Żebbuġ Perched	0.4	87,200	66,080	21,120	Good Status
MT018	Victoria-Kercem Perched	1.5	327,000	125,330	201,670	Good Status

Water Balance assessments are complemented with groundwater level monitoring in the main Malta and Gozo mean sea-level groundwater bodies. Twenty-year trends were computed to assess the quantitative data. This assessment was done only for the monitoring points where a sufficiently long time series of data was available. Out of the 34 monitoring points in the Malta Mean Sea Level (Figure 32), 7 monitoring points showed a positive trend, 5 showed no trends and 19 monitoring points showed decreasing trends. For the Gozo Mean Sea Level, the three groundwater monitoring points available showed a positive trend, a negative trend, and no trend in the Gozo Mean Sea Level groundwater body. The monitoring point in the Miżieb Mean Sea Level groundwater body also showed a decreasing trend despite having a positive water balance.

For the quantitative status of this groundwater body, the water balance assessment was considered to be a more appropriate measure of the quantitative status of this groundwater body given that the existing groundwater level monitoring station is impacted by localised abstraction. Therefore, the results derived from the water level monitoring stations confirm the water balance status assessment for the Malta and Gozo Mean Sea Level groundwater bodies. Trend assessments in the other groundwater bodies, namely the MT005 Pwales Coastal, MT008 Mellieħa Perched, MT010 Marfa Coastal and MT012 Comino Mean Sea Level, were not performed as there was insufficient long term groundwater level data to allow such an assessment. Trend assessments for these groundwater bodies will be done in the next cycle. A map of the different groundwater bodies' quantitative status is shown in Figure 33. With the commissioning of the new monitoring networks, future quantitative assessments for all bodies of groundwater will be based on direct water level or water flow monitoring data, which will improve the confidence in these assessments.

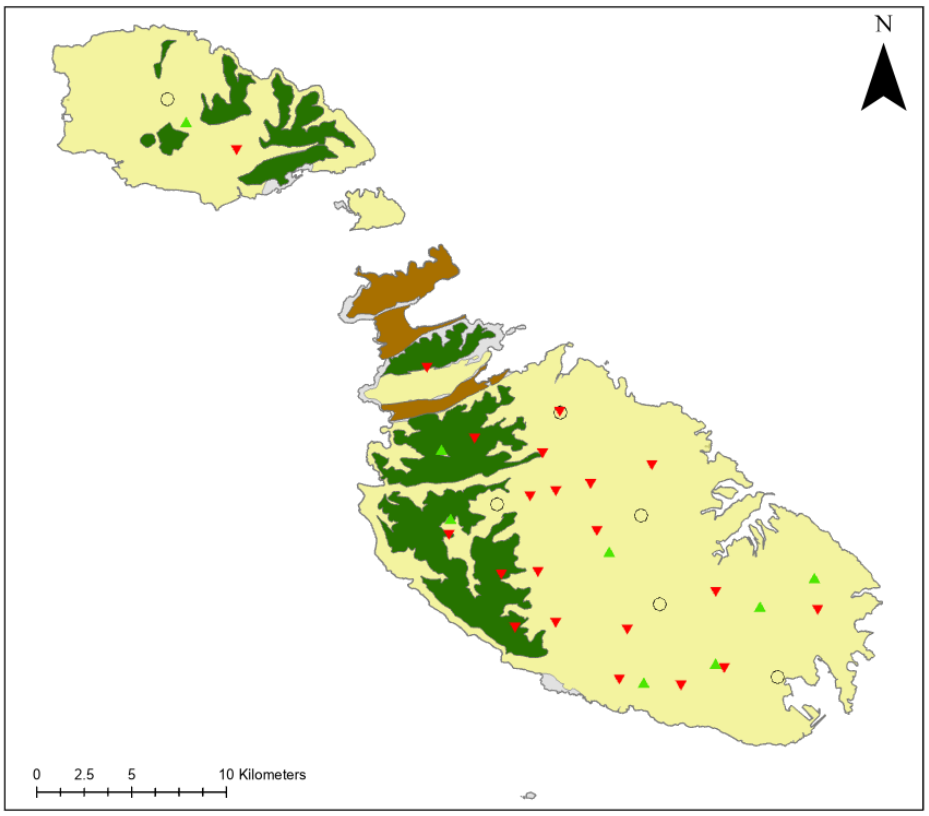

Figure 32 *Map of MLSA (Malta, Miżieb and Gozo) water level sites with negative ▼, positive ▲ and neutral trends [◯]*[110].

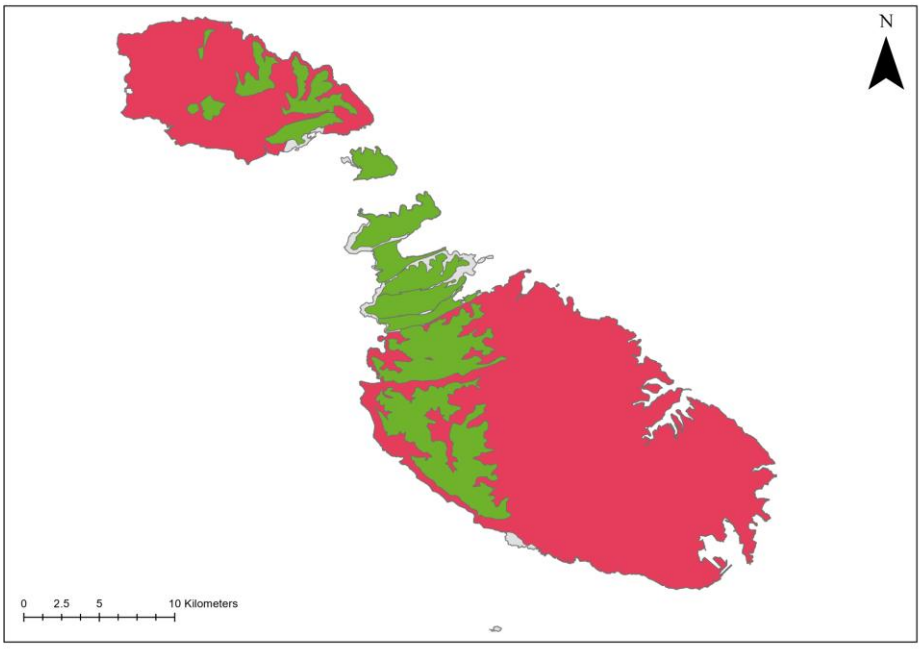

Figure 33 *Map with groundwater bodies in good quantitative status (green) and poor quantitative status (red).*

[110] The monitoring stations shown in this map are monitoring groundwater level in Malta, Miżieb and Gozo Mean Sea Level groundwater bodies.

6.2.2. Groundwater Qualitative Status Assessment

Groundwater Qualitative Status is benchmarked against a suite of Quality Standards and Threshold Values for parameters listed under Annex I and II of the EU Groundwater Directive (2006/118/EC). Annex I parameters are nitrates and pesticides. The threshold value for annex I parameters are set for all member states at 50 mg/l for nitrates and 0.1 µg/l per pesticide (including their metabolites) and 0.5 µg/l for total pesticides. The total refers to the sum of all individual pesticides found at one monitoring site. Annex II (2006/118/EC) parameters also need to be monitored, however due to the influence of background levels naturally found in the environment, the threshold value is determined by each member state. Previously cadmium, mercury, trichloroethylene, and tetrachloroethylene were not detected, however, during the 2nd monitoring cycle the latter two parameters were detected therefore a threshold value has been set which reflects half the threshold value of the Drinking Water Directive. A summary list of the quality standards and threshold values presented under Malta's 2nd RBMP are confirmed for the purpose of the 3rd RBMP can be found in Table 45.

Table 45 *Annex II (2006/118/EC) Parameters and determined threshold values.*

ANNEX II PARAMETERS AND THRESHOLD VALUES			
	PERCHED	MEAN-SEA LEVEL	COASTAL
Chloride	210 mg/l	1000 mg/l	500 mg/l
Sulphate	190 mg/l	475 mg/l	475 mg/l
Conductivity	2000 µS/cm	4500 µS/cm	3000 µS/cm
Lead	10 µg/l	10 µg/l	10 µg/l
Ammonium	0.25 mg/l	0.25 mg/l	0.25 mg/l
Trichloroethylene	5 µg/l	5 µg/l	5 µg/l
Tetrachloroethylene	5 µg/l	5 µg/l	5 µg/l
Nitrite	0.25 mg/l	0.25 mg/l	0.25 mg/l
Phosphate	0.03 mg/l	0.03 mg/l	0.03 mg/l
	MALTA MSL	GOZO MSL	
Arsenic	5 µg/l	7.5 µg/l	
PARAMETERS NOT LISTED IN ANNEX II WITH A THRESHOLD VALUE DEFINED			
Sodium	160 mg/l	450 mg/l	450 mg/l
Boron	0.5 mg/l	0.6 mg/l	1 mg/l
Copper	2 mg/l	2 mg/l	2 mg/l
Zinc	3 mg/l	3 mg/l	3 mg/l
	MALTA MSL	GOZO MSL	
Fluoride	1.5 mg/l	2.75 mg/l	

The results from the operational and surveillance monitoring programmes, undertaken during the implementation period of the 2nd RBMP (2016-2021), highlighted detection of the 6 main parameters: electrical conductivity, nitrates, chlorides, sulphates, sodium, and boron (Table 46). The qualitative status was determined based on the mean values of the stations in the same groundwater body throughout the implementation cycle of the 2nd RBMP. The method to determine the groundwater body status is illustrated in Figure 34.

Table 46 *Qualitative Status Assessment of the main parameters for groundwater during the period of 2016 - 2021.*

GWB ID	GROUNDWATER BODY	ELECTRICAL CONDUCTIVITY	NITRATES	CHLORIDES	SULPHATES	SODIUM	BORON
MT001	Malta Mean Sea Level	Pass	Fail	Pass	Pass	Pass	Pass
MT002	Rabat-Dingli Perched	Pass	Fail	Fail	Pass	Pass	Pass
MT003	Mġarr-Wardija Perched	Pass	Fail	Fail	Pass	Pass	Pass
MT005	Pwales Coastal	Fail	Fail	Fail	Pass	Fail	Pass
MT006	Miżieb Mean Sea Level	Pass	Fail	Fail	Pass	Fail	Pass
MT008	Mellieħa Perched	Pass	Pass	Fail	Pass	Fail	Pass
MT009	Mellieħa Coastal	Pass	Fail	Fail	Pass	Pass	Pass
MT010	Marfa Coastal	Fail	Fail	Fail	Pass	Fail	Pass
MT012	Comino Mean Sea Level	Pass	Pass	Pass	Pass	Fail	Pass
MT013	Gozo Mean Sea Level	Pass	Pass	Pass	Pass	Pass	Pass
MT014	Għajnsielem Perched	Fail	Fail	Fail	Fail	Fail	Pass
MT015	Nadur Perched	Pass	Fail	Pass	Pass	Pass	Pass
MT016	Xagħra Perched	Fail	Fail	Fail	Pass	Fail	Pass
MT017	Żebbuġ Perched	Fail	Fail	Fail	Pass	Fail	Pass
MT018	Victoria-Kerċem Perched	Pass	Fail	Fail	Pass	Fail	Pass

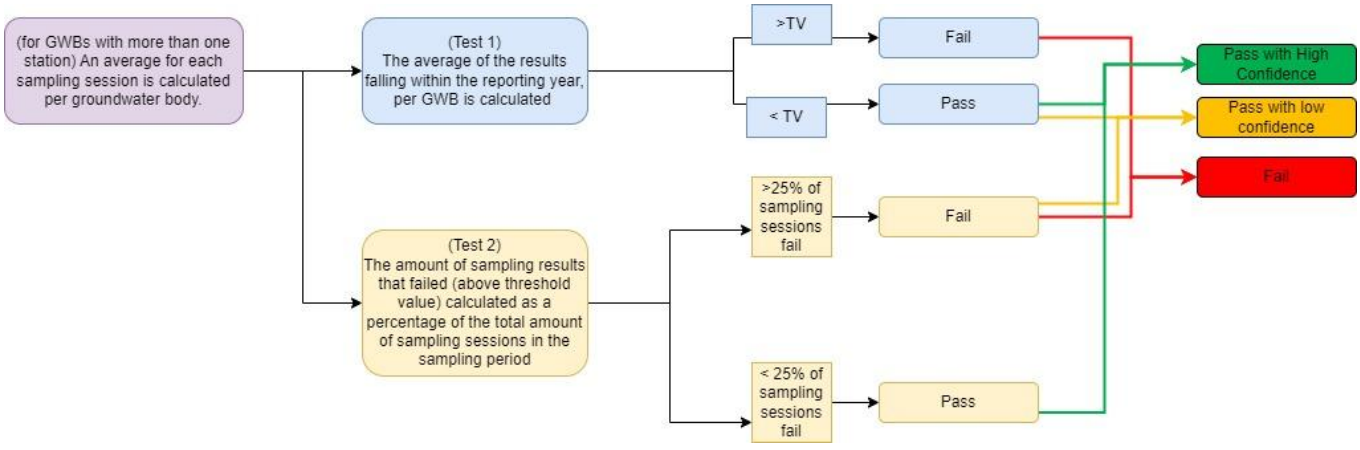

Figure 34 *Flowchart illustrating the tests used to determine groundwater status for the 3rd RBMP reporting period.*

Another groundwater parameter required by Annex II (2006/118/EC) is phosphate. During the period of this RBMP cycle, measurements were occurring for orthophosphates only, as the analysis of phosphates was technically not possible. When testing for orthophosphates, all the groundwater bodies were found to be above the TV, except for the Mellieħa Perched GWB. As part of the new operational monitoring cycle for the 3rd RBMP, the presence of phosphates in GWBS are now being analysed.

Table 47 summarises the status assessment of Annex II (2006/118/EC) parameters which are not detected as frequently including arsenic, fluoride, lead, copper, zinc, ammonium, and nitrite. The method for these parameters was adjusted from the method outlined in Figure 34, since there are not many detections to display the percentage of monitoring events where a positive detection was noted. For the parameters listed in Table 47, when more than 25% of monitoring events were above the threshold value this was considered a fail and is therefore shaded in red. Hence, this method considers how many times the monitoring site was sampled, and whether there was an exceedance during the six-year period. 0% means that no exceedances were found. This method takes into consideration the frequency that a monitoring station fails a certain parameter. During this reporting period, cadmium and mercury were not detected. Trichloroethylene was detected 9 times at a maximum detection of 0.39 µg/l whilst tetrachloroethylene was detected 7 times at a maximum of 0.64 µg/l.

Table 47 *Percentage of monitoring events with a result higher than the threshold value during 2016 - 2021.*

GWB ID	GROUNDWATER BODY	ARSENIC	FLUORIDE	LEAD	COPPER	ZINC	AMMONIUM	NITRITE
MT001	Malta Mean Sea Level	0%	1%	1%	0%	0%	1%	1%
MT002	Rabat-Dingli Perched	0%	0%	0%	0%	0%	0%	0%
MT003	Mġarr-Wardija Perched	0%	0%	3%	0%	0%	0%	0%
MT005	Pwales Coastal	10%	11%	0%	0%	0%	0%	0%
MT006	Miżieb Mean Sea Level	0%	0%	0%	0%	0%	0%	0%
MT008	Mellieħa Perched	0%	0%	0%	0%	0%	0%	0%
MT009	Mellieħa Coastal	0%	4%	4%	0%	0%	0%	0%
MT010	Marfa Coastal	0%	0%	9%	0%	0%	9%	18%
MT012	Comino Mean Sea Level	0%	0%	0%	0%	0%	0%	0%
MT013	Gozo Mean Sea Level	24%	5%	1%	0%	0%	0%	0%
MT014	Għajnsielem Perched	0%	0%	0%	0%	0%	0%	0%
MT015	Nadur Perched	0%	0%	0%	0%	0%	27%	45%
MT016	Xagħra Perched	0%	0%	0%	0%	0%	0%	13%
MT017	Żebbuġ Perched	0%	0%	0%	0%	0%	0%	18%
MT018	Victoria-Kercem Perched	4%	0%	0%	0%	0%	0%	26%

6.2.2.1. Nitrates

Results confirm that nitrates are one of the main statuses failing parameter for groundwater bodies in the Maltese islands. In fact, all groundwater bodies except the Gozo Mean Sea Level, Comino Mean Sea Level and Mellieħa Perched groundwater bodies, fail the qualitative status objectives due to their nitrate content being in excess of the 50 mg/l Quality Standard (Figure 35).

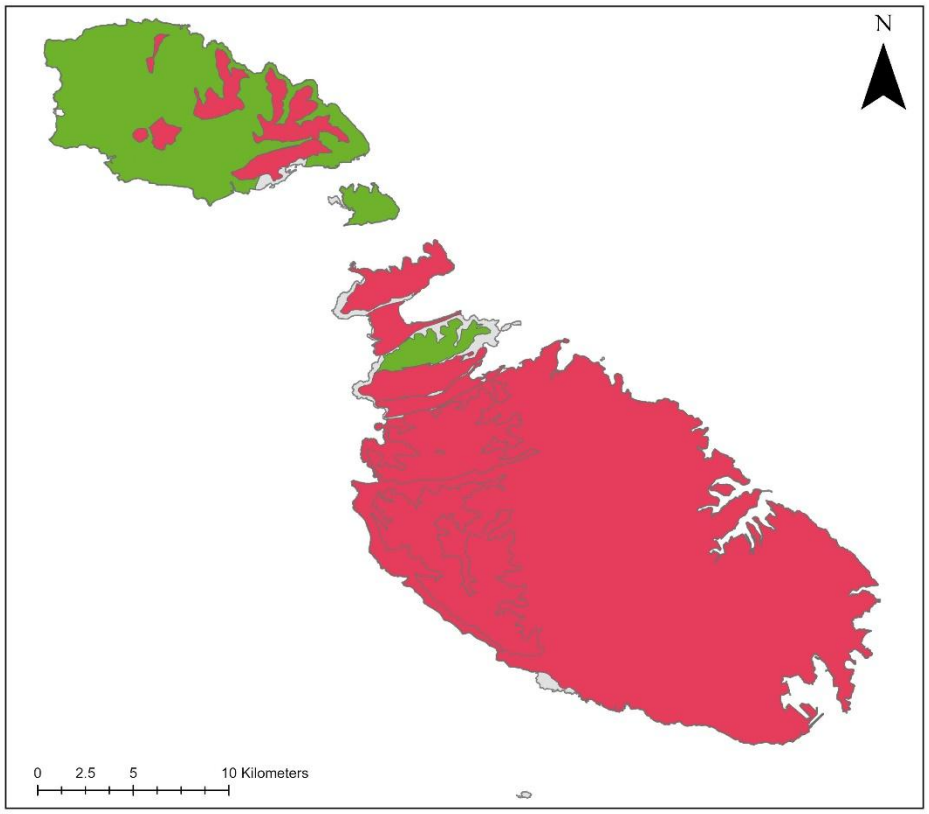

Figure 35 *Map of groundwater bodies failing good status objectives due to their high nitrate levels.*

6.2.2.2. Salt-water Intrusion

Sea-water intrusion is another important status failing parameter, which is tested for through the presence of electrical conductivity, chloride, sulphate, sodium, and boron. In particular for the Mean Sea Level and coastal groundwater bodies (Figure 36), saline intrusion is a significant issue, as these are in direct vertical and/or lateral contact with saline water in the rock matrix. Perched aquifer systems are also indicating increased levels of salinity (particularly sodium and chlorides), some in excess of the set threshold value potentially arising due to mixing with groundwater abstracted from the mean sea-level aquifer systems which is then used for irrigation.

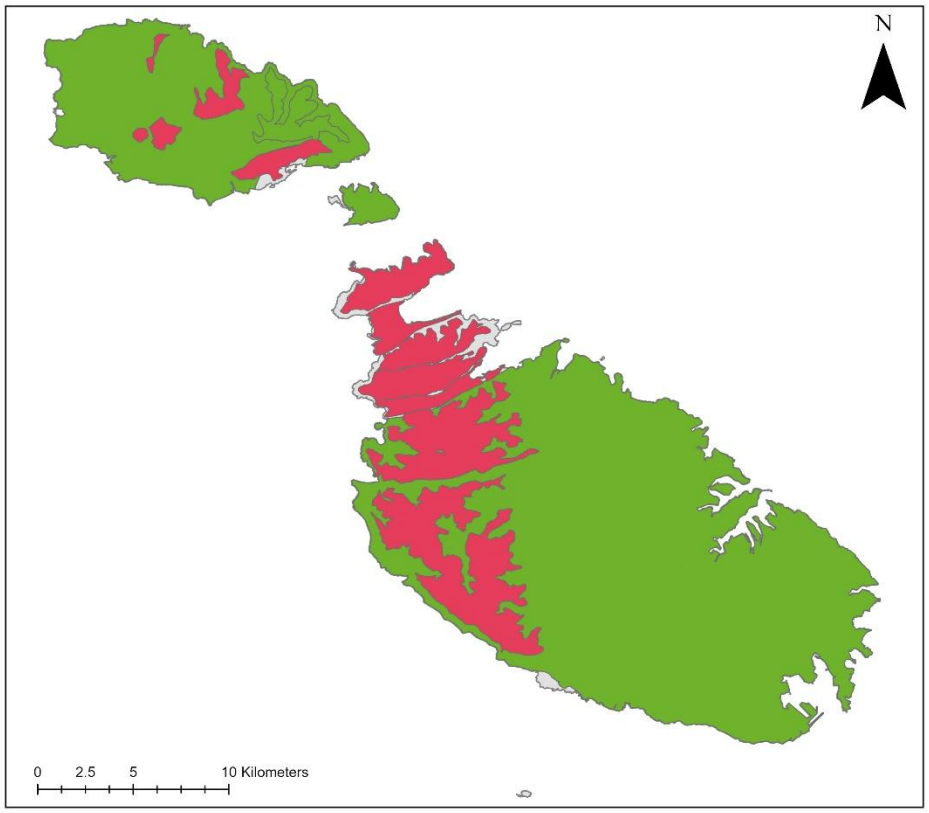

Figure 36 *Map of groundwater bodies failing good status objectives due to parameters related to sea-water intrusion.*

6.2.2.3. Trends of nitrates and saline intrusion

Operational groundwater monitoring data from 2009 to 2021 was used to conduct trend analysis on the groundwater parameters which are causing most groundwater bodies to fail the qualitative status assessment. The method utilised for the assessment of trends is the Mann-Kendall Test, set at 95% level of confidence, using the mean values calculated for each groundwater body. At monitoring station level, trends could not be determined due to occasional gaps in the data. Furthermore, at station level, trends could be indicative of localised pressures rather than being indicative of the general impacts at groundwater body level. Statistical trend reversal was not observed when comparing the trends from the first and second monitoring cycle of the RBMP. Table 48 summarises the trend results of polluting parameters. It should be noted that for the Mellieħa perched groundwater body, no data is included in Table 48, since there was not a sufficient amount of data to carry out trend assessment. This will be included in the next reporting for the 4th River Basin Management Plan. Figure 37[111] displays the groundwater bodies with a significant upward trend for nitrates and Figure 38[112] illustrates those groundwater bodies with a significant upward trend in any of the parameters associated with saline water intrusion.

[111] Upward trends for nitrate content were observed in the Pwales Coastal groundwater body.

[112] Upward trends were observed in the Malta Mean Sea Level, Rabat-Dingli Perched, Miżieb Mean Sea Level, Marfa Coastal, Comino Mean Sea Level, Gozo Mean Sea Level, Għajnsielem Perched, Nadur Perched and Żebbuġ Perched.

Table 48 *Trend results of parameters (saline water intrusion and nitrates).*

GWB ID	GROUNDWATER BODY	TREND ASSESSMENT
MT001	Malta Mean Sea Level	Upward trends for parameters indicating saline water intrusion and no trend in nitrates.
MT002	Rabat-Dingli Perched	Upward trends for parameters indicating saline water intrusion and no trend in nitrates.
MT003	Mġarr-Wardija Perched	No Trends.
MT005	Pwales Coastal	No Trends.
MT006	Miżieb Mean Sea Level	Upward trends for parameters indicating saline water intrusion and pollution of nitrates.
MT009	Mellieħa Coastal	No Trends.
MT010	Marfa Coastal	Upward trends for parameters indicating saline water intrusion and no trend in nitrates.
MT012	Comino Mean Sea Level	Upward trends for parameters indicating saline water intrusion and downward trend in nitrates.
MT013	Gozo Mean Sea Level	Upward trends for parameters indicating saline water intrusion and no trend in nitrates.
MT014	Għajnsielem Perched	Upward trends for parameters indicating saline water intrusion and downward trend in nitrates.
MT015	Nadur Perched	Upward trend in parameter indicating saline water intrusion, no trend in nitrates.
MT016	Xagħra Perched	No Trends.
MT017	Zebbuġ Perched	Upward trend for parameters indicating saline water intrusion and no trend in nitrates.
MT018	Victoria-Kerċem Perched	No trend for parameters indicating saline water intrusion and downward trend in nitrates.

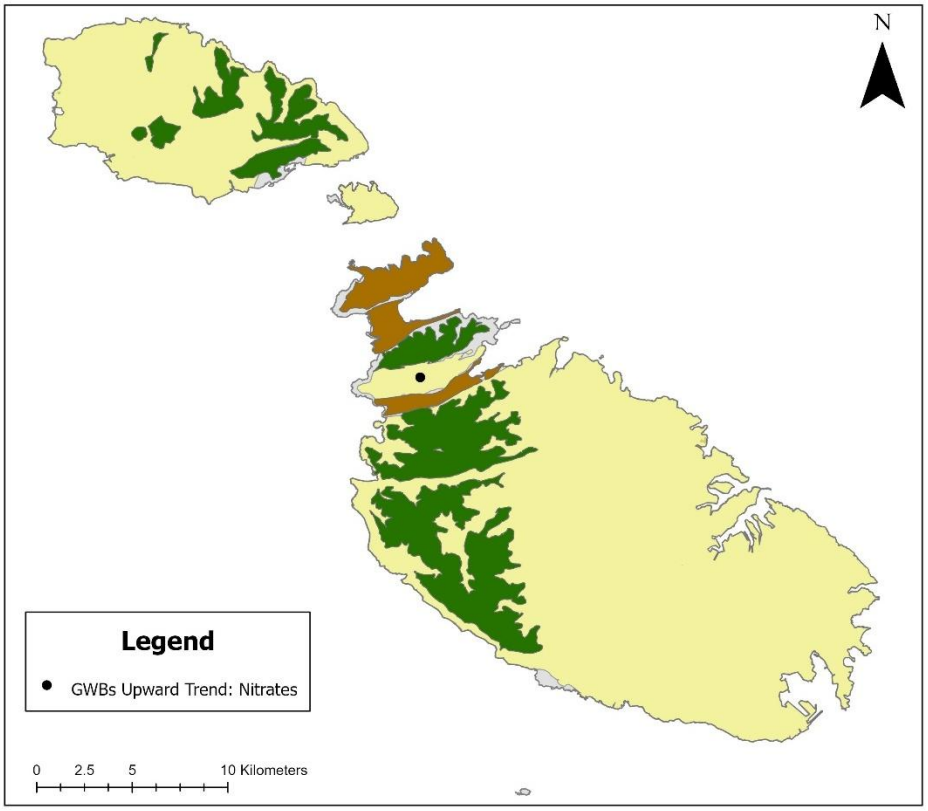

Figure 37 *Map of groundwater bodies indicating a significant upward trend in nitrates. Upward trends for nitrate content were observed in the Pwales Coastal groundwater body*.

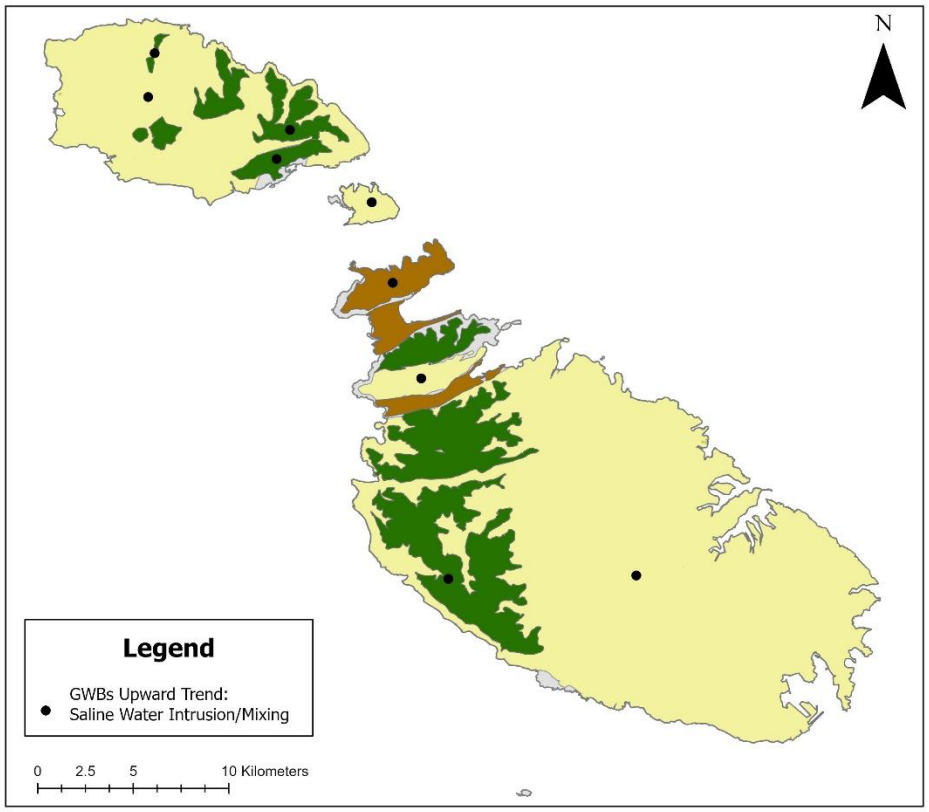

Figure 38 *Map of groundwater bodies indicating a significant upward trend in any parameter indicating saline water intrusion.*

6.2.2.4. Emerging Contaminants

Monitoring in recent years also resulted in monitoring stations having detections of emerging contaminants such as pesticides (Figure 39[113]), pharmaceuticals (Figure 40[114]) and PFAS (Figure 41[115]). In specific monitoring stations the concentration levels of these parameters exceeded the established quality standards (in the case of pesticides) and the newly proposed quality standards, by the European Commission for pharmaceuticals and PFAS (COM/2022/540)116. Monitoring programmes during the implementation cycle of the 3rd RBMP will provide an added focus on these parameters to enable national threshold values to be established.

[113] Detections above quality standards were found in the Mellieħa Coastal and Pwales Coastal groundwater bodies.

[114] No detections exceeded the proposed quality standards for the year 2016. Pharmaceuticals were not monitored from 2017 to 2021. Detections below quality standards were found in Gozo Mean Sea Level, Victoria-Kerċem Perched, Xagħra Perched, Marfa Coastal, Mġarr-Wardija Perched, and Rabat-Dingli Perched groundwater bodies.

[115] Any detections above the quality standard refer to the proposed quality standard, which were found in Malta Mean Sea Level, Mġarr-Wardija Perched, Marfa Coastal, Comino Mean Sea Level, Gozo Mean Sea Level, Victoria-Kerċem Perched, Nadur Perched, and Xagħra Perched groundwater bodies.

[116] COM/2022/540. *Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2000/60/EC establishing a framework for Community action in the field of water policy, Directive 2006/118/EC on the protection of groundwater against pollution and deterioration and Directive 2008/105/EC on environmental quality standards in the field of water policy.* https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52022PC0540.

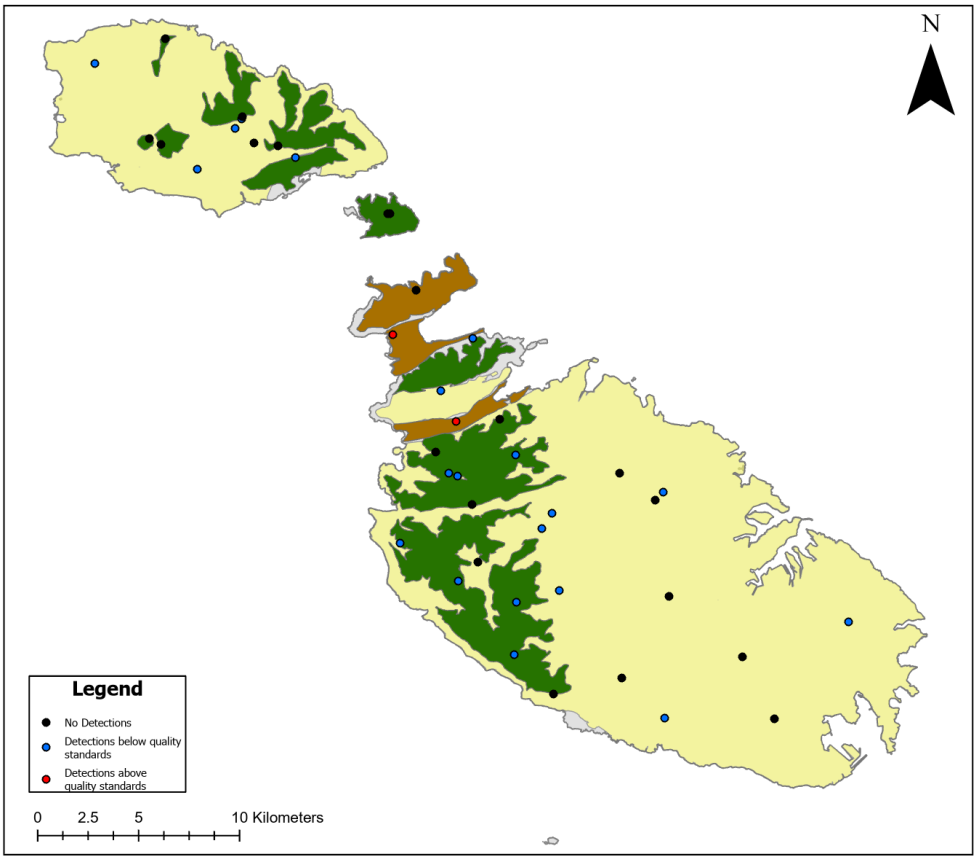

Figure 39 *Map of groundwater bodies indicating monitoring points and the presence of pesticides.*

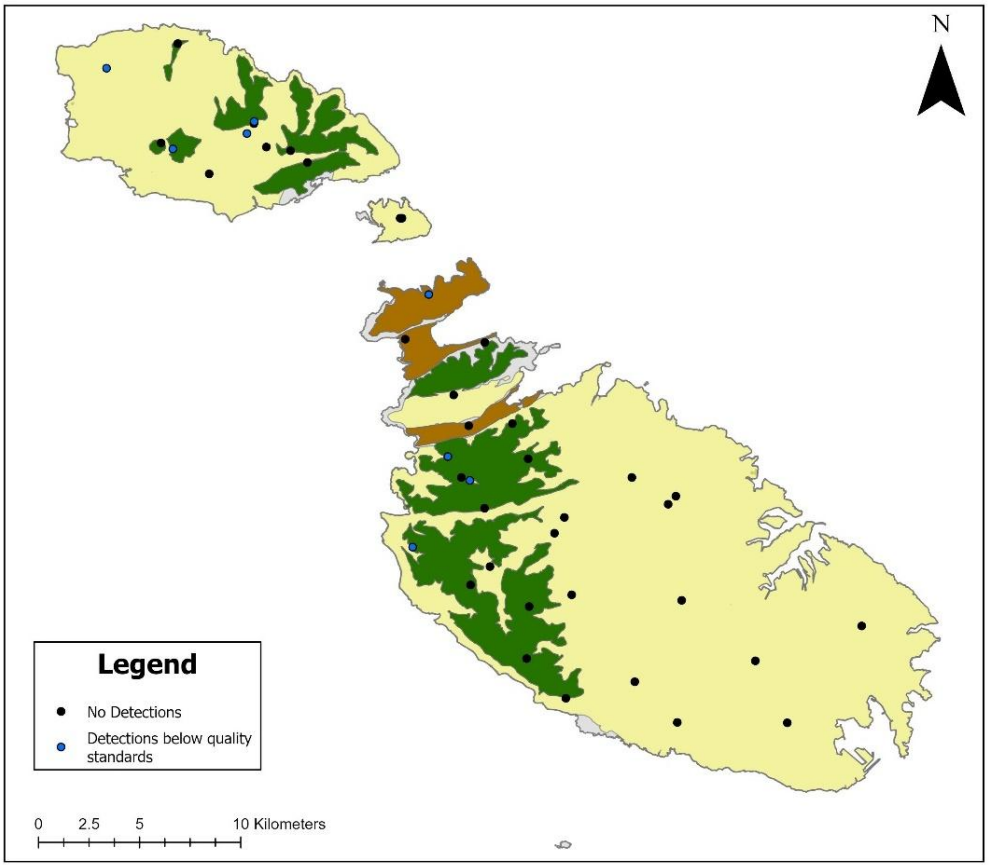

Figure 40 *Map of groundwater bodies indicating monitoring points and the presence of pharmaceuticals.*

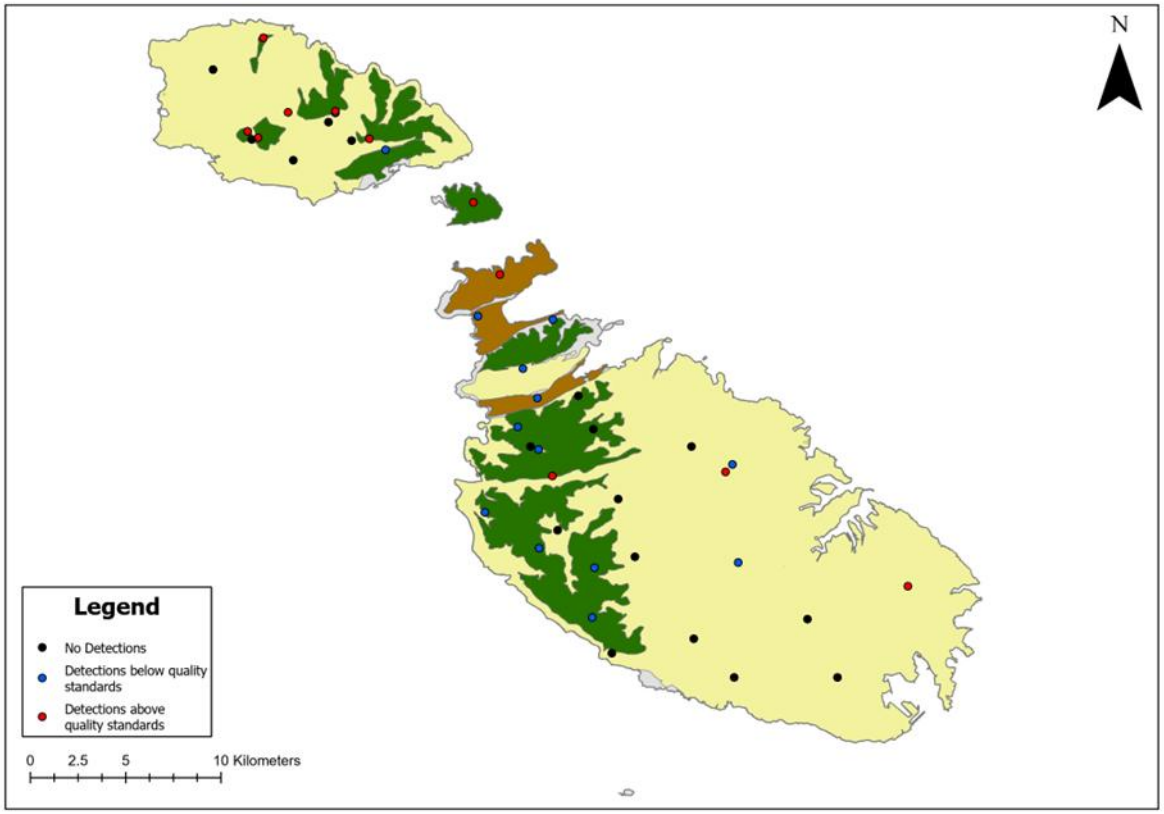

Figure 41 *Map of groundwater bodies indicating monitoring points and the presence of PFAS in 2023.*

For the purpose of qualitative status assessment, groundwater bodies were also assessed for the following issues:

- Associated surface waters test: the ability of the bodies of groundwater to sustain associated surface water systems, whether the transfer of pollutants from groundwater to surface water threatens surface water ecology.
- Drinking water tests: if the current status of the body of groundwater will require further treatment to that already in place for the production of drinking water.

A detailed assessment of the qualitative status of the groundwater bodies based on the assessment procedure developed under CIS Guidance Document No 18 was undertaken, the results of which are presented in Table 49 and graphically in Figure 42. The saline intrusion test takes into consideration both groundwater bodies being impacted by lateral and vertical saline intrusion and also those groundwater bodies that are being impacted by salinisation due to the use of water which is more saline than the water body itself and is infiltrating into the groundwater body.

Table 49 *Results of the Qualitative Status Assessment Test for groundwater bodies.*

GROUND WATER BODY ID	GROUNDWATER BODY	GENERAL QUALITATIVE TEST	SALINE INTRUSION TEST	ASSOCIATED SURFACE WATERS TEST	DRINKING WATER TEST	STATUS ASSESSMENT
MT001	Malta Mean Sea Level	Fail	Pass	n/a	Pass	Fail
MT002	Rabat-Dingli Perched	Fail	Fail	Pass[117]	n/a	Fail
MT003	Mġarr-Wardija Perched	Fail	Fail	n/a	Pass	Fail
MT005	Pwales Coastal	Fail	Fail	n/a	n/a	Fail
MT006	Miżieb Mean Sea Level	Fail	Fail	n/a	Pass	Fail
MT008	Mellieħa Perched	Fail	Fail	n/a	n/a	Fail
MT009	Mellieħa Coastal	Fail	Fail	n/a	n/a	Fail
MT010	Marfa Coastal	Fail	Fail	n/a	n/a	Fail
MT012	Comino Mean Sea Level	Fail	Fail	n/a	n/a	Fail
MT013	Gozo Mean Sea Level	Fail	Pass	n/a	Pass	Fail
MT014	Għajnsielem Perched	Fail	Fail	n/a	n/a	Fail
MT015	Nadur Perched	Fail	Pass	n/a	n/a	Fail
MT016	Xagħra Perched	Fail	Fail	n/a	n/a	Fail
MT017	Żebbuġ Perched	Fail	Fail	n/a	n/a	Fail
MT018	Victoria-Kerċem Perched	Fail	Fail	Pass[26]	n/a	Fail

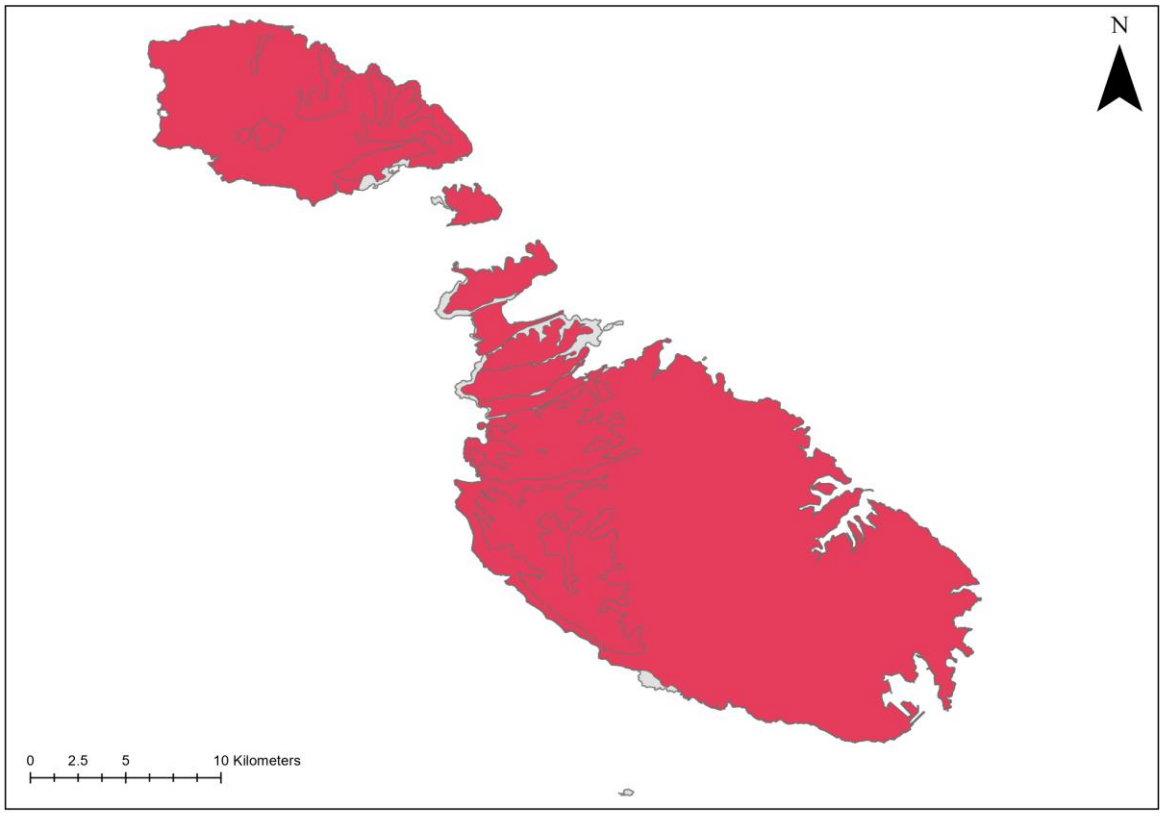

Figure 42 *Map showing the qualitative status of the groundwater bodies. Groundwater bodies shaded in red are in poor qualitative status.*

[117] This perched groundwater body is connected to surface waters however, no evidence of transfer of pollutants from the groundwater to surface water has been detected.

6.2.3. Overall Status Assessment

Table 50 presents the overall status of groundwater bodies in the Maltese islands, where good overall status requires that both the quantitative status and qualitative status of each groundwater body are positive. When considering both the quantitative and qualitative status, all groundwater bodies in the Maltese islands are classified as being in poor status Figure 43.

Table 50 *Classification of overall status for groundwater bodies.*

GWB CODE	GWB NAME	QUANTITATIVE STATUS ASSESSMENT	QUALITATIVE STATUS ASSESSMENT	OVERALL STATUS
MT001	Malta Mean Sea Level	Poor	Poor	Poor
MT002	Rabat-Dingli Perched	Good	Poor	Poor
MT003	Mġarr-Wardija Perched	Good	Poor	Poor
MT005	Pwales Coastal	Good	Poor	Poor
MT006	Miżieb Mean Sea Level	Good	Poor	Poor
MT008	Mellieħa Perched	Good	Poor	Poor
MT009	Mellieħa Coastal	Good	Poor	Poor
MT010	Marfa Coastal	Good	Poor	Poor
MT012	Comino Mean Sea Level	Good	Poor	Poor
MT013	Gozo Mean Sea Level	Poor	Poor	Poor
MT014	Għajnsielem Perched	Good	Poor	Poor
MT015	Nadur Perched	Good	Poor	Poor
MT016	Xagħra Perched	Good	Poor	Poor
MT017	Żebbuġ Perched	Good	Poor	Poor
MT018	Victoria-Kerċem Perched	Good	Poor	Poor

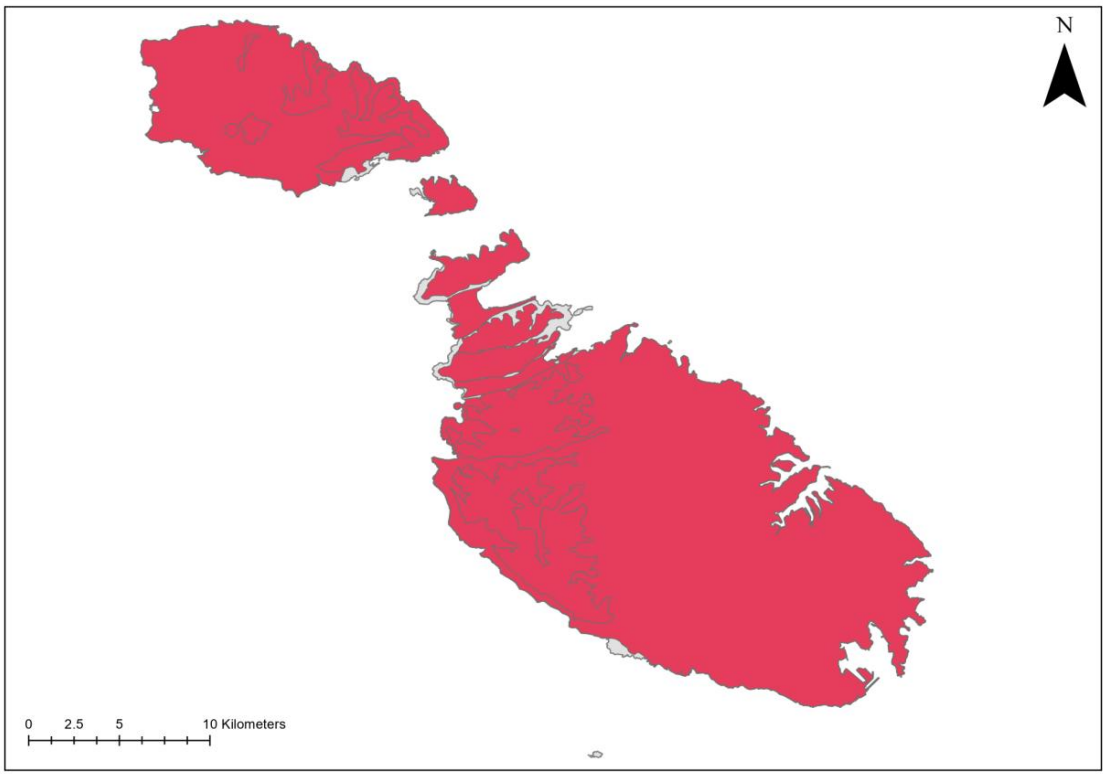

Figure 43 *Map with groundwater bodies in poor overall status (red).*

7. Environmental Objectives and Exemptions

The environmental objectives set by Article 4 of the WFD for surface and groundwater bodies call for the achievement of good status in such waters by 2015, prevention of deterioration of status, progressive reduction or phasing out of pollution by priority/priority hazardous substances in surface waters and achievement of standards and objectives set for protected areas.

These objectives are followed by a number of exemptions that allow for the following:

- The extension of the deadline: good status must be achieved by 2021 or 2027 at thelatest or as soon as natural conditions permit after 2027 (Article 4.4).
- The achievement of less stringent objectives under certain conditions (Article 4.5).
- The temporary deterioration of the status in case of natural causes of *force majeure* (Article 4.6).
- New modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, new sustainable development affecting high status water bodies, or failure to prevent status deterioration of a body of surface water(including from high to good status) as a result of new sustainable human development activities (Article 4.7).

This chapter evaluates progress in achieving the WFD objectives for each water body within the timeframes of the third implementation cycle i.e. 2021 – 2027 and assesses the need of applying the above-mentioned exemptions.

7.1. Environmental Objectives: Surface Waters

The 3rd RBMP seeks to achieve the WFD objectives by addressing the gaps between the current ecological classification and chemical status in each surface water body and the 'good' ecological status/potential and chemical status. For this purpose, objectives need to be set for each water body depending on its current status.

The objectives for each water body are elaborated on the basis of its current status, as updated through the 3rd RBMP, and includes the timeframe by when good status can be achieved, noting that the latest timeline by when such status should be achieved is set as 2027 by the Directive (Article 4(4)).

When there is not enough confidence that good status will be achieved, exemptions need to be applied. In line with the requirements of the WFD, the possibility of extending the 2015 deadline for achieving good status should be explored first before considering the application of a less stringent objective.

The timely achievement of good ecological or chemical status in surface waters is dependent on various factors including:

- The recovery potential of the aquatic ecosystems with respect to their current status: some ecosystems may take longer time periods to recover and reach good status.

- The nature of the chemical causing failure in good chemical status: some chemicals remain in circulation long after their discharge into the environment is reduced or phased out.
- The timelines by when the management measures are implemented and their effectiveness in achieving such status within the stipulated timeframes.

The status objectives for each surface water body are included in Table 51.

7.1.1. Exemptions: Surface Waters

In view of the generally good ecological and chemical status of coastal water bodies[118], management efforts in relation to such water bodies are focused on no deterioration or maintenance of such status.

However, the situation for inland surface and transitional water bodies is different. All three natural inland surface water bodies (Wied tal-Baħrija, Il-Qattara and L-Għadira ta' Sarraflu) are in bad ecological status; the two heavily modified watercourses (Wied il-Luq and Wied tal-Lunzjata) are in poor ecological potential; and two heavily modified transitional waters (Il-Magħluq ta' Marsascala and Il-Ballut ta' Marsaxlokk) are in bad ecological potential. Furthermore, the ecological classification of the other three heavily modified transitional waters (Is-Salini, Is-Simar and L-Għadira) in good ecological potential is doubtful since not all relevant Biological Quality Elements have been assessed.

There is very low confidence in the achievement of good status/potential for such water bodies by 2027. This is due to the fact that the 3rd RBMP represents the first management effort for these water bodies that is based on a systematic status assessment process[119]. Time is thus required, not only for the implementation of the measures, but for these measures to have the required effect. For this purpose, application of Article 4(4) is being sought for all inland surface and transitional water bodies. The possibility for the need of less stringent objectives for some of these water bodies is not being excluded at this stage, also due to the uncertainties associated with the unique characteristics of Malta's water bodies and the applicability of the assessment methodologies in defining ecological status for such waters. The poor/bad ecological classification could be due to the natural characteristics of the small water bodies coupled to the potentially limited applicability of the assessment methodologies to reflect such natural characteristics, rather than a response to pressures, warranting the need for consideration of less stringent objectives in accordance with Article 4(5) in upcoming WFD implementation cycles.

The Programme of Measures as part of the 3rd RBMP is seeking the progressive achievement of good status for inland surface and transitional water bodies through targeted measures per water body/water body types focusing on restoration efforts. The implementation of such measures will

[118] MTC105 is a heavily modified water body that has been classified as 'moderate' ecological status. Assessment of ecological potential is pending monitoring on the basis of the re-delineation of such HMWB.

[119] To note that exemptions applied to inland surface and transitional waters by the 2nd RBMP were primarily based on assessment of Natura 2000 objectives rather than on WFD assessment methodologies.

involve the necessary studies to enable informed restoration efforts to be implemented in synergy with Natura 2000 management processes.

Exemptions related to the water bodies which are failing their chemical status, including the exemptions defined in Malta's 2nd RBMP for coastal water bodies, will be assessed in the upcoming WFD implementation cycle. Additionally, this will be supported through the measure put forward by the 3rd RBMP for a risk-assessment process on contaminants including continued improvements in knowledge on sources and pathways of such.

The exemptions being applied for each water body are indicated in Table 51.

Table 51 *Status, objectives, and exemptions for each category of surface water bodies.*

WATER BODY	CODE	CURRENT STATUS		STATUS OBJECTIVES	EXEMPTIONS
		ECOLOGICAL	CHEMICAL		
Wied tal-Baħrija	MTWC01	Bad Ecological Status	Failing to achieve good status	Good ecological and chemical status. *Possibility of less stringent objectives to be assessed*	2027 or when natural conditions permit.
Wied il-Luq	MTWC02	Poor Ecological Potential	Failing to achieve good status	To achieve good ecological potential and good chemical status	2027 or when natural conditions permit.
Wied tal-Lunzjata	MTWC03	Poor Ecological Potential	Failing to achieve good status	Good ecological potential and good chemical status	2027 or when natural conditions permit.
Il-Qattara	MTSW01	Bad Ecological Status	Failing to achieve good status	Good ecological and chemical status. *Possibility of less stringent objectives to be assessed*	2027 or when natural conditions permit.
L-Għadira ta' Sarraflu	MTSW02	Bad Ecological Status	Failing to achieve good status	Good ecological and chemical status. *Possibility of less stringent objectives to be assessed*	2027 or when natural conditions permit.
Is-Salini	MTTW01	Good ecological potential	Failing to achieve good status	Good ecological potential and good chemical status	2027 or when natural conditions permit.
Il-Magħluq ta' Marsascala	MTTW02	Bad Ecological Potential	Failing to achieve good status	Good ecological potential and good chemical status	2027 or when natural conditions permit.
Il-Ballut ta' Marsaxlokk	MTTW03	Bad Ecological Potential	Failing to achieve good status	Good ecological potential and good chemical status	2027 or when natural conditions permit.
Is-Simar	MTTW04	Good Ecological potential	Failing to achieve good status	Good ecological potential and good chemical status	2027 or when natural conditions permit.
L-Għadira	MTTW05	Good Ecological potential	Failing to achieve good status	Good ecological potential and good chemical status	2027 or when natural conditions permit.
Coastal Water Bodies	MTC101	High Ecological Status	Good	Good ecological status/potential and good chemical status.	No deterioration - no exemptions required.
	MTC102	Good Ecological Status	Good		
	MTC103	High Ecological Status	Good		
	MTC104	Good Ecological Status	Good		
	MTC105	Moderate Ecological Status	Good		
	MTC106	Good Ecological Status	Good		
	MTC107	Good Ecological Status	Good		
	MTC108	Good Ecological Status	Good		
	MTC109	Good Ecological Status	Good		

7.1.2. Application of Article 4(7)

WFD Article 4(7) applies to new modifications to the physical characteristics of a surface water body, alterations to the level of bodies of groundwater and new sustainable human development activities, which can lead to failure of achieving WFD objectives. This article requires screening of development proposals to assess whether new modifications can lead to deterioration in water status.

The first step in an authorisation or licensing process of relevant development proposals is the 'applicability assessment' which determines whether:

- A new modification to the physical characteristics of a body of surface water/ alterations to the level of bodies of groundwater might lead to deterioration/non-achievement of good status/potential, or
- a new sustainable human development activity might lead to deterioration from high status and needs to be accomplished in advance.

If a new project is not expected to result in deterioration of any of the Biological Quality Elements or will not compromise the achievement of good status/potential (e.g. due to the application of mitigation measures), then no Article 4(7) test is required, and the project can be authorised under the WFD.

During the second WFD implementation cycle, a number of development proposals were subject to Article 4(7) 'applicability assessment'. Cases subject to such screening were associated with development along the coastline, thus potentially affecting coastal water bodies. The manner in which the screening was undertaken varies depending on the scale of the development proposal and location, ranging from expert judgement to hydrological modelling to exclude deterioration of the water body status.

The type of development proposals which were screened per coastal water body are indicated in Table 52, with more details on the 'applicability assessment' carried out provided in the Technical Document "Surface Waters: Environmental Objectives and Exemptions" as per CIS Guidance Document No. 36. The screening undertaken to date did not result in expected deterioration of WFD water bodies. Hence, Malta has not yet resorted to the application of Article 4(7) exemptions in relation to WFD surface water bodies.

Table 52 *Type of development subject to Article 4(7) applicability assessment in each water body.*

COASTAL WATER BODY	PROJECTS SCREENED IN ACCORDANCE WITH ARTICLE 4(7)
MTC102	Breakwaters and groynes
MTC103	Piers/jetties
MTC104	Breakwaters
	Sports facilities
	Waste installations
	Beach nourishment
MTC105	Mooring facility
	Marina
	Sports facilities
	Ferry landings
	Cargo facilities
	Quays
MTC106	Breakwaters
MTC107	Breakwaters
MTC109	Piers

7.2. Status Objectives: Groundwater

The 3rd River Basin Management Plan confirms the status objectives established under the 2nd RBMP for all bodies of groundwater in the Maltese islands, namely the long-term objective of achieving good quantitative and qualitative status in all groundwater bodies, with the exception of the two minor groundwater bodies at Pwales and Marfa (Table 53), where 'less stringent objectives' will be applied, as outlined under Article 4(5) of the Water Framework Directive.

Table 53 *Status Objectives for groundwater bodies in the Malta River Basin District.*

GROUNDWATER BODY	CODE	STATUS OBJECTIVES
Malta Mean Sea Level	MT001	Good
Rabat-Dingli Perched	MT002	Good
Mġarr-Wardija Perched	MT003	Good
Pwales Coastal	MT005	Less Stringent Objectives
Miżieb Mean Sea Level	MT006	Good
Mellieħa Coastal	MT008	Good
Mellieħa Perched	MT009	Good
Marfa Coastal	MT010	Less Stringent Objectives
Comino Mean Sea Level	MT012	Good
Gozo Mean Sea Level	MT013	Good

Għajnsielem Perched	MT014	Good
Nadur Perched	MT015	Good
Xagħra Perched	MT016	Good
Zebbuġ Perched	MT017	Good
Victoria-Kerċem Perched	MT018	Good

7.2.1. Exemptions: Groundwater

Due to the long natural response time of the groundwater bodies, arising as a result of both the long percolation time in the unsaturated zone and the high storage to recharge factor, it is envisaged that longer timeframes (beyond 2027) will be required for the good status objectives to be achieved. In as much, the 3rd RBMP sets status objectives due to natural conditions (Article 4(4) of the Water Framework Directive) for all groundwater bodies with the exception of the Pwales and Marfa Coastal groundwater bodies (Table 54), which have been assigned 'less stringent objectives'. For the latter two groundwater bodies, the main objective therefore is that of preventing further deterioration in their status.

Table 54 *Status Exemptions for groundwater bodies in the Malta River Basin District.*

GROUNDWATER BODY	CODE	CURRENT STATUS	STATUS OBJECTIVES	TIMELINE
Malta Mean Sea Level	MT001	Poor	Good	2027 or when natural conditions permit.
Rabat-Dingli Perched	MT002	Poor	Good	2027 or when natural conditions permit.
Mġarr-Wardija Perched	MT003	Poor	Good	2027 or when natural conditions permit.
Pwales Coastal	MT005	Poor	Less stringent objectives	No Deterioration.
Miżieb Mean Sea Level	MT006	Poor	Good	2027 or when natural conditions permit.
Mellieħa Coastal	MT008	Poor	Good	2027 or when natural conditions permit.
Mellieħa Perched	MT009	Poor	Good	2027 or when natural conditions permit.
Marfa Coastal	MT010	Poor	Less stringent objectives	No Deterioration.
Comino Mean Sea Level	MT012	Poor	Good	2027 or when natural conditions permit.
Gozo Mean Sea Level	MT013	Poor	Good	2027 or when natural conditions permit.
Għajnsielem Perched	MT014	Poor	Good	2027 or when natural conditions permit.
Nadur Perched	MT015	Poor	Good	2027 or when natural conditions permit.
Xagħra Perched	MT016	Poor	Good	2027 or when natural conditions permit.
Zebbuġ Perched	MT017	Poor	Good	2027 or when natural conditions permit.
Victoria-Kerċem Perched	MT018	Poor	Good	2027 or when natural conditions permit.

8. Programme of Measures

The Programme of Measures (PoM) is established for the 3rd WFD implementation cycle with the aim of continuing Malta's efforts towards maintaining or achieving good status of surface and groundwater bodies. Such a programme seeks the maintenance or achievement of ecological and chemical status of all inland surface and transitional waters and coastal waters; and quantitative and qualitative status of groundwater, by addressing the main pressures and challenges on such waters.

From a water management perspective, the PoM continues to invest in water demand management at the local and national level to ensure that water use levels in all water using sectors are maintained at highly efficient levels. Water demand measures will be complemented by infrastructural measures aimed at increasing the national water production capacity of non-conventional water resources to ensure that the efficient use of water resources occurs.

The programme of measures was elaborated based on the measures put forward through Malta's 2nd RBMP and other sectoral processes, which are being taken forward to address:

- The significant water management issues identified as the main challenges that need to be addressed in the third implementation cycle for achievement of WFD objectives.
- Gaps in the achievement of good ecological and chemical status for surface water bodies, on the basis of the updated assessment of status and pressures.
- The achievement of common objectives for WFD water bodies and protected areas.

The key focus of the PoM within the 3rd RBMP therefore is on:

1. Supporting water demand management measures in all water using sectors, including the domestic, agricultural, and commercial sectors through increased engagement with stakeholders.
2. Enhancing the production capacity of non-conventional water resources to continue to diversify water supply resources for municipal and agricultural water supply and investing in energy efficiency measures to reduce the environmental footprint of these alternative water resources.
3. Assessing opportunities for supporting and promoting alternative water resources which can be used at source, such as harvested rainwater and greywater; and
4. Optimising the management of groundwater resources through the introduction of a groundwater abstraction licensing framework for water users.
5. Addressing the restoration of water-related conditions of aquatic ecosystems in synergy with Natura 2000 management processes.
6. Improving water quality in aquatic ecosystems through a multi-faceted approach including incentives and education for use of sustainable products and authorisation processes.

8.1. Progress in implementation of Programme of Measures targeting surface waters in Malta's Second River Basin Management Plan

Since the publication of Malta's 2nd RBMP, the implementation of the PoM has addressed significant pressures on surface waters primarily through improved and targeted regulation of specific activities as well as interactions with relevant entities and stakeholders.

The 2nd RBMP included five (5) basic measures and twenty-three (23) supplementary measures addressing pressures on surface waters. These measures were classified into five categories as listed hereunder. A description of the implementation progress and/or links with the PoM of the 3rd RBMP is included under each section.

(i) Key measures (KEY): pre-requisite measures required to support implementation of other measures put forward as part of Malta's RBMP

KEY measures included both basic and supplementary measures targeting sources of pollution in surface waters through the development of a strong regulatory framework for permitting of industrial operational activities and improvements of data flows across relevant sectors. These are ongoing measures which will be taken forward through the third implementation cycle.

(ii) General Surface Water measures (SWM): targeting the most significant point and diffuse sources of pollution, as well as other pressures on water resources

'General surface water' (SWM) measures broadly sought:

- The development of guidance documents to support permitting systems in contributing to the achievement of WFD objectives.
- The use and interpretation of emissions data to gear processes towards achievement of WFD objectives.
- To address pressures arising from specific sectors or activities.

The regulation of priority substances and other substances of concern, including links across regulatory processes, are implemented on a continuous basis through the environmental permitting system governed by the KEY measures, also through the associated assessment and compliance processes. Permitting processes also cover disposal of dredged material and aquaculture operations. These measures will continue to be taken forward through the 3rd RBMP and are considered the main processes that address contamination in surface waters. Continuous improvements of such processes will also be sought through knowledge improvement with respect to sources of contaminants and associated risks as part of the 3rd RBMP.

Management of wastewater to reduce impacts on surface water quality will continue to be sought through a comprehensive approach as part of the 3rd RBMP in consideration of the requirements of the Urban Wastewater Treatment Directive.

Moreover, the management of pressures in coastal waters in relation to bathing waters and marine litter was sought through collaboration with relevant government entities, with management of marine litter being addressed also through collaboration with non-governmental organisations. Measures related to marine litter will continue to be sought in synergy with the implementation of the Programme of Measures pursuant to the EU Marine Strategy Framework Directive (MSFD).

For inland surface waters, while efforts have been made to address specific pressures such as non-indigenous species, a more comprehensive management and restoration framework will be sought as part of the 3rd RBMP in synergy with Natura 2000 management processes.

(iii) Knowledge measures (KNO): targeting enhancement of the knowledge base

The majority of the studies covered by the measures in this category have either been completed or are ongoing through EU Funded project LIFE 16 IPE MT 008[120]. The outcome of these studies has informed the development of the 3rd RBMP for surface waters.

Knowledge gaps which are still relevant as part of this implementation cycle pertain to sources of contamination in waters and these will continue to be addressed as part of the 3rd RBMP.

(iv) Emergency Response measures (EMER): targeting improvement of the Marine and Terrestrial Contingency Response

Three measures put forward by Malta's 2nd RBMP within this category target the improvement of the Marine and Terrestrial Contingency Response. The implementation of these measures is ongoing, also being handled as part of wider processes related to the National Marine Pollution and Contingency Plan. Within this context, the updating of sensitivity maps is being undertaken in conjunction with the development of a national policy on the use of oil dispersants.

(v) Awareness measures (AWA): targeting communication and awareness raising

Malta's 2nd RBMP put forward two measures targeting communication and awareness-raising in relation to marine litter and domestic, agricultural, and industrial chemical waste and waste packaging. While these two measures have been implemented through campaigns on marine litter by the Ministry for the Environment, Energy and Enterprise and other sectors[121,122], the 3rd RBMP will be taking these measures forward in conjunction with the current regulatory frameworks put in place as part of the Single-Use Plastic (SUP) Directive.

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120 https://www.rbmplife.org.mt/ - specific reference to LIFE IP Actions A5, A6, C14, C16 and C18.

121 The Malta Competition and Consumer Affairs Authority provides ongoing training both to farmers and distributors. This training includes the safe disposal of Plant Protection Products and their containers. Farmers and distributors are referred to civic amenity sites managed by Wasteserv where information is given with respect to the need for the product to be treated as hazardous waste. Such training is ongoing and is renewed every five years.

122 WasteServ Malta Ltd. also launched a service whereby pharmaceutical waste is collected from pharmacies. Interested pharmacies across Malta and Gozo were supplied with secure medicinal bins, aimed to be a convenient disposal for expired/unwanted medicine and medicinal waste.

8.2. Progress in implementation of Programme of Measures targeting groundwater in Malta's Second River Basin Management Plan

The measures present in Malta's 2nd RBMP which specifically target improving the quantitative and qualitative status of our groundwater were classified according to the significant water management issues which have been identified. A description of the implementation progress of the measures by the relevant significant water management issues for groundwater is provided below.

(i) Governance and Capacity Building

Soon after the adoption of the 2nd RBMP, the assessment focusing on the determination of the roles and responsibilities of all public sector agencies involved in the wider management of the water sector was completed. As part of the Government's initiative to better define the policy, regulatory and operational roles, throughout the implementation cycle of the 2nd RBMP, new entities have been setup in the environment and transport sector focusing on the protection of Malta's natural capital and the maintenance and upkeep of Malta's transport infrastructure.

Through the LIFE 16 IPE MT 008 project there have been various actions to improve governance (Action A5 and C10), and capacity building, including regular meetings of the National Water Table are being held with stakeholders from both the public and private sector, in order to increase stakeholder involvement in the development of the approaches and measures required for the achievement of the Water Framework Directive's environmental objectives. The National Water Table meets on a six-monthly basis to assess the progress achieved in the implementation of the project itself and also the implementation of the 3rd RBMP. The National Water Table is also an important forum for the discussion on the future implementation of the 3rd RBMP and its included measures. Furthermore, a dedicated national water conservation awareness campaign (part of the EU funded project CF.PA10.0096) was launched in the third quarter of 2019, which campaign facilitated the public's access to information and provided a central reference point for water related information.

(ii) Water Demand Management

Water Demand Management is an important cross-cutting measure within Malta's water management strategy. The 2nd RBMP hence proposed a series of measures targeting different water using sectors with the aim of providing the tools necessary for these sectors to optimise the efficiency of their water use. The public (municipal), domestic, and agricultural sectors were specifically considered under the 2nd RBMP PoM[123].

The 2nd RBMP included a series of tangible and supporting measures for ensuring the optimised use of water resources by the public sector (municipal), most importantly targeting the effective management of leakages in the municipal water distribution network. This is an ongoing measure undertaken by the

[123] These measures were supported through the LIFE 16 IPE MT 008 Project Actions: A1, A2, C1, C2, C3 and C19.

public utility which is resulting in the progressive reduction of leakage rates to an Infrastructural Leakage Index (ILI).

Measures addressing the domestic sector are an ongoing measure in particular through the nationally funded energy and water consumption audit to support households in better understanding their water, and also energy, consumption and hence identify how these can be reduced. This exercise was also complemented by the National Water Conservation Campaign.

The rural development programme incentivised schemes for farmers to optimise the efficiency of their irrigation systems, which supports the adoption of high-end irrigation technology such as drip irrigation. In this regard it is noted that a high percentage of irrigated land in Malta is fitted with such technology. Throughout the 2nd cycle of implementation significant investments were also carried out by the farming community in the development of new reservoirs to harvest rainwater runoff.

(iii) Water Supply Augmentation

Malta's water management strategy as presented in the 2nd RBMP focused on the conjunctive use of water demand management and water supply augmentation measures to meet the national water demand whilst ensuring the sustainable use of natural water resources[124]. Hence the protection and development of the national resource base featured strongly in the Programme of Measures, with specific measures addressing each of the four main water resource typologies present in the Maltese islands.

The initiatives under the PoM are:

- Measures related to groundwater modelling,
- Online groundwater monitoring,
- Installation of variable speed pumps for groundwater abstraction sources,
- Rehabilitation of rainwater harvesting infrastructures,
- Inauguration of a new desalination plant in Gozo,
- Further optimisation of the existing desalination plants and
- The additional expansion of the New Water network facilitated the achievement of the objective of water supply augmentation.

(iv) Stakeholder Engagement

During the 2nd cycle of implementation, the stakeholder engagement actions were primarily centred on the National Water Conservation Campaign which was officially launched in September 2019[125]. The campaign utilised various types of communication media to highlight the importance of several facets of water management including the importance of water use efficiency in all sectors, the importance of water reclamation and the protection of the quality of water resources.

[124] These measures were supported through the LIFE 16 IPE MT 008 Project Actions: A8, A9, C6, C8, C9 and C11.

[125] Additional actions focusing on stakeholder engagement include LIFE Actions A4, C5 and E5.

This campaign was complemented by an educational campaign centred around Malta's National Water Conservation Awareness Centre (GĦAJN). This Centre provides an educational programme for students, who spend a day at the Centre undertaking various water centred educational activities. Through LIFE funds the educational product of the Centre has been upgraded to increase its interactive content and hence ensure a higher level of engagement with the visiting students. In 2019 the GĦAJN Centre was awarded the EU Sustainability Award by the European Commission for its educational activities on the sustainable use of water resources.

(v) Monitoring and Data Management

Measures related to the upgrading of monitoring infrastructure continued throughout the 2nd cycle of the implementation of the RBMP[126]. A project for the upgrading of the national groundwater monitoring framework was initiated to address the existing challenges for monitoring perched aquifer systems and introduce innovative monitoring solutions. These were accomplished by monitoring of the unsaturated zone monitoring network, enabling the assessment of the qualitative characteristics of recharge to groundwater, and establishing a level monitoring network for the freshwater and saltwater interface. Monitoring of the freshwater and saltwater interface is an important aspect for ensuring the sustainable management of Malta's most important groundwater bodies.

(vi) Research and Development

During the implementation of the 2nd RBMP, specific research initiatives were launched by the WFD Competent Authorities, in collaboration with academic institutions, to address specific information gaps identified in the 2nd RBMP. Important aspects of such research initiatives focused on:

- Management and quality of groundwater resources,
- Utilisation of satellite technology for water demand assessments,
- the establishment of national water irrigation demand coefficients for the arable agricultural sector,
- the identification of the sources of arsenic content in groundwater,
- the characterisation of sea-water intrusion mechanisms using isotopic markers and,
- the assessment of the content of specific contaminants of emerging concern.

(vii) Qualitative Aspects

The protection of groundwater resources was addressed through the implementation of basic measures such as those under the Nitrates and the Plant Protection Products Directives. The measures under the 2nd RBMP which are related address the reduction of leakages from the wastewater collection network. The comprehensive and ongoing upgrade programme of the sewer network was continued by the public utility throughout the 2nd cycle.

[126] The measures were further supported by LIFE Actions A6, A7, C14, C15 and C16.

Complimenting this activity was also the project which was initiated by the public water utility to optimise the enforcement capacity of the utility's sewer discharge permitting unit with a view of enabling a better control on the discharge of contaminants to the public sewer. This action was initiated during the 2nd RBMP and will continue in the coming years to protect the quality of wastewater in view of the importance of water reclamation (particularly through New Water), in the coming years.

(viii) Flood Management

The initial objective of the measures addressing this significant water management issue was to reassess the resultant risk following the completion of the National Flood Relief project. This assessment was finalised and also extended to additional catchments in the Maltese islands which have not been considered as part of the National Flood Relief project. This assessment provided the basis for the identification of those areas which are still prone to flood risk the development of flood hazard and risk maps.

Work on the development of this strategic framework for the use of sustainable urban drainage systems (SUDS) and nature-based solutions (NBS) commenced during the 2nd cycle of implementation which will now be complemented by the completion of the sites demonstrating the application of SUDS and NBS in Malta. The experienced gained from the implementation of these sites will also allow the development of technical guidelines for storm water management and use of SUDS and NBS specifically adapted to the conditions in Malta.

(ix) Water-Energy Nexus

Energy consumption in desalination plants operated by the national public utility has been significantly lowered through comprehensive plant upgrade programmes. The water utility established specific power benchmarks for the desalination plants which saw the energy consumption of existing plants reduced over the baselines set at the start of the 2nd RBMP implementation period[127].

Energy consumption in water distribution was also addressed through the identification and replacement of distribution pipes entailing high frictional losses. Furthermore, the configuration of the distribution network was further optimised to eliminate unnecessary head and frictional losses in the distribution network thereby enabling a further reduction in the energy requirements for water distribution.

(x) Economic Aspects

The implementation of the leakage identification and control programme was continued by the water utility throughout the implementation period of the 2nd RBMP. Such an activity further complemented the measures undertaken by the utility to also reduce apparent losses through meter replacement programmes, theft identification and improved billing technologies. The results of this programme are

[127] Additionally, Action C12: *Heating and cooling installations* also focuses on the water-energy nexus.

evident in an increasing level of "billed consumption" which is progressively improving the cost recovery levels for the provision of water services throughout the 2nd cycle of implementation of the RBMP.

8.3. Updated Programme of Measures

Malta's 3rd RBMP is putting forward measures targeting the achievement of the environmental objectives of surface water bodies and the good quantitative and qualitative status of groundwater. A description of the respective measure together with the expected impact of each measure are provided in Table 55.

The improvement in status of Malta's natural water is being sought by addressing the drivers of the significant pressures on our water resources and therefore the measures being proposed will work towards addressing the gaps towards good status of these water bodies. Most of these measures reflect or build upon ongoing initiatives currently being implemented or already planned for implementation by a number of Government entities. The measures included as part of this plan shall therefore also strengthen the integrated and cross-sectoral approach which is necessary towards effective management of Malta's water resources.

The formulation process of the Programme of Measures for the 3rd RBMP has been supported by the LIFE 16 IPE MT 008. The projects' Actions and their relevance to the PoMs are referenced in Table 55, and further explained in detail in Annex 3.

Table 55 *List of measures addressing inland, transitional, surface, coastal, and groundwater to be implemented as part of the third River Basin Management cycle.*

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE (KTM)	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Upgrading of Urban Waste Water Treatment Plants. **Measure Code: 001**	Malta's Urban Waste Water Treatment Plants (Ċumnija, Ras il-Hobż and Ta' Barkat) discharge treated effluent into coastal surface waters. This measure involves the upgrading of the Urban Waste Water Treatment Plants to cater for projected wastewater production and peak flows with a view to ensure compliance of the discharges with the Urban Wastewater Treatment Directive. This will in turn reduce risks associated with nutrient and organic enrichment of coastal waters. Feasibility studies will provide a detailed analysis of available options to implement the projected treatment capacity upgrades, with upgrades planned to be in place by 2026.	Article 11(3)(a) requires measures to implement Community legislation for the protection of water, including measures required under the legislation specified in Article 10 and in part A of Annex VI: The Urban Waste-water Treatment Directive (91/271/EEC).	KTM1	These measures are implemented by Malta's Water Services Corporation. Noting that Malta's Urban Waste Water Treatment plants discharge into marine waters, they will continue to contribute to the 'high' and 'good' status of coastal water bodies by targeting potential pressures from nutrient/organic matter enrichment. The upgrading of sewerage networks in coastal areas will also reduce the potential for sewage leakages into coastal waters. While no gaps towards achievement of WFD objectives are being addressed because of the overall good status

Upgrading of sewerage network. **Measure Code: 002**	The measure involves the renewal and upgrading of Malta's sewerage network, including the upgrading of pumping stations and rising mains. This process will concurrently address pressures on surface waters and groundwaters associated with the conveyance of sewage through the current network.	Article 11(3)(a) requires measures to implement Community legislation for the protection of water, including measures required under the legislation specified in Article 10 and in part A of Annex VI: The Urban Waste-water Treatment Directive (91/271/EEC).		of coastal water bodies into which the treatment plant discharges, these measures will ensure maintenance of such status. In addition, the measures will contribute to the achievement of protected areas' objectives including Marine Protected Areas designated under the EU Habitats Directive, bathing waters designated under the Bathing Water Quality Directive and the Nitrates Vulnerable Zone as per Nitrates Directive. The measures will continue the implementation of basic measures under the 2nd RBMP.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Sewer Discharge Permitting and Monitoring. **Measure Code: 003**	This measure involves the commissioning of a number of designated sewer discharge points where private carriers registered by the Environment and Resources Authority can discharge wastewater to the sewage network whilst being monitored for wastewater quality and will therefore ensure the protection of the quality of wastewater (supported through LIFE Action C10). In addition to this, a network of thirty-two (32) fixed wastewater monitoring stations is implemented in order to assess the quality of wastewater in crucial nodes of the sewer network. It is envisaged that such data can also be used in conjunction with an AI to be able to predict the wastewater quality and use this prediction model to enhance sewage treatment plant operations. Furthermore, additional investments in the Discharge Permitting Unit (DPU) within the Water Services Corporation, whose role is to enforce the national Sewer Discharge Control Regulations in terms of personnel, equipment, and procedures, will be sought.	Article 11(3)(a) requires measures to implement Community legislation for the protection of water, including measures required under the legislation specified in Article 10 and in part A of Annex VI: The Urban Waste-water Treatment Directive (91/271/EEC).	KTM1	This measure is implemented by Malta's Water Services Corporation. Ensuring the quality of wastewater reaching wastewater treatment plants will guarantee the operation of wastewater treatment plants to ensure effluent meeting the quality requirements for marine discharge. Boosting the capacity of the Discharge Permitting Unit will also contribute to the control of the quality of discharges to the sewer network. While no gaps towards achievement of WFD objectives are being addressed as a result of the overall good status of coastal water bodies into which the urban wastewater treatment plants discharge, this measure will ensure maintenance of such status. In addition, the measure will contribute to the maintenance/achievement of protected areas' objectives including Marine Protected Areas designated under the EU Habitats Directive and bathing waters designated under the Bathing Water Quality Directive.
Use of Sustainable Urban Drainage Systems and	An integrated approach towards the planning and implementation of Sustainable Urban Drainage Systems (SUDS) and Nature Based Solutions will be sought through the development of a Strategic Framework on Stormwater	Article 11(3)(h) for diffuse sources liable to cause pollution, measures to	KTM23	This measure will contribute towards addressing the gaps in relation to chemical status of inland surface and transitional water bodies, which all failed achieving good

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Nature Based Solutions targeting improvement of water quality. **Measure Code: 004**	management and based on demonstration projects involving the implementation and assessment of SUDS and NWRM. The activities carried out as part of this measure shall be co-financed through the LIFE 16 IPE MT 008 (Action C7). This measure is aligned with Malta's second Flood Risk Management Plan (FRMP) and will be taking forward the assessment of SUDS and NWRM on a national scale in recognition of pressures, other than flooding, that would be addressed through such systems, including improvements in surface water and groundwater quality as a result of the improved quality of runoff and/or the reduction of storm water runoff which could potentially end up polluting such water bodies. An assessment on the implementation of such systems at a national level will be undertaken through the Inter-Ministerial Committee on Water and the Stakeholder Water Tables as set up through Malta's 2nd RBMP. This will enable the involvement of all relevant stakeholders and a coordinated approach towards the implementation processes, the monitoring of the quality of stormwater (as outlined in the measures of Malta's 2nd FRMP) and the development of additional guidelines (as necessary) to promote the sustainable use of such systems.	prevent or control the input of pollutants. Controls may take the form of a requirement for prior regulation, such as a prohibition on the entry of pollutants into water, prior authorisation or registration based on general binding rules where such a requirement is not otherwise provided for under Community legislation. These controls shall be periodically reviewed and, where necessary, updated.		chemical status and which are all subject to risks of failing good status from diffuse sources of pollution associated with urban run-off. In parallel, the measure will contribute to achievement of the objectives of relevant Natura 2000 sites.
Reducing pollution risks associated with sewage overflows. **Measure Code: 005**	Malta's Water Services Corporation has significantly invested in monitoring and control of the sewerage network, including important investments to mitigate sewage overflows from key pumping stations. This measure will continue to improve on the current control processes through the installation of generators	Article 11(3)(a): requires measures to implement Community legislation for the protection of water, including measures required under the legislation specified in	KTM21	This measure will contribute to maintenance or improvement of nutrient conditions in inland surface water bodies and coastal water bodies. Within this context it will contribute towards the gap towards good status for inland and transitional water bodies, but also towards maintenance of good status in coastal waters.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
	and retention basins (as relevant) in sewage pumping stations, thus further preventing the occurrence of sewage overflows into the surrounding environment. Noting the vicinity of some of the pumping stations to WFD inland and coastal surface water bodies, this measure will further contribute to the achievement of quality objectives of such water bodies [Is-Salini and coastal water bodies].	Article 10 and in part A of Annex VI: The Bathing Water Directive (2006/7/EC) and Habitats Directive (92/43/EEC).		In parallel, the measure will contribute to achievement of the objectives of relevant Natura 2000 sites.
National guidance document on the application of WFD Article 4(7). **Measure Code: 006**	Development proposals or interventions that may result in hydromorphological modifications to WFD water bodies are subject to assessments in line with WFD Article 4(7), to ensure that any potential failure to achieve good status or to prevent deterioration in the status of a body of surface water meets the conditions stipulated by the Directive. This assessment is aligned with other environmental assessment procedures as relevant, including Environmental Impact Assessments (and is supported by LIFE Action C10). This measure will seek the development of a national guidance document on the application of WFD Article 4(7) to be used by relevant entities, project proponents and environmental consultants, whilst ensuring alignment across environmental assessment procedures. The scope of the measure is to ensure a consistent approach towards the application of Article 4(7) in accordance with the requirements of the Directive.	Article 11(3)(i) for any other significant adverse impacts on the status of water identified under Article 5 and Annex II, in particular measures to ensure that the hydromorphological conditions of the bodies of water are consistent with the achievement of the required ecological status or good ecological potential for bodies of water designated as artificial or heavily modified. Controls for this purpose may take the form of a requirement for prior authorisation or registration based on general binding rules where such a requirement is not otherwise provided	KTM6	This measure seeks the development of a guidance document and hence will not have a direct ecological effect. On the other hand, it seeks to address pressures on water bodies from hydromorphological alterations in a consistent manner. All WFD heavily modified water bodies (two watercourses, five transitional waters and three coastal water bodies) are considered to be at risk of failing good status as a result of hydromorphological alterations, therefore this measure can contribute to reduce such risks.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	DESCRIPTION			
		under Community legislation. Such controls shall be periodically reviewed and, where necessary, updated.		
Review of Malta's Nitrates Action Programme. **Measure Code: 007**	In accordance with the requirements of the Nitrates Directive 91/676/EEC as transposed through Subsidiary legislation 549.25, the Nitrates Action Programme will be reviewed and if necessary revised, on the basis of relevant information with respect to the contribution of nitrogen from agricultural sources. This measure will explore relevant data collection processes that can contribute to an informed review of the Action Programme and enable evaluation of its effectiveness. This would ensure that the Programme adopts the most relevant approaches in addressing nutrient input from agricultural activity. A coordinated approach in defining and, where necessary adopt, the relevant data collection processes will be ensured across all relevant entities.	Article 11(3)(a): those measures required to implement Community legislation for the protection of water, including measures required under the legislation specified in Article 10 and in part A of Annex VI: The Nitrates Directive (91/676/EEC).	KTM2	All three WFD watercourses are at risk of failing achievement of good status as a result of nutrient enrichment. This measure seeks to strengthen the implementation processes under the Nitrates Directive to address the gap to good status for the three inland surface water bodies. In parallel, the measure will contribute to achievement of the objectives of relevant Natura 2000 sites.
Incentive schemes for Integrated Pest Management. **Measure Code: 008**	Malta's National Action Plan for the Sustainable Use of Pesticides (2019 - 2023) includes provisions related to Integrated Pest Management which can contribute to the goal of reducing the use of chemical and hazardous pesticides by 2030 as a target of the EU Biodiversity Strategy 2030 [COM (2020) 380 final]. In accordance with Malta's National Action Plan, "*measures to promote alternate low pesticide-input pest management strategies are addressed through awareness, training in view of certification as professional users and distributors acknowledged by the Malta Competition and*	Article 11(3)(a): those measures required to implement Community legislation for the protection of water, including measures required under the legislation specified in Article 10 and in part A of Annex VI: Regulation (EC) No 1107/2009 concerning the placing of plant	KTM3	While none of the WFD surface water bodies failed chemical status due to Plant Protection Products, this measure will contribute to the prevention of the contamination of surface water, hence it will have a pollution reduction effect. It is primarily addressing Contaminants of Emerging Concern.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
	Consumer Affairs Authority (MCCAA), and the availability of a Guidance Document on Integrated Pest Management in the Maltese Islands which includes recommendations on prevention and suppression of harmful organisms, monitoring, non-chemical measures, protection of bees, protection of water, protection of human health, disposal and record-keeping which are the minimum measures that farmers should implement". This measure reflects the eco-schemes adopted in line with Malta's Common Agricultural Policy Strategic Plan, which provide incentives for farmers to adopt Integrated Pest Management. Funding as part of these schemes is subject to the provision of an integrated pest management plan which is in line with guidelines issued by the Agriculture Directorate and should include at least three (3) of the listed techniques. Such eco-schemes can also promote the use of sustainable or lower risk pesticides. The promotion of sustainable pesticides will also be sought with official or scientific bodies involved in agricultural activities or professional agricultural organisations through facilitation of the registration process of lower risk substances which are already registered in the European Union.	protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC.		
Environmental Permitting System. **Measure Code: 009**	The Environmental Permitting System addresses point discharges to surface coastal waters from installations through the setting of Emission Limit Values, as well as diffuse sources of pollution through the elaboration of preventive measures in permits. This measure is supported by LIFE Actions C10 and C18. This measure refers to the continued implementation of the environmental permitting system and takes forward	Article 11(3)(g) for point source discharges liable to cause pollution, a requirement for prior regulation, such as a prohibition on the entry of pollutants into water, or for prior authorisation, or	KTM15	This measure is a continuation of measures put forward as part of Malta's 2nd RBMP. However, it will seek to ensure improvements in the process. Point discharges from industrial operators are only allowed in coastal waters. Although none of the coastal water bodies failed chemical status, this measure will continue to contribute to a reduction in pollution in marine waters.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
	the parallel implementation of the following measures reported through Malta's 2nd RBMP: • KEY 1: Continue to refine the regulatory framework for industrial operational practices. • KEY 2: Create an effective feedback mechanism within the Environment and Resources Authority to ensure compliance and risk mitigation. • SWM 1: Continue to strengthen the relationship between environmental and planning regulatory processes (including Marine Strategy Framework Directive concerns). • SWM 2: Continue to control priority hazardous substances, priority substances and other substances of concern via the environmental permitting process. One aspect that will be given due importance through this measure is a feedback mechanism, whereby data generated through ongoing research and monitoring processes informs any necessary updates to the environmental permits. Such a mechanism will ensure that the permits are adequately contributing to the achievement of quality objectives for coastal water bodies through targeted control of chemical contaminants. The updating of guidance documents to facilitate the permitting processes across relevant sectors will continue to be sought.	registration based on general binding rules, laying down emission controls for the pollutants concerned, including controls in accordance with Articles 10 and 16. These controls shall be periodically reviewed and, where necessary, updated. Article 11(3)(h) for diffuse sources liable to cause pollution, measures to prevent or control the input of pollutants. Controls may take the form of a requirement for prior regulation, such as a prohibition on the entry of pollutants into water, prior authorisation or registration based on general binding rules where such a requirement is not otherwise provided for under Community legislation. These controls shall be periodically reviewed and, where necessary, updated.		

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Enabling identification of substance-specific measures through a risk assessment process. **Measure Code: 010**	Malta's 2nd RBMP put forward a number of measures targeting improved knowledge on sources of contaminants and/or pathways of contamination: • SWM 10: Establish a Mercury Management Plan to enable the investigation of potential sources of mercury and potential mitigation measures. • KNO 3: Characterise and quantify hydrological input of land-based contaminants (including litter) to coastal waters from major sub catchments. • KNO 4: Investigate the role transboundary contaminants through hydrographic pathways and the extent of their contribution to marine contamination. • KNO 5: Carry out investigations to gauge potential contribution of contaminants to our coastal waters by atmospheric deposition. • KNO 6: Carry out a survey of all direct discharges to sea and identify their source with the objective of setting up a plan to curtail/regulate such discharges. Improvement in knowledge on potential local sources of contaminants is being primarily achieved through LIFE 16 IPE MT 008 whereby data collection processes are being implemented to (i) characterise the quality of wastewater as a primary route through which contaminants reach marine waters noting that urban waste water treatment plants discharge into coastal waters (Action C10); (ii) attain a better understanding of contaminants which reach waters through diffuse sources of pollution (Action C18); and (iii) determine the relevance of contaminants of emerging concern for Malta's water environment (Action C18). Such data collection processes, coupled to the outcome of monitoring under WFD and MSFD processes, will be providing a holistic overview of the contaminants which	Article 11(3)(g) for point source discharges liable to cause pollution, a requirement for prior regulation, such as a prohibition on the entry of pollutants into water, or for prior authorisation, or registration based on general binding rules, laying down emission controls for the pollutants concerned, including controls in accordance with Articles 10 and 16. These controls shall be periodically reviewed and, where necessary, updated. Article 11(3)(h) for diffuse sources liable to cause pollution, measures to prevent or control the input of pollutants. Controls may take the form of a requirement for prior regulation, such as a prohibition on the entry of pollutants into water, prior authorisation or registration based on general binding rules where such a requirement is not otherwise provided under Community legislation. These controls	KTM14	This measure will enable prioritisation of management/regulatory regimes targeting the most important sources of contamination of Malta's waters, while also enabling the identification of substance-specific measures. This measure will thus contribute to address the gaps towards achievement of good chemical status for inland surface and transitional water bodies.

	are relevant, and which are posing the highest risks to Malta's waters. This measure will involve a risk assessment to prioritise contaminants on the basis of the risk posed on surface water quality. The risk assessment will be primarily based on the status assessment under the WFD, the outcome of monitoring processes and other data collection processes as per relevant actions under LIFE 16 IPE MT 008. The prioritised contaminants identified though such risk assessment will be subject to further assessment to identify sources and pathways, taking forward the above measures put forward by the 2nd RBMP.	shall be periodically reviewed and, where necessary, updated.		
Educational campaign supporting objectives of the Single-Use Plastic Products Strategy for Malta 2021-2030 adopted in 2021. **Measure Code: 011**	The Single-Use Plastic (SUP) Strategy as adopted by Malta in September 2021 puts forward several measures aiming at the reduction of the introduction of litter into coastal waters, including inter alia measures related to: • The design and production phase, to avoid leakage of plastic in the environment and increase in the use of alternative materials. • The use and consumption phase with appropriate labelling, the introduction of economic instruments and better regulations and monitoring, to restrict the availability of certain SUP products and promote the use of alternatives. • The waste management phase to improve the collection and recycling of plastic waste. All three phases should be accompanied by a holistic educational campaign targeting the sectors involved.	Supplementary Measure; Annex IV Part B: Educational Projects.	KTM99	This measure will build on other policy sectors to address marine litter as an emerging pressure on water resources. It will thus contribute to the improvement of water quality of surface water bodies.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
	In addition, the SUP Framework Regulation (S.L. 549.149) stipulates legal requirements for the uptake of consumption reduction measures by catering establishments including: Provision of an adequate number of reusable alternatives to SUP food containers and cups for beverages at the point of sale • Provision of adequate incentives to consumers to bring their own reusable alternatives to SUP food containers and cups. • Adoption of incentives to use re-usable food containers and cups for beverages, filled at the point of sale, with the aim of reducing the use of SUPs. • Restrictions on the provision of SUP food containers and cups for beverages at the point of sale. The successful implementation of the regulations relies on educational campaigns or strategies that facilitate the uptake of such measures by catering establishments. The need to reach out to all relevant stakeholders to promote contributions towards reduction of marine litter across sectors was recognised by Malta's 2nd RBMP (AWA 1) and the marine strategies pursuant to the EU Marine Strategy Framework Directive. The 3rd RBMP will widen the scope of the measure put forward by the 2nd RBMP and will seek to strengthen the objectives and measures adopted through the different policy processes by engaging in targeted promotional processes across all relevant sectors, while identifying and putting forward relevant initiatives to facilitate uptake of existing regulations aimed at reducing marine litter.			

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Management of pressures from boating activity in coastal waters. **Measure Code: 012**	Boating activity in coastal waters and internal waters (excluding port areas) is an important pressure on both ecological and chemical status of coastal water bodies. Pressures from anchoring activity on seagrass meadows as one of the Biological Quality Elements of coastal water bodies is currently being subject to studies as part of LIFE 16 IPE MT 008 (Action C14) and addressed as part of the management of Marine Protected Areas (MPAs). The inclusion of such measure in the 3rd RBMP seeks to reinforce the MPA management process, by confirming the need to take the studies further and implement feasible management options targeting reduction of impacts from anchoring activity on a pilot basis in WFD coastal water bodies and MPAs. The measure will also take a holistic approach towards management of pressures related to boating activity, particularly by taking forward previous measure SWM 11 which sought the harmonisation of swimming zones and bathing areas in consideration of the possible interactions of recreational boating with bathing water quality. In this regard, this measure will continue to seek discussions through the Bathing Water Committee with respect to potential pressures of recreational boating on bathing water quality.	Supplementary Measure; Annex IV Part B.	KTM19	While coastal water bodies achieved good status, this measure will contribute to the maintenance or localised improvement of the ecological status of one of the main Biological Quality Elements for coastal waters: *Posidonia oceanica.* This measure is also aligned with the site-specific objectives of Marine Protected Areas.
Setting of Environmental Quality Standards in sediments. **Measure Code: 013**	Assessment of chemical status is primarily based on the concentration of contaminants in the water column and/or biota (as relevant) in accordance with Directive 2013/39/EU. Contaminants in sediment are assessed on the basis of trends. In order to determine any potential exceedances of sediment contamination, Malta has so far	Supplementary Measure; Annex IV Part B.	KTM14	Noting that measure is more related to knowledge improvement, it is not associated with direct effects on ecology or pollution reduction. However, it will enable an improved assessment of status in relation to chemical pollution.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	DESCRIPTION			
	utilised Environmental Quality Standards for contaminants in sediment as stipulated by neighbouring countries. This measure will seek, through engagement of experts in the field, to ensure the applicability of EQSs for sediments in Maltese coastal waters and define methodologies how such would contribute to a more holistic assessment of status.			
Enabling restoration of watercourses delineated as WFD water bodies. **Measure Code: 014**	Malta's 2nd RBMP called for the development of a strategic policy framework to encourage integrated valley management (SWM 14). Through this action, management plans for valleys were developed as part of LIFE 16 IPE MT 008. Within this wider management framework, this measure will be focusing on the three WFD watercourses (Wied il- Luq, Wied tal-Baħrija and Wied tal-Lunzjata), taking forward management/restoration needs in a phased approach. This approach acknowledges that effectiveness in management of the three watercourses hinges on the involvement of landowners, users, and the farming communities within the areas in question. In this regard, this measure will seek to identify all relevant stakeholders and engage them in identifying feasible management and/or restoration approaches through *inter alia* the review and assessment of current barriers and their uses, as well as options for control of non-indigenous species and replacement with typical riparian species. This measure will cover the initial steps in defining targeted restoration plans in agreement with the relevant stakeholders through the setting up of stakeholder platforms as necessary and/or relevant for each of the three watercourses. On the basis of the outcome of such	Supplementary Measure; Annex IV Part B.	KTM7	This measure will contribute towards addressing the gap in the achievement of good ecological status/potential and good chemical status of the three WFD watercourses. Wied tal-Baħrija is located within Special Area of Conservation MT0000024; Wied il-Luq is located within Special Area of Conservation MT0000018 and Wied tal-Lunzjata is located within Special Area of Conservation MT0000020. The measure will contribute to the achievement of Favourable Conservation Status of habitats within these SACs that are associated with freshwater.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
	measures, the management/restoration plans will be taken forward in upcoming WFD implementation cycles.			
Hydromorphologi-cal assessment targeting stabilisation of physico-chemical conditions in two transitional water bodies. **Measure Code: 015**	L-Għadira and Is-Simar are two transitional water bodies which are designated as Special Areas of Conservation under the Habitats Directive 92/43/EEC and Special Protected Areas under the Birds Directive 2009/147/EC. Both sites are currently subject to increasing trends in water salinity, also as a result of reduced rainfall. Such increasing trends in salinity may potentially impact avifauna and other biodiversity associated with the transitional water bodies. This measure seeks an assessment of the hydrology of the two sites and their wider catchment areas (which is partly covered through the implementation of the WFD monitoring programme). Following this study, mitigation measures will be elaborated considering *inter alia* potential engineering works, regular artificial recharges and maintenance interventions that would enable improved water flows and stabilisation of salinity levels. The focus will be on reaching optimal water quality conditions for avifauna and the ecological communities associated with the transitional water bodies.	Article 11(3)(a): those measures required to implement Community legislation for the protection of water, including measures required under the legislation specified in Article 10 and in part A of Annex VI: Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC).	KTM6	These measures seek to address pressures from hydromorphological alterations on three transitional water bodies with a view to work towards achievement of good ecological potential across all relevant Biological Quality Elements (noting that these heavily modified water bodies achieved good ecological status for some BQEs). This measure will contribute to protection of birds as part of the objectives of the SPAs MT0000006 (Is-Simar) and MT0000015 (L-Għadira) and the habitats associated with transitional waters within Special Area of Conservation MT0000007 (Is-Salini) and the Special Areas of Conservation of L- Għadira and Is-Simar.

Restoration of water circulation in Salini. **Measure Code: 016**	Is-Salini is a transitional water body that is characterised by a channel of water (Tas-Sokkorsu canal) running on both sides of salt pans and connected with seawater at both ends. Poor circulation along this channel is leading to sub-optimal conditions for the aquatic ecosystems associated with the water body. This measure will seek to identify and implement interventions required to improve the water circulation. Consideration will be particularly given to the regular maintenance of the water exchange system as well as the restoration of a historical breakwater which would ensure a unilateral and continuous flow along the whole channel, thus restoring the original water circulation within the site. Planned interventions will need to be sensitive to the cultural importance of the site which is protected on a national level in view of the salt pan complex' architecture.	Article 11(3)(a): those measures required to implement Community legislation for the protection of water, including measures required under the legislation specified in Article 10 and in part A o Annex VI: Habitats Directive (92/43/EEC).	KTM6	

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Restoration techniques for freshwater pools. **Measure Code: 017**	L-Għadira ta' Sarraflu is a very small freshwater pool with limited water flow and circulation. This pool is thus very susceptible to high nutrient concentrations and associated episodes of algal blooms. This measure will be exploring options for the restoration of the pool and the long-term improvement in water quality. On the basis of the most feasible options, an implementation plan will be developed and works undertaken accordingly. The implementation plan will address other threats and pressures at the site in question, including the continuation of the removal of non-indigenous species as per previously reported measure SWM 12 [*Extend the basic measure related to the removal of alien species from the Qattara habitat, as identified in the Natura 2000 Management Plan, to Għadira ta' Sarraflu*].	Supplementary Measure; Annex IV Part B.	KTM99	This measure will seek to address the gap towards achievement of good ecological and chemical status in this freshwater pool. L-Għadira ta' Sarraflu is protected under the Environment Protection Act as a Special Area of Conservation of National Importance. The pool is also designated as an Area of Ecological Importance and Site of Scientific Importance.
Restoration of Transitional Water Bodies. **Measure Code: 018**	This measure will continue to implement the restoration efforts for the transitional water body of Il-Ballut (Marsaxlokk), based on a hydromorphological assessment of the site in question. Priority will be given to the implementation of restoration measures targeting the reduction in coastal erosion, noting that this is one of the	Article 11(3)(a): those measures required to implement Community legislation for the protection of water, including measures	KTM99	This measure seeks to address gaps towards achievement of good ecological potential and chemical status in transitional water bodies, more specifically Il-Ballut ta' Marsaxlokk. Replication of the measure in other transitional water bodies, including il-Magħluq ta' Marsascala will be explored, in synergy with the site-specific framework of N2K management.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	DESCRIPTION			
	major pressures on this site. Other restoration measures will be implemented in a phased approach. The restoration of il-Ballut is being undertaken as a demonstration project as part of LIFE 16 IPE MT 008 (Action C13). On the basis of this measure, further restoration techniques will be developed in relation to the other transitional water bodies, and these will feed into the RBMP measures targeting such water bodies to ensure an adaptive management approach.	required under the legislation specified in Article 10 and in part A of Annex VI: Habitats Directive (92/43/EEC).		Il-Ballut ta' Marsaxlokk and the other transitional water bodies are all covered by Natura 2000 designations as follows: MT0000006 (Is-Simar); MT0000007 (Is-Salini); MT0000014 (Il-Ballut ta' Marsaxlokk); MT0000015 (L-Inħawi tal-Għadira) and MT0000023 (Il-Magħluq tal-Baħar). Therefore, this measure will contribute to the achievement of objectives for these Natura 2000 sites.
Increasing the production capacity and plant upgrades of desalinated water for municipal supply purposes. **Measure Code: 019**	The WSC will be upgrading the seawater desalination plants and increasing the production capacity of desalinated water. The upgrades also focus on the energy consumption of the plants, which will be optimised further. The increased production capacity will enable the utilisation of a higher proportion of desalinated water in the municipal water mix, optimising the quality of drinking water and ensuring a higher level of compliance with the indicator parameters of the Drinking Water Directive. The measure will also result in a reduction in the volume of groundwater abstracted by the WSC.	Water Framework Directive – Supplementary Measure.	KTM24	Implementation of the measure will result in an increased production capacity of desalinated water to increase the additional municipal demand. This increased production capacity will enable WSC to better manage groundwater resources and maintain current abstraction levels whilst ensuring security of supply.
Optimising groundwater abstraction framework to reduce localized seawater intrusion. **Measure Code: 020**	The WSC will be re-commissioning a number of groundwater abstraction sources in operation to spread groundwater abstraction over a higher number of sources. As part of this process abstraction stations are also being fitted with variable speed pumps which enable abstraction rates to be remotely varied according to the quality of abstracted groundwater. Within the overall framework of groundwater management, WSC will be reducing the total volume of	Water Framework Directive – Supplementary Measure.	KTM24	The implementation of the measure will result in spreading groundwater abstraction and thereby limit the occurrence of salt-water upconing under groundwater abstraction sources, resulting in a better quality (in terms of salinity) of the groundwater blend.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	DESCRIPTION			
	groundwater abstracted and spread the abstracted volume over a higher number of abstraction sources. This will result in lower flow rates from specific abstraction sources thereby providing added protection from localized seawater intrusion and hence protecting against the qualitative deterioration of sea-level groundwater bodies.			
Reducing leakages in the Municipal Water Network. **Measure Code: 021**	This is an ongoing measure intended to optimise the operational efficiency of the water distribution system. As a result of this measure the Infrastructure Leakage Index (ILI) was reduced to a level of 1.87 with a leakage rate of 389 m^3/hr for the whole of the Maltese Islands in 2020. Through the implementation of this measure, WSC will maintain this effort to reduce leakages to a flow rate closer to the economically optimal level of leakage for the water distribution network in Malta.	Water Framework Directive – Supplementary Measure.	KTM8	Measure will enable the continued containment of leakage levels in the public distribution network. Lower leakage levels require less production of water – hence enabling the better protection of groundwater and avoidance of production of desalinated water.
Optimisation of the municipal supply network. **Measure Code: 022**	This measure involves the commissioning of a tunnel linking the Pembroke Desalination plant and the Ta' Qali group of reservoirs reducing the elevation of which the desalinated water needs to be pumped by 25 m from the current 125 m. This will reduce the energy required for the operation of the municipal water distribution network.	Water Framework Directive – Supplementary Measure.	KTM8	Reduction of energy consumption for the distribution of drinking water, as well as enabling the utilisation of the full blending potential of desalinated water leading to better drinking water quality.
Increasing the production capacity of reclaimed water treatment plants (New Water) and the extension of the distribution network for reclaimed water. **Measure Code: 023**	This measure focuses on increasing the production and distribution capacity of reclaimed water in the Malta South, Malta North, and Gozo regions. The completion of the reclaimed water distribution network together with the commissioning of additional water dispensers will extend access to the agricultural community that is still reliant on groundwater. The use of reclaimed water by the agricultural sector in substitution of groundwater will result in reducing the dependence of the sector on groundwater reducing existing pressures on groundwater.	Water Framework Directive – Supplementary Measure.	KTM24	Increasingly address irrigation water demand through the use of alternative water resources thereby reducing the pressures on groundwater resources.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Dissemination of information regarding New Water for irrigation at the Government Experimental Farm in Gozo. **Measure Code: 024**	The use of reclaimed water by the agricultural sector will act as a substitute for groundwater, thereby reducing the dependence and pressures on this resource. Information and training will be given to stakeholders within the sector to ensure that the use of New Water has a good uptake (supported by LIFE Action C6).	Water Framework Directive – Supplementary Measure.	KTM24	Increased awareness on the effective use of New Water in the agricultural sector, to support efficient use of this resource.
Development of a National Water Efficiency label. **Measure Code: 025**	This measure focuses on the development of a National Water Efficiency Label intended to support consumers in making informed decisions on the purchase of more water efficient devices and appliances. The implementation of the measure will be supported through ongoing information campaigns on water demand management. The measure forms part of the LIFE 16 IPE MT 008 Project.	Water Framework Directive – Supplementary Measure.	KTM8	Increased information to consumers to promote the market infiltration of water efficient use-points and appliances, contributing to a more efficient use of water at the national level.
Support schemes for the uptake of greywater recycling systems in the domestic sector. **Measure Code: 026**	The objective of this measure is to enable and facilitate the adoption of grey water reuse technology within the domestic sector. In-house recycling of grey waters for secondary uses has the potential to reduce direct water reuse within the household sector by around 30%. The measure involves: (i) the formulation of a proposal for the review of the regulatory framework for greywater reuse,	Water Framework Directive – Supplementary Measure.	KTM8	The measure is intended to facilitate the market entry of greywater reuse technology in order to enable increased efficiency in household water use.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
	(ii) the drafting and implementation of a financial support scheme to support the market entry and adoption of such technologies.			
Support scheme for the restoration of rainwater harvesting facilities in the domestic sector. **Measure Code: 027**	The objective of these measures is to further encourage the harvesting and use of rainwater in the domestic sector. This measure will therefore allow damaged or unused rainwater harvesting structures to be reinstated and to be included as a second-class water system within the domestic sector.	Water Framework Directive – Supplementary Measure.	KTM8	Measure aims to promote the use of rainwater runoff for secondary uses, reducing the dependence of households on the municipal supply – hence reducing impact on groundwater resources and the need to produce water by sea-water desalination.
Support scheme for the restoration of communal rainwater harvesting reservoirs by Local Authorities. **Measure Code: 028**	This measure will support Local Authorities in identifying and restoring communal public rainwater harvesting reservoirs located in their locality.	Water Framework Directive – Supplementary Measure.	KTM99	Measure will facilitate access to water in localities – supporting the sustainability of urban greening projects as well as contributing to the management of urban floods.
Support scheme for the uptake of greywater recycling systems in the commercial sector. **Measure Code: 029**	The objective of this measure is to enable and facilitate the adoption of grey water reuse technology within the commercial sector. Built-in systems for grey water recycling for secondary uses have the potential to reduce direct water reuse within the commercial sector. The measure involves: (i) the formulation of a proposal for the review of the regulatory framework for greywater reuse, (ii) the drafting and implementation of a financial support scheme to support the market entry and adoption of such technologies.	Water Framework Directive – Supplementary Measure.	KTM8	Increase in house recycling capability and capacity thereby increasing the water efficiency of commercial enterprises and lowering their dependence on the municipal water supply.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Revision of the existing regulatory framework for the construction of rainwater harvesting cisterns in new developments. **Measure Code: 030**	The objective of this measure focuses on the revision of the existing regulatory framework in relation to the development of rainwater harvesting facilities with new developments. This will be undertaken as part of a broader revision process dealing with the review of Technical Guidance Document F – Conservation of Fuel, Energy and Natural Resources, and the establishment of the administrative framework required for the effective application of its provisions. Efforts to ensure proper enforcement of this measure are foreseen.	Water Framework Directive – Supplementary Measure.	KTM8	Development of the regulatory framework required to enforce requirements for rainwater harvesting infrastructure with new developments.
Household Water Consumption Audits. **Measure Code: 031**	This measure focuses on the provision of free water and energy consumption audits to households (supported by LIFE Action C1), where residents are made aware of their water use practices and informed on potential changes which can make their household more water efficient.	Water Framework Directive – Supplementary Measure.	KTM8	Increased awareness on water conservation in the general public.
Vulnerable Households Scheme. **Measure Code: 032**	Vulnerable households are the people who are most likely to benefit from the interventions related to the replacement of inefficient water using devices and appliances. The objective of this measure is therefore to determine, following an initial site visit, whether the existing appliances are leading to the inefficient use of water resources, which will eventually be replaced with more water efficient models. This measure will also directly impact the energy consumption of the respective household. The measure also addresses potential cases of water-poverty.	Water Framework Directive – Supplementary Measure.	KTM8	Support vulnerable households in optimising their water use thereby also addressing potential cases of water-poverty.

Increase the accessibility to water consumption information. **Measure Code: 033**	The WSC provides a service to consumers where water account holders (consumers) can login into a dedicated portal to monitor their daily, weekly, or monthly water consumption. Water users can track their usage and identify ways how water can be used more efficiently or identify existing leakages within their water supply system. Furthermore, the Corporation provides a messaging system alerting consumers registering abnormal consumption patterns. The implementation of this measure shall also be complemented with an information campaign to increase the existing awareness on the availability of this tool amongst the general public.	Water Framework Directive – Supplementary Measure.	KTM8	Increase awareness on water conservation in the general public.
Development of an interactive water- use game. **Measure Code: 034**	The objective of this measure is to develop an interactive game, focusing on the day-to-day water use practices, to educate and inform the general public on the importance of using water resources in an efficient and sustainable manner. By gamifying the concept of day-to-day water consumption, this measure will seek to indirectly affect the water consumption characteristics of the younger generations and their respective households. This measure forms part of the LIFE 16 IPE MT 008 project.	Water Framework Directive – Supplementary Measure.	KTM8	Increase awareness on water conservation in the general public.
Support scheme for Voluntary and Sport Organisations to optimise water and energy consumption. **Measure Code: 035**	The Energy and Water Agency shall continue its efforts to aid voluntary and sports organisations, as done in previous schemes, through financial support to allow these organisations to invest in water and energy saving measures within their establishments.	Water Framework Directive – Supplementary Measure.	KTM8	Improve efficient water use in the voluntary sector (NGOs) and promote water efficient techniques with their members.

Technical support for small and medium sized enterprises to better manage energy and water use. **Measure Code: 036**	Through this measure, the Energy and Water Agency shall continue with its direct contact with the small and medium enterprises through: • The provision of water and energy audits to enable a thorough review of the entity's activities and identify any actions and investments which can be carried to shift to more water efficient practices (supported by LIFE Action C1). • Mentoring sessions where enterprises would share knowledge from their successful projects with other enterprises. • Participation in projects were enterprises take on board and implement sustainable actions towards energy and water conservation.	Water Framework Directive – Supplementary Measure.	KTM8	Improve efficient water use in the commercial sector.
Support schemes for small and medium sized enterprises to optimise operational efficiency including in use of water and energy. **Measure Code: 037**	Support scheme managed by Malta Enterprise that finance either through tax credits or cash grants of up to Eur50,000, investments by commercial entities in operational improvement, including investments aimed at reducing the consumption of water aimed at the sustainable use of this resource.	Water Framework Directive – Supplementary Measure.	KTM8	Improve efficiency in water use in the commercial sector.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Support scheme for the uptake of efficient irrigation systems by the agricultural sector. **Measure Code: 038**	Financial schemes to support the development of rainwater harvesting systems, the adoption of efficient irrigation techniques and water management technologies in the animal husbandry sector.	Water Framework Directive – Supplementary Measure.	KTM8	Improve efficiency in water use in the agricultural sector.
Use of remote sensing for crop water demand assessment. **Measure Code: 039**	The objective of this measure is to create a tool for the assessment of the irrigation water demand of the agricultural sector. The availability of this tool will assist with a better understanding of the water use characteristics of the agricultural sector (LIFE Action C3). The availability of this information can also provide an opportunity for farmers to be informed and supported through adequate information on their irrigation practices and crop water use characteristics.	Water Framework Directive – Supplementary Measure.	KTM8	Development of technical capacity to enable a more reliable estimation of water use for agricultural irrigation thereby supporting quantitative status assessments.
Research and Innovation Scheme for the Energy and Water Sectors. **Measure Code: 040**	An R & I strategy specifically for projects within the fields of energy and water was unveiled in 2020 together with an annual fund for research projects within these two important sectors. This annual call for research projects will be maintained over the next cycle to increase local R & I activities in the energy and water sectors drive positive impacts in the sector.	Water Framework Directive – Supplementary Measure.	KTM14	Funding of R & I initiatives addressing issues of relevance to the local water sector including: • water efficient use, • water use in agriculture, • non-conventional water resources.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Upgrade of the National Hydrological Monitoring Network. **Measure Code: 041**	The objective of this measure is the continued upgrade the national hydrological monitoring network with the following specific aims: (i) develop the capacity for multi-level groundwater qualitative assessments, and (ii) upgrade the inland runoff monitoring network to better assess the relationship between rainfall, runoff, recharge, and evapo-transpiration for six catchments, and through a separate monitoring network, provide the basis for the determination of runoff levels in major catchments potentially affected by flood risk and enable the assessment of the relationship between flood risk and rainfall characteristics.	Water Framework Directive – Supplementary Measure.	KTM14	Continued improvement in the national hydrological monitoring capacity with the aim of increasing reliability of status assessments.
Development of a National Valley Management Plan. **Measure Code: 042**	This measure entails the development of Master Plans and Technical Guidelines for 12 major catchments in the Maltese Islands with guidance frameworks for the management of water resources that can be replicated in other catchments in the Maltese Islands (supported through LIFE Action A8).	Water Framework Directive – Supplementary Measure.	KTM23	Coordinated framework for the long-term management of valley systems to optimize their water retention capacity.
Rehabilitation works in Valley Systems. **Measure Code: 043**	The scope of rehabilitating valleys will be of protecting local flora and fauna and detailing invasive species for their removal. The work will also focus on special habitation areas and how to conserve these, whilst harvesting water for use within surrounding areas (supported by LIFE Action C9). This measure also includes the undertaking of rehabilitation works in at least two valley systems, one in Malta and another in Gozo and the maintenance of existing valleys systems, with the objective of harvesting increased amounts of water, both for agricultural use as well as for aquifer recharge.	Water Framework Directive – Supplementary Measure.	KTM23	Increase the catchment capacity of rainwater runoff in valley systems, enabling an alternative supply of water for nearby agricultural activities. Increase recharge to groundwater from the catchment areas.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
The development of technical guidelines for stormwater management and use of SUDS in the Maltese islands together with the implementation of demonstration projects. **Measure Code: 044**	This measure involves the publishing of technical guidelines and best practices manual which will disseminated amongst stakeholders, including the public and private construction sector, to provide detailed information on the construction and maintenance of SUDS in the local context (LIFE Action C21). Moreover, three demonstration SUDS projects will be implemented in the Maltese Islands which will be used as a test bed for different types of SUDS within the local context and to help to prove the sustainability of such stormwater management infrastructure to both public and private entities (LIFE Action C7).	Water Framework Directive – Supplementary Measure.	KTM23	Development of technical guidelines to promote (and facilitate) the application of SUDS in the local context.
Support schemes for the promotion of Green Urban Infrastructure. **Measure Code: 045**	This measure entails the launch of financial support schemes to enable households and local authorities to invest in greening initiatives in urban areas, such as green roofs, green walls, and green open areas. From a water management perspective, green urban infrastructures support the optimized management of rainwater runoff reducing flood risk and increase the recharge to groundwater.	Water Framework Directive – Supplementary Measure.	KTM23	Increase recharge to groundwater through the impermeabilization of hard standing areas transformed into green infrastructure, as well as increase the capacity for harvesting rainwater runoff in urban areas.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Managed Aquifer Recharge scheme in the Pwales groundwater body. **Measure Code: 046**	This measure relates to the application MAR scheme within the Pwales aquifer system, located in the northern region of the island of Malta. The Pwales Valley groundwater body is characterized by high concentrations of nitrate and chloride due to an intense agricultural activity which results in the overexploitation of the aquifer system. To enhance the status of this groundwater body, the MAR scheme (LIFE Action C8) will inject high quality recharge water in the Pwales groundwater body, thereby contributing to the augmentation of groundwater resources (supporting the achievement of Quantitative Status objectives) and to the dilution and flushing out of contaminants from the groundwater body (supporting the achievement of Qualitative status objectives). The quantitative and qualitative status of the Pwales Valley MAR scheme will be monitored in specific monitoring wells localised in suitable locations with increasing radial distance from the MAR scheme, to assess the impact of the MAR scheme. This monitoring framework is intended to assess the geochemical qualitative status of the groundwater body through the analysis of key monitoring parameters in water samples, which will be monitored daily with multiparametric probes, and monthly with laboratory analysis for a comprehensive assessment of the qualitative status of the groundwater body. Automatic water level meters will be installed into piezometers and real-time data acquisition systems will be implemented to cease the injection flow rate if water table mounds exceed a safety unsaturated thickness to prevent waterlogging.	Water Framework Directive – Supplementary Measure.	KTM14	Assess the feasibility of MAR schemes and develop guidelines for their future application. Sustain the Pwales groundwater body to achieve good quantitative status.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Educational Activities on Water Conservation. **Measure Code: 047**	A water educational programme targeted specifically at younger generations will continue to increase awareness in school children about the scarcity of natural water resources in the Maltese Islands and promote water conservation amongst the younger generations (supported by LIFE Action C4). This through educational activities undertaken at the National Water Conservation Awareness Centre – GĦAJN, as well as school outreach activities. Moreover, a water sustainability course for the corporate sector will help create awareness about water conservation at the workplace through a series of workshops highlighting best practices for water conservation within various work environments and practical steps of how these can be achieved.	Water Framework Directive – Supplementary Measure.	KTM8	Increase awareness on water conservation and promote simple everyday actions which are key for ensuring that water is used efficiently.
Specific Research on Local Hydrogeology. **Measure Code: 048**	The aim of this measure is to broaden and contribute to the existing body of knowledge on the various aspects of Malta's hydrogeology. This shall be achieved through the continuation of the existing research on the identification and delineation of groundwater subsurface coastal discharge sites and the characteristics of the discharges including flow and seasonal variations. Furthermore, research shall also focus on the geochemical characterization of carbonate formations, with reference to determining any geogenic (natural) occurrences of parameters, thereby enabling the correlation of geochemistry with hydrochemistry. Concurrently, studies shall be carried out on groundwater age, using natural isotopes to further substantiate information on the reaction time on groundwater bodies.	Water Framework Directive – Supplementary Measure.	KTM14	Improve the conceptual understanding of the different aquifer systems in the Maltese islands thereby contributing to the status assessment and the justifications of any applicable extensions of deadlines under Article 4 of the WFD.

PROPOSED MEASURE		DIRECTIVE'S REQUIREMENTS	KEY TYPE MEASURE	IMPACT OF MEASURE
TITLE	**DESCRIPTION**			
Economic Assessment of Environmental costs and benefits. **Measure Code: 049**	This measure will launch a study focusing on a first assessment of Environmental and Resource costs and benefits associated with water use in Malta and thus provide the information base required to better guide the future application of Article 9 WFD.	Water Framework Directive – Supplementary Measure.	KTM14	Development of the information base necessary to ensure the development of an equitable water pricing policy which takes due considerations of the environmental, economic, and social costs and benefits generated by different water use activities.
Establishing a Stakeholder Engagement Framework. **Measure Code: 050**	This measure shall continue with the implementation of the Inter-Ministerial Committee on Water to oversee the implementation of the 3rd RBMP. The Committee will monitor and follow-up on the measures planned for implementation as part of the 3rd RBMP with the entities responsible for the implementation of these measures over the lifetime of the 3rd RBMP. The measure will also continue the meetings of the National Stakeholder Water Table, a technical discussion platform established between stakeholder entities from the public and private sector to discuss and review the implementation of the 3rd RBMP (supported by LIFE Action C17).	Water Framework Directive – Supplementary Measure.	KTM99	Increased engagement with stakeholders from the public and private sectors with the aim of ensuring a continuous consultation process to guide the implementation of the 3rd RBMP.
Drought Monitoring Framework. **Measure Code: 051**	Through this measure EWA shall establish an observatory to monitor Malta's semi-arid climate and improve the existing data flows and capacity building to address the analysis and interpretation of hydro-climatic data. Malta is already facing the impacts of water scarcity and drought events and therefore the establishment of this observatory will enable Malta to adequately plan and address the existing and future extreme scenarios.	Water Framework Directive – Supplementary Measure.	KTM24	This measure will focus on the collation, management and interpretation of data pertaining to water scarcity and drought with the aim of increasing awareness on the status and emerging trends in the natural water cycle.
Pilot study on the rehabilitation of perched aquifer springs as an	The study will have the scope of assessing the current condition of existing springs networks, to evaluate their water quality and quantity and identify potential challenges or issues that may hinder their rehabilitation.	Water Framework Directive – Supplementary Measure.	KTM14	By assessing the potential for the rehabilitation of spring systems, this measure will seek to optimize the use of groundwater resources in particular those generated from the perched aquifer systems –

irrigation water supply. **Measure Code: 052**	The results of this study will make efforts to restore the springs more feasible and will ensure a sustainable water supply for agricultural purposes.			increasing the sustainability and security of supply for the agricultural sector.
Development of a Groundwater Abstraction Licensing Framework. **Measure Code: 053**	This measure will work on the development of a groundwater abstraction licensing framework with the aim of better regulating groundwater abstraction by users in the agricultural, commercial, and domestic sectors. The licensing framework will enable the application of a water pricing policy which aims to protect the availability and needs of users, through incentivising efficient use of water. This with the scope of contributing to the achievement of good groundwater quantitative status.	Water Framework Directive – Supplementary Measure.	KTM11	The measure will enable the regulation of private groundwater abstraction sources, enabling the protection of users who operate responsibly and generate environmental and economic benefits, whilst addressing inefficient water use.

8.3.1. Key Type of Measures

The individual measures, which have been outlined above, have been grouped into Key Types of Measures (KTMs) to simplify the level of detail of the measures. The list of KTMs which can be utilised are predefined and is common to all Member States for the purpose of reporting. The measures with the 3rd RBMP address more than 15 of the KTM categories as a result of the variety of measures which are included in the plan to address Malta's water management issues holistically.

A total of 17 measures are addressing the KTM focusing on *Water efficiency, technical measures for irrigation, industry, energy, and households* (KTM 8), aligning with the 3rd RBMP's, particularly focus on continuously improving the management of national water demand the level of efficiency at the point of use.

The 3rd RBMP is also giving due importance to research to improve the existing knowledge base and reduce uncertainty and knowledge gaps (KTM 14). Eight (8) measures are addressing this KTM to improve the exiting level of knowledge on the specific components of Malta's hydrological cycle. Measures addressing natural water retention are also an important group of measures which have been included within the 3rd RBMP as evidenced by the relatively high number of measures for KTM 23. The list of KTMs which have been considered as being applicable for the 3rd RBMP are listed below in Table 56.

Table 56 *List of Key Type Measures, as categorised according to the Water Framework Directive reporting requirements.*

KTMID	EURBDCODE	KEYTYPEMEASURE	KEYTYPEMEASUREOTHER
1	MTMALTA	KTM1 – Construction or upgrades of wastewater treatment plants.	
2	MTMALTA	KTM10 – Water pricing policy measures for the implementation of the recovery of cost of water services from industry.	
3	MTMALTA	KTM11 – Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture.	
4	MTMALTA	KTM14 - Research, improvement of knowledge base reducing uncertainty.	
5	MTMALTA	KTM15 - Measures for the phasing-out of emissions, discharges, and losses of Priority Hazardous Substances or for the reduction of emissions, discharges, and losses of Priority Substances.	
6	MTMALTA	KTM19 - Measures to prevent or control the adverse impacts of recreation including angling.	
7	MTMALTA	KTM2 - Reduce nutrient pollution from agriculture.	
8	MTMALTA	KTM3 – Reduce pesticides pollution from agriculture.	
9	MTMALTA	KTM6 - Improving hydromorphological conditions of water bodies other than longitudinal continuity.	
10	MTMALTA	KTM7 - Improvements in flow regime and/or establishment of ecological flows.	
11	MTMALTA	KTM8 – Water efficiency, technical measures for irrigation, industry, energy, and households.	
12	MTMALTA	KTM9 – Water pricing policy measures for the implementation of the recovery of cost of water services from households.	
13	MTMALTA	KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure.	
14	MTMALTA	KTM23 – Natural water retention measures.	
15	MTMALTA	KTM24 – Adaptation to climate change.	
16	MTMALTA	KTM99 - Other key type measure reported under PoM.	Educational campaign supporting objectives of the Single- Use Plastic Products Strategy for Malta 2021-2030 adopted in 2021.
17	MTMALTA	KTM99 - Other key type measure reported under PoM.	Restoration techniques for freshwater pools.
18	MTMALTA	KTM99 - Other key type measure reported under PoM.	Restoration of Transitional Water Bodies.
19	MTMALTA	KTM99 - Other key type measure reported under PoM.	Support scheme for the restoration of communal rainwater harvesting reservoirs by Local Authorities.
20	MTMALTA	KTM99 - Other key type measure reported under PoM.	Establishing a Stakeholder Engagement Framework.

8.3.2. Prioritisation of Measures: Assessment Framework Ecological Classification: an overview

The measures put forward in this plan were subject to a prioritisation exercise through the application of a multi-disciplinary evaluation framework. This framework is based on a semi-quantitative assessment of each measure according to key factors, encompassing the broad impact of the Programme of Measures beyond the strict limits of the water sector. The results of this assessment serve to highlight the multidisciplinary and broad ranging impact of the 3rd RBMP and the overlap (and hence influence) which the 3rd RBMP will have on other sectoral policies. Such approach highlights the cross-Ministerial nature of this document and the importance of ensuring policy alignment.

For the purpose of this exercise, the measures were categorized on the basis of their contribution to the achievement of WFD objectives for surface waters and groundwater. While some measures are expected to contribute to quality objectives of both groundwater and surface waters, such categorization was based on the main contributions of the measures. The prioritisation exercise was then carried out separately for the two types of measures, in order to avoid the risk for those measures contributing primarily to groundwater objectives outweighing measures contributing to the achievement of surface water objectives.

The key factors used in the separate prioritisation exercises and their application were tailored to the two types of water as described hereunder. In both cases however a rating/weighting matrix has been developed enabling an unbiased assessment of the importance of each identified measure based on the respective contribution to each key factor. Within this assessment matrix, each factor was assigned a “weighting”, which value highlights its relative importance to other factors. Subsequently, each measure was assigned a “rating”, a value related to its importance within each factor. The justification for assigning the various weightings and ratings is presented below.

(i) Key factors considered and their respective weighting

The key factors which were considered for this assessment framework were allocated a specific weighting in reflection of their relative importance within the context and implementation cycle of the 3rd RBMP. Although this weighting can be considered as a subjective value, it reflects the discussions undertaken with the various stakeholder and entities during the drafting process of the 3rd RBMP. The weightings assigned to these factors are intended to provide increased value in implementation to those measures with are tangibly achievable (therefore reducing the risk of implementation), are cost effective and have potential cross sectoral impacts. Key factors on cost-effectiveness and risk assessment were given the highest weighting so that measures that are cost-effective, tangible and risk averse rank higher up. The weightings for each key factor are listed hereunder in Table 57.

Table 57 *Weightings assigned to the key factors which were considered as applicable to address the issues and measures included in the 3rd RBMP.*

KEY FACTORS	WEIGHTING
Key Factor 1 – Significant Water Management Issues – F_{SI}	2
Key Factor 2 – Cost-effectiveness – F_{CE}	3
Key Factor 3 – Resource Benefits – F_{RE}	1
Key Factor 4 – Climate Change – F_{CC}	1
Key Factor 5 – Risk Assessment – F_{RK}	3
TOTAL WEIGHTING	**10**

The prioritisation of the surface water and groundwater measures was then carried out separately, as outlined earlier on, through the application of the below formula which calculates the average value for each measure based on the weighting of each factor and the rating assigned to each measure:

$$Score = \frac{(WF_{SI} * RF_{SI} + WF_{CE} * RF_{CE} + WF_{RE} * RF_{RE} + WF_{CC} * RF_{CC} + WF_{RK} * RF_{RK})}{10}$$

The final relative score achieved by each measure enabled the ranking of the measures. The scope of this prioritisation exercise was therefore intended to identify the most important measures within the Programme of Measures and serve as an indicator of which measures should be prioritized during the implementation cycle of the 3rd RBMP, in order to enable the effective achievement of the Environmental Objectives established for the Malta River Basin District.

(ii) Factors and their associated ratings

a. KEY FACTOR 1: Contribution to addressing the key significant water management issues (F_{SI})

This factor reflects the contribution of the measures in addressing the Significant Water Management Issues (SWMI) identified for this 3rd RBMP cycle[128]. The assessment is based on the relative contribution of each measure in addressing the respective identified gap to the achievement of good quantitative or qualitative status in groundwater and good ecological and chemical status in surface waters.

The rating of the measures for this factor is based on a quantitative assessment of the expected impact of the measure in terms of the number of significant water management issues being addressed, as relevant to the groundwater or surface waters.

For surface water bodies, the four SWMI related to qualitative aspects were considered to be most relevant in terms of the gaps towards the achievement of the WFD objectives for such waters. Therefore, the assessment for Key Factor 1 for surface water bodies was based on these qualitative issues. For the groundwater related measures, consideration was given to the potential direct or

[128] https://energywateragency.gov.mt/wp-content/uploads/2022/04/Significant-Water-Management-Issues-Document_final-1.pdf.

indirect contribution of the respective measure to the mitigation of all the quantitative, qualitative, and horizontal issues identified as significant water management issues as part of this 3rd RBMP.

The criteria and related scoring used for this assessment are outlined hereunder.

CRITERIA	SCORE
No SWMI are being addressed through the measure	0
1 SWMI is being addressed through the measure	1
2 SWMI are being addressed through the measure	2
3+ SWMI are being addressed through the measure	3

b. KEY FACTOR 2: Financial Cost-effectivity of the measure (F_{CE})

The second factor focuses on the (estimated) cost-effectiveness of the measures and is therefore intended to prioritise measures on the basis of their contribution to the achievement of the water objectives in comparison to their implementation costs. The most cost-effective measures would have the highest rating.

While this factor applies to both groundwater and surface water the approach adopted is slightly different for these two water typologies. For groundwater, the following approach was adopted:

- In the case of measures having a volumetric impact, the ratio of the cost of the measure to its volumetric impact was be used as a metric, generating a Euro/m^3 valuation of each measure. The cost-effectivity values of each specific measure were then classified into three categories (low, medium, and high-cost effectivity) with each category having an associated rating score of 3, 2 and 1 respectively. The categories were determined based on a statistical analysis of the available cost-effectivity values.
- In the case of measures having a qualitative impact, the rating value was assigned according to a semi-quantitative assessment of the potential impact of the measure in reducing the inflow of contaminants to the groundwater environment. Measures were then classified into low, medium, and high pollution prevention categories and given an associated rating score of 1, 2 and 3 respectively.
- Measures which have no direct impact on the volume or quality of our groundwater water resources were given an associated rating score of 0.

The quantification of the effect of measures primarily contributing to achievement of surface water objectives was not always possible. Cost-effectiveness analysis for such measures was thus primarily based on a qualitative assessment of their effects. These measures were individually scored on the basis of pressure/impacts that will be reduced through their implementation in order to provide an indication of the extent of contribution of the measures in reducing costs of degradation. Pressures considered for such purpose include diffuse sources, point sources, hydromorphological modifications and biological pressures. The score attained was then compared to the relative cost of the measure to attain a cost-effectiveness score as outlined hereunder.

CRITERIA	SCORE
Measure cannot be linked to reduction of impacts	0
Low-cost effectiveness	1
Medium cost effectiveness	2
High-cost effectiveness	3

c. KEY FACTOR 3: Consideration to the generation of resources and environmental benefits (F_{RE})

The classification of the third factor was based on a qualitative assessment of the potential of the measure to generate resource and environmental benefits outside those that were primarily intended for water management processes, hence taking into due consideration the broader benefits of each respective measure. The assessment for this key factor only refers to external and additional benefits to avoid overlap with the assessment covered by Key Factor 2 (cost-effectiveness).

These benefits were captured through an evaluation of the potential of the measure to contribute to job/wealth creation and to the achievement of the strategic goals of the National Strategy for the Environment, which at the time of the publication of the 3rd RBMP is being drafted[129]. Such goals are listed hereunder for ease of reference:

- Strategic Goal 1: Clean air for wellbeing, healthy humans and thriving nature.
- Strategic Goal 2: A quality environment for liveable towns and villages, conducive to healthy living
- Strategic Goal 3: Biodiversity valued, conserved, restored, and sustainably used for the benefit of our nature, people, and climate.
- Strategic Goal 4: Responsible and efficient resource use that reflects the value of raw and waste materials in support of zero waste to landfill.
- Strategic Goal 5: Land resources managed to sustain natural functions and increase resilience to climate change.
- Strategic Goal 6: Ecologically diverse, healthy, and productive marine waters, capable of supporting sustainable growth.
- Strategic Goal 7: Sustainable water resources that ensure long-term use and support water-dependent ecosystems.
- Strategic Goal 8: Enabling and empowering the required green transition.

Strategic Goals 6 and 7 are directly related to the objectives of the 3rd RBMP and were thus excluded from this assessment in order to ensure that only external factors are considered in the rating exercise for this key factor. The criteria and related scoring used for this assessment are outlined hereunder.

CRITERIA	SCORE
Measure does not have potential to generate wider benefits	0
Measure has potential to generate benefits in one key area	1
Measure has potential to generate benefits in a few key areas (2- 3)	2
Measure has potential to generate benefits in various key areas (4 or more)	3

[129] https://era.org.mt/wp-content/uploads/2022/09/National-Strategy-for-the-Environment-2050-%E2%80%93-Public-Consultation-Draft.pdf.

d. KEY FACTOR 4: Contribution to addressing climate change impacts (F_{CC})

The fourth factor enables a climate check for the measures put forward by the 3rd RBMP. This climate check is based on the following questions, the results of which were then interpreted to determine whether the measures are flexible, low-regret measures or win-win measures according to the criteria and related scoring outlined hereunder.

- Is the measure addressing climate change impacts?
- Does the measure address the predicted changes in pressures identified as part of the 3rd RBMP?
- Is the measure likely to cope with changing natural conditions including changes in temperature, precipitation (decrease / increased frequency of heavy rainfall events), sea level rise and storm surges?
- Is the measure sufficiently adaptable that it can incorporate changes in the future?

CRITERIA	SCORE
Regrets: measure unlikely to perform well under future climate conditions and that cannot be enhanced or modified to deal with future climate change OR measure is unclassifiable	0
Flexible adaptation: Measure designed to include capacity to be modified at a future date as climate changes	1
Low regrets: Measure justified under current climate conditions, consistent with addressing climate risks and worthwhile whatever the extent of future climate change	2
Win-win: Measure addressing climate change impacts or exploiting opportunities for adaptation action, which also has social, economic, or environmental benefits.	3

e. KEY FACTOR 5: Likelihood that effects will materialize (F_{RK})

This key factor captures the risks associated with the implementation of the measures in terms of the likelihood for the expected effects to materialise and of the likelihood of acceptability of the measure by the public or relevant public sectors. The assessment is primarily qualitative with scoring given in accordance with the criteria listed hereunder.

CRITERIA	SCORE
High risk: expected effects very uncertain and/or strong opposition by public/target sector expected	0
Medium risk: expected effects have some uncertainty and/or potential for opposition by public/target sector	1
Low risk: expected effects have limited uncertainty and/or expected to be broadly acceptable by public/target sector	2
No risk: expected effects certain and acceptable to general public and target sector	3

8.3.3. Prioritisation of Measures: Outcome for surface waters

The outcome of the prioritisation exercise for measures primarily contributing to the achievement of surface waters' objectives is provided in Table 58 and Table 59. Measures which have an on-the-ground effect and are more likely to be accepted by the public or relevant public sectors have ranked highest, with such ranking also reflecting the costs associated with the measures in question. For example, while upgrading of urban wastewater treatment plants and the sewerage network are associated with significant beneficial effects, their relatively higher costs have possibly resulted in a lower ranking than expected.

On the other hand, soft measures which do not have a direct effect on water bodies and have little bearing on external factors have ranked lowest. These include the development of guidance documents and/or studies, which while facilitating the achievement of the WFD objectives, cannot be associated with a direct reduction of pressures or improvement in status.

On the basis of these results, priority should be given to the implementation of measures which are associated with a high effect in addressing relevant pressures and achievement of good surface water status. The low-ranking measures were however not excluded from the Programme of Measures since they were still considered necessary to improve the WFD implementation process and to enable a targeted management process in future RBMP implementation cycles.

Table 58 Scores attained from prioritisation exercise for measures primarily contributing to achievement of surface water objectives.

Measure ID	Name of Measure	W_{SI}	R_{SI}	T_{SI}	W_{CE}	R_{CE}	T_{CE}	W_{RE}	R_{RE}	T_{RE}	W_{CC}	R_{CC}	T_{CC}	W_{RK}	R_{RK}	T_{RK}	Score
001	Upgrading of Urban Waste Water Treatment Plants.	2	1	2	3	1	3	1	1	1	1	2	2	3	3	9	1.7
002	Upgrading the sewerage network.	2	1	2	3	1	3	1	1	1	1	2	2	3	3	9	1.7
003	Sewer discharge permitting and monitoring.	2	1	2	3	2	6	1	1	1	1	2	2	3	1	3	1.4
004	Use of Sustainable Urban Drainage Systems and Nature Based Solutions targeting improvement of water quality.	2	1	2	3	3	9	1	2	2	1	3	3	3	2	6	2.2
005	Reducing pollution risks associated with sewage overflows.	2	1	2	3	2	6	1	2	2	1	3	3	3	2	6	1.9
006	National guidance document on the application of WFD Article 4(7).	2	0	0	3	0	0	1	1	1	1	0	0	3	0	0	0.1
007	Review of Malta's Nitrates Action Programme.	2	1	2	3	2	6	1	3	3	1	1	1	3	1	3	1.5
008	Incentive schemes for Integrated Pest Management.	2	1	2	3	2	6	1	3	3	1	1	1	3	1	3	1.5
009	Environmental Permitting System.	2	2	4	3	3	9	1	3	3	1	2	2	3	1	3	2.1
010	Enabling identification of substance-specific measures through a risk assessment process.	2	1	2	3	2	6	1	1	1	1	1	1	3	0	0	1.0
011	Educational campaign supporting objectives of the Single-	2	1	2	3	2	6	1	3	3	1	0	0	3	1	3	1.4

	Use Plastic Products Strategy for Malta 2021-2030 adopted in 2021.																
012	Management of pressures from boating activity in coastal waters.	2	0	0	3	3	9	1	2	2	1	1	1	3	0	0	1.2
013	Setting of Environmental Quality Standards in sediments.	2	1	2	3	0	0	1	0	0	1	0	0	3	0	0	0.2
014	Enabling restoration of watercourses delineated as WFD water bodies.	2	2	4	3	3	9	1	2	2	1	2	2	3	1	3	2.0
015	Hydromorphological assessment targeting stabilisation of physico-chemical conditions in two transitional water bodies.	2	0	0	3	3	9	1	2	2	1	3	3	3	1	3	1.7
016	Restoration of water circulation in Salini.	2	0	0	3	3	9	1	2	2	1	2	2	3	2	6	1.9
017	Restoration techniques for freshwater pools.	2	0	0	3	3	9	1	2	2	1	2	2	3	1	3	1.6
018	Restoration of Transitional Water Bodies.	2	0	0	3	3	9	1	2	2	1	2	2	3	1	3	1.6

Table 59 Measures primarily contributing to achievement of surface water objectives ranked on the basis of scores achieved.

Priority	PoM	Score
1	Use of Sustainable Urban Drainage Systems and Nature Based Solutions targeting improvement of water quality.	**2.2**
2	Environmental Permitting System.	**2.1**
3	Enabling restoration of watercourses delineated as WFD water bodies.	**2.0**
4	Reducing pollution risks associated with sewage overflows.	**1.9**

5	Restoration of water circulation in Salini.	**1.9**
6	Upgrading of Urban Waste Water Treatment Plants.	**1.7**
7	Upgrading the sewerage network.	**1.7**
8	Hydromorphological assessment targeting stabilisation of physico-chemical conditions in two transitional water bodies.	**1.7**
9	Restoration techniques for freshwater pools.	**1.6**
10	Restoration of Transitional Water Bodies.	**1.6**
11	Review of Malta's Nitrates Action Programme.	**1.5**
12	Incentive schemes for Integrated Pest Management.	**1.5**
13	Sewer discharge permitting and monitoring.	**1.4**
14	Educational campaign supporting objectives of the Single-Use Plastic Products Strategy for Malta 2021-2030 adopted in 2021.	**1.4**
15	Management of pressures from boating activity in coastal waters.	**1.2**
16	Enabling identification of substance-specific measures through a risk assessment process.	**1.0**
17	Setting of Environmental Quality Standards in sediments.	**0.2**
18	National guidance document on the application of WFD Article 4(7).	**0.1**

8.3.4. Prioritisation of Measures: Outcome for groundwater

The prioritisation exercise for the measures targeting the issues and objectives set for groundwater, highlight the relative importance of measures addressing the achievement of good Quantitative Status, which is an expected outcome given the specific challenges related to Water Scarcity and Droughts prevalent in the Malta River Basin District.

Interestingly water supply augmentation measures seem to generally rank higher than water demand management measures. This result is not totally unexpected, and could reflect the following considerations:

(i) Malta has already undertaken significant efforts to optimize water demand management during the 1st and 2nd RBMPs, resulting in one of the lowest per capita consumptions in the EU. Therefore, any further improvements in efficiency are difficult to achieve, given that the "low hanging fruits" have already been reaped, and

(ii) The water production sector has developed significantly during the last decade resulting in improved operational efficiency and hence lower operational costs, including the desalination of seawater, where energy requirements have been more than halved and the wastewater treatment sector where costs of technologies are falling as the market demand for such technologies increases. All this results in lower production costs, which improves the ranking of such measures.

The multi-disciplinarity nature of the assessment is also reflected in high rankings for measures such as rainwater harvesting, which usually tend to rank negatively when considered from an exclusive financial perspective. Hence the assessment framework provides due consideration to the social and environmental impact of the measures and ensures a better alignment with the broader objectives of the Water Framework Directive.

In addition, measures addressing the achievement of good Groundwater Qualitative Status, in particular measures addressing contamination by Nitrates and measures addressing seawater intrusion, are also highlighted by the prioritization framework utilized as part of this exercise. Once more this reflects the importance of these issues within the context of the Malta River Basin District.

Finally, the prioritization framework also results in a high consideration to stakeholder engagement measures which, although not providing a quantified benefit, are important in ensuring the coherent implementation of the Programme of Measures. This is considered as one of the positive outcomes of this exercise, once more highlighting the importance of the adoption of a comprehensive approach to the implementation the 3rd RBMP in full recognition of the multi-sectoral nature of this planning document.

The prioritised list of measures (Table 60 and Table 61) will be used to guide the implementation process of the Programme of Measures during the course of the 3rd RBMP. Although all the measures included in the 3rd RBMP are intended to be financed and implemented throughout the implementation cycle of this management plan, the prioritisation exercise enables a stronger case to be made to expedite matters for the implementation of the highest ranked measures during the initial years of the 3rd RBMP cycle given their relative importance and contribution to the achievement of this plan's objectives.

Table 60 *Scores attained from the prioritisation exercise for measures primarily contributing to achievement of the groundwater objectives.*

Measure ID	Name of Measure	W_{SI}	R_{SI}	T_{SI}	W_{CE}	R_{CE}	T_{CE}	W_{RE}	R_{RE}	T_{RE}	W_{CC}	R_{CC}	T_{CC}	W_{RK}	R_{RK}	T_{RK}	Score
019	Increasing the production capacity and plant upgrades of desalinated water for municipal supply purposes.	2	3	6	3	2	6	1	3	3	1	2	2	3	3	9	2.6
020	Optimising groundwater abstraction framework to reduce localized seawater intrusion.	2	3	6	3	2	6	1	2	2	1	2	2	3	3	9	2.5
021	Reducing leakages in the Municipal Water Network.	2	2	4	3	2	6	1	2	2	1	1	1	3	2	6	1.9
022	Optimisation of the Municipal Water Supply Network.	2	1	2	3	0	0	1	1	1	1	1	1	3	3	9	1.3
023	Increasing the production capacity of reclaimed water treatment plants (New Water) and the extension of the distribution network for reclaimed water.	2	3	6	3	2	6	1	3	3	1	2	2	3	2	6	2.3
024	Dissemination of information regarding New Water for irrigation at the Government Experimental Farm in Gozo.	2	1	2	3	3	9	1	1	1	1	0	0	3	3	9	2.1
025	Development of a National Water Efficiency label.	2	1	2	3	3	9	1	1	1	1	1	1	3	3	9	2.2
026	Support schemes for the uptake of greywater recycling systems in the domestic sector.	2	1	2	3	1	3	1	1	1	1	2	2	3	2	6	1.4
027	Support scheme for the restoration of rainwater harvesting facilities in the domestic sector.	2	1	2	3	1	3	1	1	1	1	2	2	3	3	9	1.7
028	Support scheme for the restoration of communal rainwater harvesting reservoirs by Local Authorities.	2	1	2	3	3	9	1	2	2	1	2	2	3	3	9	2.4

029	Support scheme for the uptake of greywater recycling systems in the commercial sector.	2	1	2	3	1	3	1	1	1	1	2	2	3	2	6	1.4
030	Revision of the existing regulatory framework for the construction of rainwater harvesting cisterns in new developments.	2	1	2	3	3	9	1	2	2	1	2	2	3	3	9	2.4
031	Household Water Consumption Audits.	2	1	2	3	3	9	1	1	1	1	1	1	3	2	6	1.9
032	Vulnerable Households Scheme.	2	1	2	3	2	6	1	1	1	1	1	1	3	3	9	1.9
033	Increase the accessibility to water consumption information.	2	1	2	3	3	9	1	1	1	1	0	0	3	3	9	2.1
034	Development of an interactive water-use game.	2	0	0	3	1	3	1	0	0	1	0	0	3	2	6	0.9
035	Support scheme for Voluntary and Sport Organisations to optimise water and energy consumption.	2	1	2	3	1	3	1	1	1	1	2	2	3	2	6	1.4
036	Technical support for small and medium sized enterprises to better manage energy and water use.	2	1	2	3	2	6	1	1	1	1	2	2	3	3	9	2
037	Support schemes for small and medium sized enterprises to optimise operational efficiency including in use of water and energy.	2	2	4	3	1	3	1	2	2	1	2	2	3	3	9	2
038	Support scheme for the uptake of efficient irrigation systems by the agricultural sector.	2	3	6	3	2	6	1	3	3	1	3	3	3	2	6	2.4
039	Use of remote sensing for crop water demand assessment.	2	2	4	3	0	0	1	0	0	1	1	1	3	2	6	1.1
040	Research and Innovation Scheme for the Energy and Water Sectors.	2	1	2	3	0	0	1	0	0	1	1	1	3	3	9	1.2
041	Upgrade of the National Hydrological Monitoring Network.	2	2	4	3	0	0	1	0	0	1	0	0	3	1	3	0.7

042	Development of a National Valley Management Plan.	2	1	2	3	1	3	1	3	3	1	2	2	3	3	9	1.9
043	Rehabilitation works in Valley Systems.	2	1	2	3	1	3	1	3	3	1	2	2	3	3	9	1.9
044	The development of technical guidelines for stormwater management and use of SUDS in the Maltese Islands together with the implementation of demonstration projects.	2	1	2	3	1	3	1	3	3	1	3	3	3	3	9	2
045	Support schemes for the promotion of Green Urban Infrastructure.	2	1	2	3	1	3	1	3	3	1	3	3	3	3	9	2
046	Managed Aquifer Recharge scheme in the Pwales Groundwater Body.	2	3	6	3	1	3	1	3	3	1	2	2	3	3	9	2.3
047	Educational Activities on Water Conservation.	2	2	4	3	2	6	1	0	0	1	1	1	3	3	9	2
048	Specific Research on Local Hydrology.	2	1	2	3	0	0	1	0	0	1	0	0	3	3	9	1.1
049	Economic Assessment of Environmental costs and benefits.	2	0	0	3	0	0	1	0	0	1	0	0	3	3	9	0.9
050	Establishing a Stakeholder Engagement Framework.	2	3	6	3	3	9	1	0	0	1	1	1	3	3	9	2.5
051	Drought Monitoring Framework.	2	0	0	3	0	0	1	0	0	1	1	1	3	3	9	1
052	Pilot study on the rehabilitation of perched aquifer springs as an irrigation water supply.	2	1	2	3	1	3	1	3	3	1	2	2	3	3	9	1.9
053	Development of a Groundwater Abstraction Licensing Framework.	2	3	6	3	2	6	1	3	3	1	2	2	3	3	9	2.6

Table 61 *Measures primarily contributing to achievement of groundwater objectives ranked on the basis of scores achieved.*

Priority	PoM	Score
1	Increasing the production capacity and plant upgrades of desalinated water for municipal supply purposes	2.6
2	Development of a Groundwater Abstraction Licensing Framework	2.6

3	Optimising groundwater abstraction framework to reduce localized seawater intrusion	**2.5**
4	Support scheme for the uptake of efficient irrigation systems by the agricultural sector	**2.4**
5	Establishing a Stakeholder Engagement Framework	**2.5**
6	Increasing the production capacity of reclaimed water treatment plants (New Water) and the extension of the distribution network for reclaimed water	**2.3**
7	Support scheme for the restoration of communal rainwater harvesting reservoirs by Local Authorities.	**2.4**
8	Revision of the existing regulatory framework for the construction of rainwater harvesting cisterns in new developments	**2.4**
9	Managed Aquifer Recharge scheme in the Pwales Groundwater Body	**2.3**
10	Development of a National Water Efficiency label	**2.2**
11	Dissemination of information regarding New Water for irrigation at the Government Experimental Farm in Gozo	**2.1**
12	Increase the accessibility to water consumption information	**2.1**
13	Reducing leakages in the Municipal Water Network	**1.9**
14	Household Water Consumption Audits	**1.9**
15	Technical support for small and medium sized enterprises to better manage energy and water use	**2**
16	Support schemes for small and medium sized enterprises to optimise operational efficiency including in use of water and energy	**2**
17	The development of technical guidelines for stormwater management and use of SUDS in the Maltese Islands together with the implementation of demonstration projects	**2**
18	Support schemes for the promotion of Green Urban Infrastructure	**2**
19	Educational Activities on Water Conservation	**2**
20	Vulnerable Households Scheme	**1.9**
21	Development of a National Valley Management Plan	**1.9**
22	Rehabilitation works in Valley Systems	**1.9**
23	Pilot study on the rehabilitation of perched aquifer springs as an irrigation water supply	**1.9**
24	Support scheme for the restoration of rainwater harvesting facilities in the domestic sector.	**1.7**
25	Support schemes for the uptake of greywater recycling systems in the domestic sector	**1.4**
26	Support scheme for the uptake of greywater recycling systems in the commercial sector	**1.4**

27	Support scheme for Voluntary and Sport Organisations to optimise water and energy consumption	**1.4**
28	Optimisation of the Municipal Water Supply Network	**1.3**
29	Use of remote sensing for crop water demand assessment	**1.1**
30	Research and Innovation Scheme for the Energy and Water Sectors.	**1.2**
31	Specific Research on Local Hydrology	**1.1**
32	Development of an interactive water-use game	**0.9**
33	Drought Monitoring Framework	**1**
34	Upgrade of the National Hydrological Monitoring Network	**0.7**
35	Economic Assessment of Environmental costs and benefits	**0.9**

8.4. Implementing this plan

The successful implementation of the programme of measures identified in the River Basin Management Plan relies on the commitment of all the identified entities and stakeholders. The 1st RBMP saw the establishment of an Inter-Ministerial Committee on Water, which oversaw the effective and timely implementation of this first plan. During the implementation cycle of the 3rd RBMP, the Inter-Ministerial Committee will actively continue to follow up on the execution of the measures included in this plan and the associated activities to ensure the progressive achievement of the environmental objectives set in this RBMP.

The main responsibilities of this Inter-Ministerial Committee on water shall include:

- To oversee the implementation of the water related directives and ensure the integration of the measures into each entity's business plan (including time frames for implementation).
- Advise on the integration of WFD principles and objectives in sectoral policies, plans, and programs and to recommend mechanisms that enable implementation of measures for adoption.
- Monitor the progress of implementation and report to the competent authorities and ministries.
- With the help of assisting sub-committees, identify constraints that hinder implementation and recommend alternative measures by reviewing subcommittees reporting and recommendations on implementation of respective measures.
- Inform the River Basin Management Plan implementation process of other issues that are likely to affect its implementation and the progress towards the achievement of the environmental objectives.

The successful implementation of the actions and measures identified in this management plan relies on the commitment of the several stakeholders, coming from a wide spectrum of activities, to work together. The join commitment towards the achievement of the good status of our natural water resources and the associated environmental objectives will allow the successful implementation of this 3rd RBMP.

Annexes

Annex 1 – Main drivers, and related pressures, affecting Malta's surface waters.

DRIVER	PRESSURE		DESCRIPTION	TYPE OF SURFACE WATER BODY AFFECTED			
				COASTAL WATERS	TRANSITIONAL WATERS	WATER-COURSES	POOLS
Agriculture	Diffuse pollution	Agricultural run-off	Rainwater runoff from agricultural land	✓	✓	✓	✓
		Atmospheric Deposition		✓	✓	✓	✓
	Abstraction or flow diversion	Flow diversion	flow diversions			✓	
	Hydromorphological Alterations	Physical Alteration of channel/bed/riparian area/shore	Modifications to banks/substrate for soil/water retention		✓	✓	✓
		Dams, barriers, and locks	Dams and weirs for water retention			✓	
		Hydrological Alteration	Historical drainage of floodplains for agriculture		✓		
Energy – non-hydropower	Point source of pollution	Point source discharges	Discharge of cooling waters and treated rainwater from interceptors	✓			
	Abstraction or flow diversion	Cooling water	Seawater intake for power station's cooling waters	✓			
	Hydromorphological Alterations	Physical Alteration of channel/bed/riparian area/shore	Land reclamation and coastline/substrate modifications linked to power station and related fuel supply	✓			
		Hydrological Alteration	Water transfer effects from cooling waters outfall	✓			
Fisheries and Aquaculture	Point source of pollution – Aquaculture	Mariculture farms	Organic pollution from fish faeces and, in the case of the tuna farms, un-eaten feed-fish	✓			

DRIVER	PRESSURE		DESCRIPTION	TYPE OF SURFACE WATER BODY AFFECTED			
				COASTAL WATERS	TRANSITIONAL WATERS	WATER-COURSES	POOLS
Flood Protection	Point source of pollution	Flood relief project discharge	Urban runoff collected from catchment diverted and discharged through flood relief infrastructure	✓			
	Hydromorphological Alterations	Physical alteration of channel/bed/riparian area/shore OR Dams, barriers, and locks			✓		
Industry	Point Source of pollution	IED plants	Effluent discharges from IED plants	✓[130]			
		Non IED plants	Effluent discharges from non-IED plants	✓			
		Contaminated sites or abandoned industrial sites	Coastal abandoned dumpsites (assumed to be contaminated)	✓			
	Diffuse pollution	Contaminated sites or abandoned industrial sites	Inland abandoned dumpsites (assumed to be contaminated)	✓			
		Atmospheric Deposition		✓	✓	✓	✓
Transport	Diffuse pollution	Urban run-off	Pollution in rainwater run-off from transport infrastructure in urban and industrial areas, including from roads and petrol stations.	✓	✓	✓	✓
		Pollution from navigation	Chronic pollution from oil spills/leakage at bunkering sites, marinas, moorings, and ports	✓			
		Atmospheric Deposition		✓	✓	✓	✓
	Hydromorphological Alterations	Physical alteration of channel/bed/riparian area/shore	Land reclamation and other physical alterations to water bodies linked to	✓	✓	✓	

[130] Malta's power stations, which are also considered under Energy (non-hydropower).

DRIVER	PRESSURE		DESCRIPTION	TYPE OF SURFACE WATER BODY AFFECTED			
				COASTAL WATERS	TRANSITIONAL WATERS	WATER-COURSES	POOLS
			transport infrastructure (quays, roads); Dredging to maintain depths for navigation.				
Urban Development	Point Source	Urban wastewater	Discharges from national urban wastewater treatment plants	✓			
		Stormwater overflows		✓	✓	✓	
		Waste disposal sites	Spoil ground	✓			
		Other	Brine discharges from national desalination plants and hotels	✓			
	Diffuse pollution	Urban run-off	Pollution in rainwater run-off from urban and industrial areas	✓	✓	✓	✓
		Atmospheric Deposition		✓	✓	✓	✓
	Abstraction or flow diversion	Public water supply	Abstraction through boreholes or seawells for public water supply (national desalination plants; hotels)	✓			
	Hydromorphological Alterations	Physical alteration of channel/bed/riparian area/shore	Land reclamation and other physical alterations to water bodies linked to urban development	✓	✓		
		Hydrological alteration	Water transfer effects from UWWTP and RO discharges	✓			
Various	Introduced species and diseases		Monocultures of the great reed *Arundo donax*; domestic ducks		✓	✓	✓
			Dumped specimen/ escapees from aquaria	✓			✓
			Introduction of non-indigenous species from ballast waters and hulls	✓			

DRIVER	PRESSURE	DESCRIPTION	TYPE OF SURFACE WATER BODY AFFECTED			
			COASTAL WATERS	TRANSITIONAL WATERS	WATER-COURSES	POOLS
Various	Exploitation or removal of animals or plants	Recreational fishing; Commercial fishing	✓			
Various	Litter or fly tipping	Litter linked to agriculture (agricultural plastic, empty pesticide/fertiliser containers, organic waste)		✓	✓	✓
		Litter linked to tourism and recreational activities	✓	✓	✓	✓
		Lost/discarded fishing gear; litter via stormwater discharges	✓			

Annex 2 – List of priority substances monitored in coastal waters.

PRIORITY SUBSTANCES IN WATER	
Benzene	Aclonifen
Fluoranthene	Bifenox
Lead and its compounds	Cybutryne
Mercury and its compounds	Cypermethrin
Naphtalene	Dichlorvos
Nickel and its compounds	Dicofol
Benzo(a)pyrene	Hexabromocyclododecane (HBCDD)
Benzo(b)fluoranthene	Heptachlor epoxide
Benzo(g,h,i)perylene	Heptaclor
Benzo(k)fluoranthene	Perfluorooctanoic acid (PFOA)
Indeno(1,2,3-c,d)pyrene	Quinoxyfen
1,2-Dichloroethane	Terbutryn
Dichloromethane	
Trichloromethane	
PRIORITY SUBSTANCES IN SEDIMENT	
Anthracene	Brominated Diphenylethers
Cadmium and its compounds	Polychlorinated Biphenyls
Lead and its compounds	Di(2-ethylhexyl)phthalate
Mercury and its compounds	Tributyltin
Nickel and its compounds	Dicofol
Naphtalene	PFOA and its compounds
Fluoranthene	Quinoxyfen
Benzo(a)pyrene	Sum of PCBs Dioxin-like
Hexachlorocyclohexane	Summation PCDD + PCDF
Hexachlorobenzene	Cypermethrine
Hexachlorobutadiene	Hexabromocyclododecane (HBCDD)
Pentachlorobenzene	Heptachlor
Sum of PAH	Heptachlor epoxide
C10-C13 Chloroalkanes	
PRIORITY SUBSTANCES IN BIOTA	
Lead	Sum of PCBs Dioxin-like
Cadmium	Dicofol
Mercury	Perfluorooctanoic acid (PFOA)
Hexachlorobenzene	Summation PCDD + PCDF
Hexachlorobutadiene	Hexabromocyclododecane (HBCDD)
Tributyltin	Heptaclor
Fluoranthene	Heptachlor epoxide
Benzo(a)pyrene	

Annex 3 – List of LIFE 16 IPE MT 008 project Actions that are supporting the 3rd RBMP's Programme of Measures.

ACTION CODE	LIFE ACTION NAME	RELEVANCE TO PROGRAMME OF MEASURES
A1	Assessment of the Sectoral Water Demand in Malta and Gozo	The objective of this action is to characterise past, present, and future national water demand by the most important water use sectors in the Maltese islands which are the touristic, domestic, agriculture and industrial/commercial sectors. Each sector was analysed historically, and a demand forecast was developed and projected for the next 50 years through the development of econometric water demand models. These models correlated water demand with expected and prevailing trends in related socio-economic and environmental factors.
A2	Market research on water demand management technologies	Action A2 involved a research and surveying exercise on the availability of water demand management technologies (including devices and appliances) in the local and foreign market, and how likely they are to be utilised by the main water using sectors in the Maltese islands. The main objective was to report the market infiltration rates of water efficient technologies in Malta and outline potential alternative technologies which might be considered/supported to enhance their future infiltration in the market.
A4	Stakeholder assessment and perception survey	Under this action a perception survey was held to gather perceptions and attitudes of the main stakeholder and water users in the Malta River Basin District. The exercise will aim to identify representative organisations for the main water using sectors such as the residential, agricultural, foreign, and tertiary sectors.
A5	Mapping of industrial polluting activities	The main aim of this action was to carry out a chemical profiling assessment of industrial wastewater discharges in Malta, in order to obtain a clear picture of the types and main constituents of liquid waste waters being generated by local industry. This exercise helped to assess the adequacy of treatment systems currently in use by industry and to suggest new locations for the construction of future industrial sewage treatment plants.
A6	Development of a monitoring strategy for contaminants of emerging concern	Action A6 developed a monitoring strategy at a national river basin district scale for contaminants of emerging concern in four water categories, namely surface waters (coastal and inland surface waters), rainwater runoff, groundwater, and new water (highly polished water resulting from urban wastewater treatment). The results of this action were intended to develop monitoring processes to be implemented through associated Action C.18: *Monitoring for emerging pollutants of potential concern* (explained further in this table), that shall be completed within the timeframe of the project.
A7	Development of a hydrographic model for Malta's marine waters	This preparatory action is intended to design and propose an implementation plan for the setting up of an observing and numerical modelling framework for the Maltese Islands. The proposed systems are intended to be applied to Malta's marine waters with a view to determine baseline hydrographical conditions for Maltese waters, serving to address the assessment processes and objectives for good environmental status of coastal and marine waters.
A8	Catchment modelling	The scope of catchment modelling is to develop a long-term vision for the protection, conservation, and rehabilitation of Malta's valleys. Moreover, the action formulated plans and guidelines for the management and maintenance of catchments, sub-catchments and valley stretches based on the notion of River Basin Management Planning. The project will also identify, assess, and categorise ecosystem services provided by each catchment.
A9	Groundwater modelling	The aim of this action was the development of 3D-Numerical Groundwater models of the Malta MSLA, the Gozo MSLA and the Pwales coastal aquifer system. Furthermore, the action focused on the training of personnel in the development, calibration, and use of the developed numerical models.
C1	Household visits - water consumption awareness	This action includes a nationwide campaign wherein households are visited by officers from the Energy and Water Agency who share their expertise and knowledge on how to reduce water and energy consumption. These visits provide the occupier with useful advice on water conservation and the efficient use of water consuming appliances within the building envelope. Furthermore, the utility bills are reviewed and checked to analyse the consumption pattern within the household. The officers also recommend physical changes within the property

		that further lowers water consumption, it is then up to the owner's own initiative whether to take them on board or not.
C2	Water Eco-label Scheme	With this, a voluntary water labelling strategy is being developed aiming to promote water efficient devices and appliances so as to empower consumers with verifiable information. This is also aligned with the measures in Malta's 2nd River Basin Management Plan which also provides awareness and education on water conservation, in particular targeting the issue of water scarcity and other challenges. The main expected result is that the designed Water Eco Label is displayed in the majority of retail outlets selling water-using devices, providing consumers with verifiable information on water consumption characteristics. Increasing awareness of the Water Eco Label, the issue of water scarcity in the Maltese Islands and household water consumption, is expected to occur through publications, promotional material, and a media campaign. Another expected result is an online registration for retailers and an online platform which will list the retail outlets importing efficient water-using devices.
C3	Remote sensing for agricultural water demand	The objective of this action is to create an online tool for the management of water in the agricultural sector. This will be achieved by developing a crop-map to help explain the dynamics and interplay of cropping, irrigation, and climate. The approach adopted shall be based on the use of optical and near-infrared Earth Observation Satellite data. This action shall provide a new approach towards the management of agricultural water demand and will be achieved through the development of an online based tool which makes use of multi-platform satellite imagery, particularly from the ESA Copernicus program and PlanetScope.
C4	Water Educational Campaign	The objective of the action is to raise awareness on the scarcity of natural water resources in the Maltese islands and also promote water conservation to the younger generations and the general public. A number of Educational Programmes are carried at the Għajn National Water Conservation Awareness Centre (Rabat, Malta), together with the branding, design, and printing of a number of educational materials. Training seminars to educators have been carried out and have tackled mainly the significant water management issues on the Maltese Islands and how the activities at the Għajn Centre can be tied to teachers' teaching schemes as part of their curriculum.
C5	Water App/Water Game	The main objective of this action is to focus on consumer trends and nudge consumers towards behavioural changes that contribute to more efficient water usage in households. The action thus seeks to educate consumers on ways to improve water use and cost through a medium (smartphone/tablet) which is widely used by consumers throughout the day. Such applications should indirectly make users more aware of their water consumption. The water game will have the same focus as the water app but will be directed to children aged 8-10.
C6	Demonstration site for the application of new water resources – Gozo	This action proposes the development of a demonstration site at the Government Experimental Farm in Gozo for the application of New Water for agricultural irrigation. The centre will include an advanced irrigation and fertigation system capable of supplying different water resources to different crop typologies. The trials and tests conducted will help establish a link between the use of borehole water and new water in the agricultural sector. This activity will provide a showcase with tangible examples on the correct and safe application of New Water by different users.
C7	Sustainable Urban Drainage Systems	This action is expected to yield a Strategic Framework Document that identifies opportunities for the implementation of SUDS in the Maltese Islands and includes the development of a multi-disciplinary assessment tool for SUDS selection. In addition, this action is expected to deliver three types of Demonstration prototype SUDS (Rural SUDS, RetrofitSUDS and Urban SUDS) in distinct Geographical Areas that are representative of a wider spectrum of sites that makes up the Maltese urban-rural profile. Finally, the production of a set of design guidelines and best practices is intended as a broad basis for the replication of SUDS in similar settings, both locally and in other regions of the EU and other Mediterranean climate regions.
C8	Development of a managed aquifer recharge scheme in Pwales groundwater body	Action C8, is the development of a Managed Aquifer Recharge (MAR) Scheme in the Pwales Coastal Groundwater Body in the North of Malta which is envisaged to have a positive impact on the quantitative and qualitative status of the Pwales groundwater body and will act as a pilot for the development of further MAR schemes in Malta. This aquifer system, due to its hydrologically isolation and

		anthropogenically highly impacted nature has been identified in the studies leading to the formulation of Malta's 2nd River Basin Management Plan as one of the ideal sites for the undertaking of an initial application of MAR techniques on a groundwater body scale.
C9	Valley Management Plan	This action will set up two pilot projects, one in Malta and one in Gozo. These will serve as case studies to monitor the effectiveness of the masterplans and technical guidelines developed within the Catchment Modelling action (Action A8). The pilot sites will be selected based on the ecosystem services evaluation carried out in the Action A8, which will rank valleys and sub-catchments according to ecosystem services and socio-economic values provided, and information gathered during the creation of the masterplans, including stakeholder feedback.
C10	Industrial discharges – enforcement augmentation and sustainability	The main scope of this action will be the building-up of the technical capacity of the Discharge Permit Unit (DPU) and the Laboratory in its supporting function within the Water Services Corporation, in terms of personnel, equipment, procedures and more in-depth knowledge about the challenges faced by the sewer network. This will allow the DPU to direct its efforts towards those areas which are contributing to the worsening of sewage quality. The result of this action will increase the potential production capacity of New Water through the improvements brought about by better and more effective enforcement by the DPU.
C11	Exploitation of deep saline aquifers	Action C11 includes the development of a pilot abstraction, treatment, and discharge system to enable the exploitation of deep saline groundwater. Malta's most important aquifer system, the Mean Sea Level aquifer system, consists of a freshwater lens floating on seawater and therefore this aquifer is bounded by saline water at the sides and the bottom. Recent technological improvements are making the exploitation of this saline water possible. This could offer an important opportunity for the development of alternative means of supply to the currently available sources of water, thus alleviating the pressure on natural water resources.
C12	Heating and cooling installations	This action shall develop a closed loop heating and cooling pilot system to allow for an assessment of the impact of the plant's operation on a coastal aquifer system. With the increasing focus on energy efficiency, the use of the subsurface for heating and cooling applications is increasingly being considered as a potential solution to increase the energy efficiency of this process. Furthermore, in a coastal environment the discharge of heat can potentially induce convection currents which could facilitate the ingress of saline waters in the fresh groundwater lens.
C13	Restoration of one of the coastal wetlands	This action seeks the restoration of an important costal wetland Il-Ballut ta' Marsaxlokk. This measure addresses the assessment and restoration of the hydro morphological elements pertaining to the coastal wetland, through water quality analysis, the study of current hydrological regimes and associated coastal erosion processes, thereby enabling the identification of the possible interventions and alternative solutions targeting the restoration of coastal wetlands.
C14	Anchoring and mooring surveys	Anchoring and mooring activity is generally associated with the pressures on the seabed habitats, occurring through physical damage. While the impacts of such activities are widely known, this pressure has not been quantified on a national scale. This action will address this knowledge gap by surveying and mapping the marine waters which are subject to mooring/anchoring activity. Furthermore, within selected areas, the habitat types that are likely to be affected through such activity will be identified and assessed for resulting impacts. The identified impacts shall be addressed through the identification of management options as applicable to different scenarios.
C15	Impact of reverse osmosis discharges on the marine environment	The objective of this action is to investigate and determine the impact of brine discharge from Reverse Osmosis plants to the marine environment. These plants are located on different parts of the Maltese coastline and the reject water of this process (brine) is being discharged into the coastal water surrounding the islands. The sampling programme shall cover a period of two years to ensure that the sampling program captures any seasonal variations in the quantity of brine being discharged into the marine environment and due consideration is given to the changing hydrodynamic conditions and their effect on brine and seawater mixing.
C16	Hydrographic model simulations for Malta's marine waters to quantify and investigate	The objective of this action is to set up and run basic elements of the modelling and observation systems required to develop the baseline hydrographic knowledge for Malta's nearshore and offshore waters, and to use this baseline data to characterise pressures and impacts on the marine environment.

	pressures in the marine environment	
C17	Multi-stakeholder platform	This action has established a multi-stakeholder water table meeting involving both stakeholders from the public and private sectors (including entities, water user associations and e-NGOs) who meet regularly to assess the progress achieved in the implementation of the LIFE IP and the 2nd RBMP, and focus on the development of the 3rd RBMP, to discuss potential ways in which this implementation process can be optimised.
C18	Monitoring for emerging pollutants of potential concern	The objective of this action is to implement a monitoring framework for contaminants of emerging concern in a number of water categories (surface waters, ground water, rainwater runoff and new water) as developed under Action A.6 at a national river basin district scale.
C19	Smart Utilities Pilot Project	This pilot project will test whether the new technologies (such as smart meters) adapt to national households, based on the 100 samples. The aim of this pilot project is to investigate whether the new technology can provide responsive real time consumer data. It will also reinforce the water demand management framework introduced under Malta's 2nd RBMP. This is in line with the EU's Water Scarcity and Droughts policies which place additional emphasis on water demand management measures to address pressures arising from the scarcity of water resources.
C21	Greenshield - Transforming Malta in a Green Flood Resilient Community	This action's main objective is to build on the results of the Green Stormwater Infrastructure (GSI) Guidance Manual, to design and deploy a hydrological-hydraulic model for the identification of the most suitable locations and for the design of models of GSI in the Maltese landscape. The model will consider different scenarios for the establishment of an economically optimal level of the application of GSI, thereby promoting green infrastructure and nature-based water retaining systems for mitigating flood risks in the Maltese Islands.
E5	Public and stakeholder engagement activities	Action E5 entails the development of a project identity and presentation framework to define the presence of the project at the local, national, and international dimension. The implementation of this framework will ensure the development of a project image (branding) which will be used in the development of various dissemination activities both at project and action level, thus ensuring continuity in the dissemination activities.