



# Targeting Measures for Water Quality Outcomes

*Analysis of the gap to achieving  
Water Framework Directive Environmental Objectives*

# ENVIRONMENTAL PROTECTION AGENCY

The EPA is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

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- Oversee the implementation of the Environmental Noise Directive;
- Assess the impact of proposed plans and programmes on the Irish environment.
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- Coordinate and fund national environmental research activity to identify pressures, inform policy and provide solutions;
- Collaborate with national and EU environmental research activity.

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- Office of Environmental Sustainability
- Office of Environmental Enforcement
- Office of Evidence and Assessment
- Office of Radiation Protection and Environmental Monitoring
- Office of Communications and Corporate Services

The EPA is assisted by advisory committees who meet regularly to discuss issues of concern and provide advice to the Board.



# **Targeting Measures for Water Quality Outcomes - Analysis of the Gap to Achieving Water Framework Directive Environmental Objectives**

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## Executive summary

The EPA has carried out an analysis of the likely water quality outcomes that may be achieved as a result of the measures outlined in the 3<sup>rd</sup> Cycle Water Action Plan 2024: a river basin management plan for Ireland (RBMP, the Plan). The forecast analysis is a snapshot in time largely based on the best available information on the measures being implemented as of September 2023, as included in the draft RBMP.

The final Water Action Plan, which was published in September 2024, has been informed by, and includes information from, the EPA's gap analysis of the draft Plan.

The analysis forecasts the number of waterbodies that are likely to achieve their 2027 status objectives, and those that are likely to show improvements, so that an assessment can be made of the gap to achieving Water Framework Directive (WFD) environmental objectives.

The analysis depends on assumptions being made about how the measures in the Plan will be implemented, for example where measures are voluntary. Improved information on the measures being implemented will allow the forecasts to be further refined over time.

The 2021 characterisation assessment (see the EPA report '[Update on pressures impacting on water quality](#)') identified there were 2,610 waterbodies, out of a total of 4,842 waterbodies (54%), which had met their objectives. These waterbodies require ongoing basic measures to protect water quality.

Of the remainder, 1,649 (34% of the total) were categorised as being At Risk of not achieving their objectives and had evidence available to determine the water quality issue(s) and the pressure(s) that needs to be addressed. These waterbodies are prioritised in the Plan for measures to restore water quality. The other 583 waterbodies are in Review, which means additional evidence is required to confirm the nature of any water quality issues and the impacts from any relevant pressures.

This analysis highlights three types of gaps to achieving WFD water quality targets: the measures gap, the effectiveness gap, and the evidence gap.

### 1. The measures gap:

The measures gap applies where waterbodies which are At Risk do not have specific, targeted measures, either in place or planned, to address the pressures by 2027. Of the 1,649 waterbodies that are At Risk, 864 (52%) are forecast to have not achieved the 2027 objectives due to this measures gap. The waterbody-scale pressures without specific targeted measures include for example hydromorphological pressures, urban-runoff pressures, urban wastewater, and invasive species. Note that a waterbody can have more than one of these significant pressures.

### 2. The effectiveness gap:

The effectiveness gap occurs where a measure is planned, but it is not likely to be 100% effective to achieve the environmental objective in all waterbodies where the pressure applies. This type of gap arises due to uncertainties about the level of uptake and implementation of the required measures, for example where they are voluntary, or where there are other external factors governing their implementation.

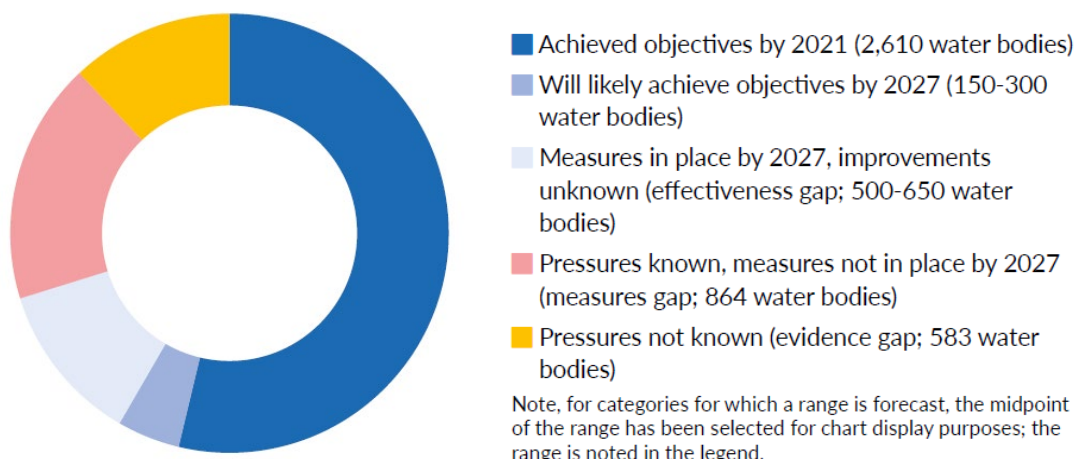
The forecast for the effectiveness gap ranges from 0 to 690 At Risk waterbodies, depending on the scenario and the assumptions about implementation that are selected. Five forecast scenarios were run based on a range of effectiveness rates from Low (10%) to 100%. Although there is a lack of information on the rate of effectiveness of many measure types, the medium (20%) and high (30%) effectiveness rates represent the most likely outcomes, based on the rates of improvements in water quality to date in response to the measures that are currently in place. These forecasts can be refined at the catchment scale as LAWPRO progress the development of the 46 catchment management plans with the implementing bodies.

### 3. The evidence gap:

The evidence gap applies to the 583 waterbodies (12%) which are in Review where further investigation is needed to confirm the water quality impacts, and the pressures, before the measures and their effectiveness can be assessed. The monitoring and assessment of the Review waterbodies is on-going to gather the evidence to determine the impacts, pressures, and measures.

The outcomes of this assessment are that out of the 1,649 At Risk waterbodies that have not met their objectives, between 150 and 300 waterbodies are likely to meet their water quality targets by 2027 as a result of the Programme of Measures. A further 500-650 waterbodies will have specific, targeted measures planned and may see some water quality improvements, even if that is not to the level required to meet the status objectives. Therefore, a total of approximately 800 At Risk waterbodies have the potential for some water quality improvements. Just over 850 waterbodies (864) are unlikely to have specific, targeted measures at waterbody level planned and are therefore very unlikely to achieve their status objectives by 2027. The remaining 2,610 waterbodies of the total of 4,842 waterbodies, had met their objectives in 2021. The analysis does not forecast which waterbodies may decline in quality over the period and no longer meet their objective.

### Closing the Gap: Forecast of Waterbodies Achieving WFD Objectives



**Figure S1. Approximate proportion of waterbodies that are forecast to have achieved their WFD objectives by 2027. Note, for categories for which a range is forecast, the midpoint of the range has been selected for chart display purposes; the range is noted in the legend.**

These forecasts can be refined at the catchment scale as the proposed catchment management plans are rolled out. Tracking and reporting on progress with measures implementation will be important during the 3<sup>rd</sup> cycle, so that water quality outcomes of the measures can be assessed, and assumptions about the effectiveness of measures can be further refined.

*The authors acknowledge feedback received during the development of this assessment from the Department of Housing, Local Government and Heritage and members of the WFD Implementation Structures, including LAWPRO.*



## 1 Introduction

Under the Water Framework Directive (WFD), water quality objectives are to be achieved in all waterbodies by 2027 at the latest, subject to a limited number of circumstances where exemptions may apply. The Water Action Plan 2024: a river basin management plan for Ireland for 2022-2027 (RBMP, the Plan) sets out the State's Programme of Measures to protect and restore water quality.

The EPA has carried out an assessment of the likely water quality outcomes arising from the Programme of Measures as described in the Plan. The purpose of this assessment was to help inform the development of the Plan, and the setting of the environmental objectives, and for developing a framework for tracking progress with the implementation of the Plan.

The focus for water management in Ireland is on targeting 'the right measure in the right place'. Technical evidence generated by the EPA, local authorities, Inland Fisheries Ireland, and other state agencies has been used to identify the scale of action required to significantly improve water quality and most importantly where the measures should be deployed.

Some examples of the key mitigation measures specified in the plan include:

- Reduce the nitrogen load (tonnes) needed to achieve the Environmental Water Quality Standard of 2.6 mg/l N in the downstream estuaries by 2027 in the catchments of concern identified by the EPA assessment (reduce N losses by up to 50% to water).
- Reduce the mass loading of phosphate and sediment by establishing a minimum of 2,500 linear kilometres of water interception measures (woodlands for water), representing 3% of all river channels.
- 20,000 hectares of voluntary water table management on organic soils that could be prioritised to deliver multiple benefits for water, climate, and biodiversity.
- Mitigating approximately 5% (270) of the 2,000-7,000 problem structures/barriers on rivers
- A sustained high level of investment by Uisce Éireann in wastewater infrastructure to address deficits and future growth needs.

The EPA has assessed what the measures outlined in the Plan are likely to achieve in terms of water quality outcomes, and where the gaps are so that they can be further considered by the appropriate bodies.

This 'gap analysis' depends on knowing what the water quality issues are, and what measures are in place, or committed to, to address them. Assumptions have been made as to when and where those measures will be implemented, and what they might achieve in terms of water quality outcomes, based on the available evidence on how effective the measures have been to date and assistance from the implementing bodies, the Department of Housing, Local Government and Heritage (DHLGH) and the Local Authorities Waters Programme.

The analysis will be used as the basis for the EPA to track progress with the water quality outcomes of the plan throughout the 3<sup>rd</sup> cycle and will inform the reporting obligations to the Commission. The DHLGH has included commitments to review progress with the implementation of the Programme of Measures with the assistance of the WFD Implementation Structures (see Section 5 of the Plan).

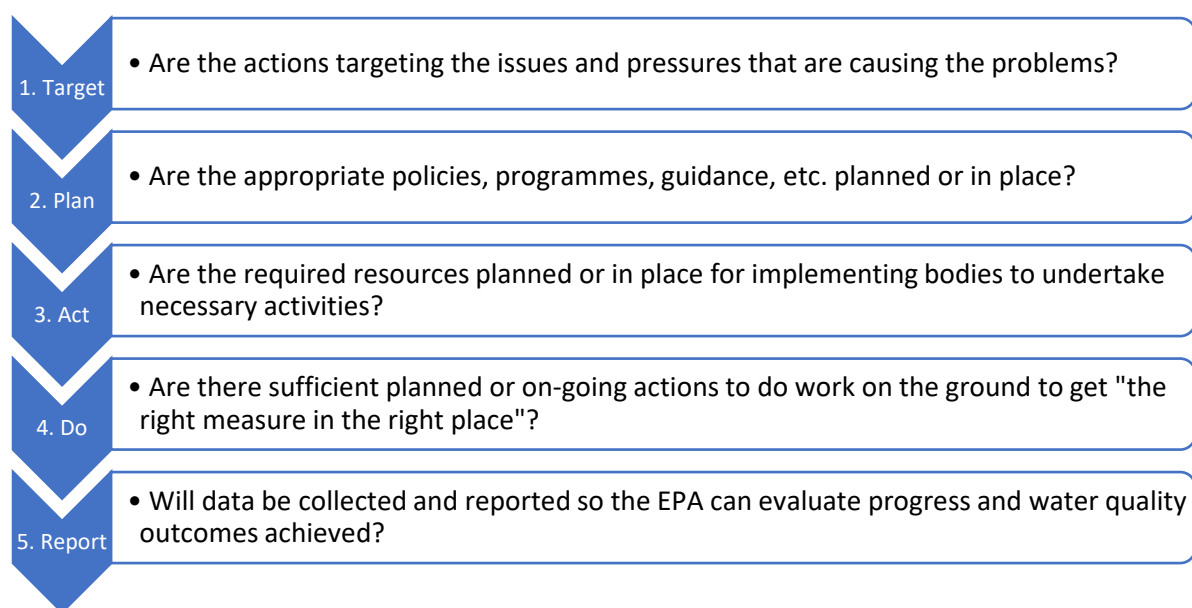
### 1.1 Overview of the gap analysis

There are many actions in the Plan which aim to support the protection of water resources but in practice, not every measure is likely to be applied everywhere it is needed, for example where the

measures are voluntary. In addition, they may or may not be sufficient in every situation to improve the waterbody enough to achieve the water quality outcomes that are needed. Some measures relate to carrying out further assessments, some involve strengthened legislation, the development of more granular sectoral action plans, additional resources, and the provision of additional appropriate advice. Other measures require actions on the ground.

Ireland's complex geology, soils and landuse means that certain measures must be tailored and targeted to the specific issues and physical conditions in each waterbody catchment where water quality problems arise. This is the basis for the principle underpinning the plan of 'the right measure in the right place' and is also the foundation of the gap analysis.

A five-step framework has been developed by the EPA's Water Programme to assess what the actions in the plan are likely to achieve in terms of waterbody objectives by 2027, and what gaps may need to be filled to strengthen the Programme of Measures (Figure 1).



**Figure 1. The 5-steps to implementing the right measure in the right place for water quality outcomes.**

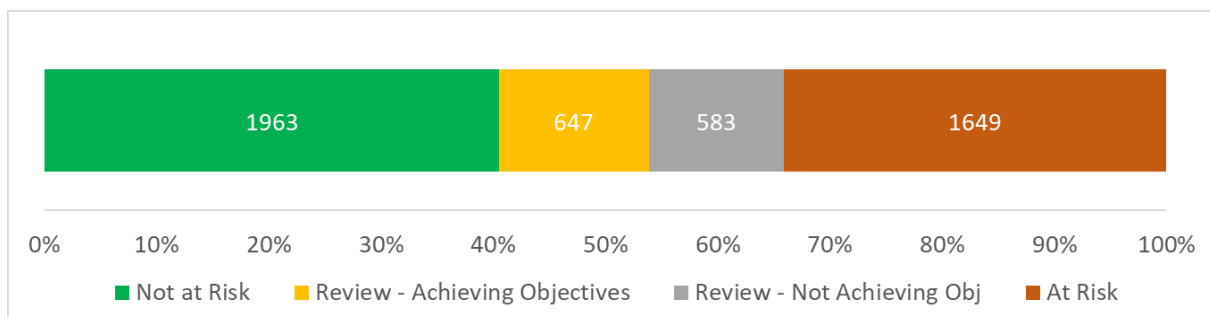
These steps are used to guide the assessment of where actions on the ground are likely to result in water quality improvements. For each waterbody that requires improvement, the characterisation process has identified the issues and pressures that are causing the problems (step 1). Where a measure has the appropriate plans and programmes in place to address the issues (step 2) and the required resources are in place or will be before 2027 (step 3) for implementing bodies to undertake action on the ground (step 4), then the measure is referred to as a 'specific, targeted measure' with respect to achieving water quality outcomes. In the final step 5, information on the actions taken and monitoring data can be used over the 3<sup>rd</sup> cycle to evaluate and report on the actual environmental outcomes achieved. Some examples of the key measures in the plan are summarised within this framework in Appendix 1, coloured to indicate progress towards implementation. This framework can be used in the proposed 46 catchment management plans to map progress with implementation of measures, at the catchment scale.

A key part of the analysis is establishing the underlying assumptions about the measures, how they are implemented, and how effective they may be at achieving the required environmental outcomes

within the required timeline. In the following section of this report, the assumptions about measures, implementation dates and the resulting environmental outcomes are outlined for each pressure type (Sections 2 to 11).

This analysis maps all the waterbodies that are impacted by different issues and are not meeting their environmental objectives, with the pressures and measures in place to address them, to forecast the environmental outcomes for each waterbody by 2027. An environmental objective date of 2027 may be assigned for a waterbody where a specific, targeted measure is, or will be, in place by 2027 for all significant pressures in that waterbody. Where there are multiple pressures with different measures and implementation dates, the objective date is set based on the latest measure to be implemented.

The 2021 characterisation assessment identified there were 2,610 waterbodies, out of a total of 4,842 waterbodies (54%), which had met their objectives and need protect measures. Of these, 1,963 waterbodies were Not at Risk (40%), and 647 were in Review with a watching brief, for example where a water quality indicator may suggest a change, but the risks need to be reviewed at the next full assessment. There were 1,649 waterbodies At Risk (34%) of not meeting their objectives that require measures to restore water quality. An additional 583 waterbodies were in Review and were also not achieving their objectives (Figure 2) but further evidence is needed before targeted measures can be assigned.



**Figure 2. Summary of the proportion of waterbodies meeting their objectives (Not at Risk and Review – Achieving objectives) and not meeting their objectives (Review – Not achieving objective and At Risk).**

This analysis highlights three types of gaps to achieving WFD water quality targets:

**1. The measures gap:**

The measures gap relates to waterbodies which are At Risk but which do not have specific, targeted measures, either in place or planned, to address the pressures by 2027. Of the 1,649 waterbodies that are At Risk, 864 (52%) are forecast to have not achieved the 2027 objectives due to this measures gap. The waterbody-scale pressures without specific targeted measures include hydromorphological pressures (448), urban-runoff pressures (194), urban wastewater (197) and invasive species (48). Waterbodies outside of LAWPRO Areas for Action that have pressures that require further characterisation are also included. Note that a waterbody can have more than one of these significant pressures.

## 2. The effectiveness gap:

The effectiveness gap occurs where a measure is planned, but it is not likely to be 100% effective to achieve the environmental objective in all waterbodies where the pressure applies. This type of gap arises due to uncertainties about the level of uptake of the measures, for example where they are voluntary, or where there is lack of information on the scale implementation of the required measures, or where they are dependent on other external factors governing their implementation.

The forecast for the effectiveness gap ranges from 0 to 690 At Risk waterbodies, depending on the scenario and assumptions selected (see Section 1.2). A range of assumptions is required regarding which measures, and therefore which waterbodies, will achieve the necessary environmental outcomes within the 2027 timeline. Five forecast scenarios were run based on Low (e10), Medium (e20), High (e30), Very High (e40) and 100% (e100) effectiveness rates (ER). Although there is a lack of information on the rate of effectiveness of many measure types, the medium (e20) and high (e30) effectiveness rate represent the most likely outcomes, based on the rates of improvements in water quality in response to the measures that are currently in place. These forecasts can be refined at the catchment scale as LAWPRO progress the development of the 46 catchment management plans with the implementing bodies.

## 3. The evidence gap:

The evidence gap relates to the 583 waterbodies (12%) which are in Review where further investigation is needed to confirm the presence and type of significant issues and pressures, before the measures, and ultimately their effectiveness, can be assessed. The monitoring and assessment of the Review waterbodies is on-going to gather the evidence to determine the risk, issues, pressures and need for targeted measures.

## 1.2 Forecast scenarios

There is a lack of information on the implementation of some measures, particularly for agriculture and other diffuse-type pressures in the landscape, which impedes the forecast of future effectiveness rates. As some of these measures are voluntary or are dependent on other external factors governing their implementation, assumptions are required regarding which measures, and therefore which waterbodies, will achieve the necessary environmental outcomes within the 2027 timeline. A series of effectiveness rates have been simulated in five forecast scenarios to indicate the likely range of improvements that may be expected. Five forecast scenarios were run based on Low (e10), Medium (e20), High (e30), Very High (e40) and 100% (e100) effectiveness rates (ER).

In contrast, many regulated activities have individual site-specific assessment of the mitigation measures likely to be implemented by 2027 (including all UWW and some licenced industry discharges), and these expected outcomes have been applied consistently across all the forecast scenarios. For example, where an UWW upgrade measure is planned to mitigate a significant pressure by 2027, this information is applied to that waterbody in all scenarios.

As more data on the implementation of targeted, specific measures becomes available for all pressure types, the expected outcomes can be updated based on the evidence, and the use of the forecasted scenario effectiveness rates can be reduced. The Catchment Management Plans proposed in the RBMP, with their associated Sectoral Action Plans, may support future assessments of the effectiveness of mitigation measures.

In the absence of adequate specific information on the implementation of measures and subsequent water quality outcomes, the following five scenario examples are selected for this forecast assessment:

1. Forecast Scenario e10: low effectiveness rate of 10%.
2. Forecast Scenario e20: medium effectiveness rate of 20%.
3. Forecast Scenario e30: high effectiveness rate of 30%.
4. Forecast Scenario e40: very high effectiveness rate of 40%.
5. Forecast Scenario e100: maximum effectiveness rate of 100%.

Based on the low rates of water quality improvements due to the implementation of the measures in previous Plans, and the increased targeting of measures in the 3<sup>rd</sup> cycle Plan, the medium (e20) and high (e30) effectiveness rate are considered to represent the most likely outcomes. These ranges of effectiveness are combined with the analysis of the waterbodies that have a specific, targeted measures gap, to predict the overall probable range of outcomes of the programme of measures (see Section 12: Outcomes Forecast).

The following sections outline the approach taken, and the assumptions made, for each significant pressure type. Where a waterbody has multiple significant pressures, the assessments for each are integrated to give an overall waterbody outcome.

## 2 Agriculture

Over 1,000 waterbodies have agriculture as a significant pressure which is preventing the achievement of environmental objectives, as a result of the issues noted in Table 2.1. The most frequent issue impacting water quality from agricultural activities is phosphorus and sediment runoff to surface waters, followed by nitrate leaching to groundwater.

**Table 2.1: The main issues, arising from agricultural activities (note that a waterbody can have more than one issue).**

Key Issues from Agriculture	No. of Waterbodies with the issue
Phosphorus Runoff	920
Nitrate losses	504
Organic Pollution	176
Sediment losses	133
Altered Habitats (hydromorphological impacts)	106
Chemical Pollution	65
Other Significant Impacts	24

The following sections set out the supporting evidence for the 5-step process for assessing the likely outcomes of measures to address phosphorus, sediment and nitrate issues arising from agricultural activities. The assumptions and resulting forecast for achieving objectives by 2027 is then outlined in section 2.6.

### 2.1 Phosphorus and sediment issues from agriculture

The characterisation assessment identified that in waterbodies that are impacted by agriculture, phosphorus loss from runoff of manures and fertilisers is the dominant issue (90%), while excess sediment is impacting nearly 15%<sup>1</sup>. For diffuse losses of phosphorus from farms, areas with poorly draining heavy soils and a lot of overland flow are high risk. The risks are typically not dependent on farm intensity as it only takes a small amount of phosphorus running off the land to cause a water quality issue in a stream. The appropriate measures typically intercept the runoff and break the pathway, such as buffer zones or bunds. As the mechanisms controlling phosphorus and sediment loss from farms are similar, it is appropriate that are considered together.

The EPA has developed the evidence base to help target measures to reduce runoff to mitigate against phosphorus and sediment impacts. This includes the EPA Targeting Agricultural measures Online Mapping Tool<sup>2</sup>, which includes the latest edition of the Targeting Agricultural Measures Map and the inclusion of Focused Delivery Flow Paths and Delivery Points in the Phosphorus Pollutant Impact Potential (PIP) maps. The Delivery Flow Paths overlain on the critical source areas map highlights the areas in the landscape that are the highest risk for phosphorus and sediment runoff to rivers.

Using these data in waterbodies with significant agricultural pressures, 200,000 high priority riverside interception measures were identified. Adding all of these specific measures together, a total required length of pathway interception measures of 2,500km was estimated as being the

<sup>1</sup> Sediment impacts are likely to be somewhat under-represented as sediment is not monitored to the same degree as nutrients.

<sup>2</sup> <https://gis.epa.ie/EPAMaps/agriculture>

highest priority. Within this estimate, areas can be further prioritised as the assessment includes a ranking of the potential risk for phosphorus and sediment losses. An example of the prioritised flow pathway interception points for the Barrow Catchment is provided in Appendix 2.

There are many actions defined in the Good Agricultural Practice (GAP) regulations to prevent loss of phosphorus from farms, and further actions are proposed under the new CAP agri-environmental schemes and the Water EIP. In addition, agricultural inspections are being enhanced to better target environmental outcomes. However, it is unclear if the actions to address this issue will be sufficient to achieve water quality outcomes in the waterbodies where agriculture is a significant pressure. Due to the voluntary nature of many of the agri-environmental schemes which are in the early stages of implementation, it is unknown how many of the actions will be targeted, and subsequently implemented, in the 200,000 identified locations to restore water quality. It is expected that locations where measures have been implemented will be identified at later stages in the life of the various schemes.

The ASSAP programme will be expanding into new Areas for Action (AFAs) as identified in the 3<sup>rd</sup> Cycle RBMP and the new Water EIP will provide a targeted funded mechanism for implementing targeted interception measures, ideally at the priority locations that have been identified. Further clarity on the number of priority locations that can be addressed through the Water EIP will be possible in time when the programme has been established. The estimated impact can be re-assessed to support the preparation of the Local Catchment Management Plans by LAWPRO.

## 2.2 Nitrate losses from agriculture

High nitrogen concentrations in waters is one of the factors that leads to poor water quality outcomes in all waters. Estuaries and coastal waters, and groundwater drinking water supplies, are particularly at risk.

Elevated nitrogen concentration is a clearly defined issue linked to over 500 waterbodies. Analysis of nutrient sources identified that over 80% of the nitrogen comes from agricultural sources. Targeted reductions in nitrogen emissions to water are needed in a number of catchments of concern in the south, southeast and east, including Maigne/Deel, Bandon, Lee, Blackwater, Suir, Nore, Barrow, Slaney, Tolka/Liffey and the Boyne river catchments <sup>3</sup>.

Based on monitoring data from 2017 to 2019, a total reduction in nitrogen load in waters of approximately 25% is required to meet water quality targets. However, the required reductions are not evenly spread; over 50% reductions are required in the Slaney and Barrow catchments, but outside of these two catchments, the required average reduction is approximately 15%.

The Nitrates Action Programme, Ag Climatise, and the draft River Basin Management Plan 2022-2027 all identify actions to reduce nitrate loss to the environment to improve water quality, air quality and biodiversity and to reduce greenhouse gases. Some of these targets refer to losses to water, and some refer to reductions in use – these are not necessarily the same because of the complex hydrogeochemical interactions that occur in the environment between the point of use and the receiving water of interest. The following targets have been set:

- The Nitrates Action Programme 2022-25 (NAP) specifies a reduction in maximum chemical nitrogen fertiliser use allowances of 10% from March 2022, and a further reduction of at least

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<sup>3</sup> [www.catchments.ie/assessment-of-the-catchments-that-need-reductions-in-nitrogen-concentrations-to-achieve-water-quality-objectives/](http://www.catchments.ie/assessment-of-the-catchments-that-need-reductions-in-nitrogen-concentrations-to-achieve-water-quality-objectives/)

5% from 1 Jan 2024, pending interim review of the programme, scientific advice, and water quality trends.

- Ag Climatise Action 1 specifies a reduction of total chemical nitrogen fertiliser use by 20%, based on 2018 usage figures, by 2030.
- The River Basin Management Plan 2022-2027 aims to reduce excessive agricultural nitrate losses to water from high-risk free draining soils to groundwater in agriculturally intensive areas (reduce N losses by up to 50% to water).

EPA has developed the evidence base to help target nitrogen reduction measures which includes the Targeting Agricultural Measures Map and the Nitrogen Pollutant Impact Potential (PIP) maps. These tools are currently in use to target action in the following ways:

- LAWPRO, ASSAP and the Dairy Sustainability Advisory Service are targeting specific advice on agricultural nitrogen use in the catchments of concern.
- Maps have been developed the EPA of the critical source areas for nitrogen. These are the highest risk areas in the landscape where nitrogen from agriculture leaches to waters. Measures to reduce leaching are being targeted in the critical source areas, in the catchments of concern, to deliver maximum environmental benefits.

The key actions include policy to reduce chemical fertiliser use, updates to the livestock excretion rates, targeted advisory services which includes significant involvement from industry, and a National Fertiliser Database to track the changes in fertiliser purchases. Once the database of fertiliser sales is well established, it should be possible to better link changes in fertiliser use to resulting water quality outcomes.

The analysis suggests that the AgClimatise, NAP, and other actions will go some way to achieving the targets, particularly in catchments where a 10-20% reduction in nitrate losses to water is estimated to be sufficient. However, other catchments will likely still fall short of the required outcomes and additional actions will likely be required to further reduce nitrate leaching from critical source areas.

### 2.3 Targeted actions to address chemical losses, hydromorphological and other issues

In a smaller number of waterbodies, other issues from agricultural activities have been identified as impacting on water quality, including losses of chemicals and changes to the physical habitat conditions (hydromorphological impacts). Many of these may be addressed through the existing measures and actions including the ASSAP service and agricultural inspections and can be further investigated through the Catchment Management Plan development process.

The handling and disposal of sheep dip has been identified as causing localised water quality pollution, in particular in the Donegal region. The Plan identified new actions around the handling, use and disposal of sheep dip to protect water quality from its toxic impacts.

### 2.4 Nutrient, dissolved carbon and sediment losses from drained organic soils

Drained organic soils are a source of elevated ammonium and dissolved organic carbon, which can impact on ecological health, and potentially drinking water quality, respectively. Drainage may destabilise the organic soils resulting in losses of fine sediment which can impact on habitat condition. In addition, controlling phosphorus losses on organic soils requires specific farm management practices that are different than for mineral soils.



In 2020, to inform the draft RBMP, a preliminary spatial analysis identified at least 20,000 hectares of farmed grassland (based on 2018 data) with organic soils that could be targeted for water table management, to achieve all three of the following key environmental benefits:

1. climate change adaptation benefits by rewetting the organic soils to reduce the losses of greenhouse gases,
2. water benefits from water table management of farmed grassland (based on 2018 data) in areas where agriculture is a significant pressure, to reduce the concentrations of ammonium, fine sediment and potentially to a lesser extent phosphorus and
3. biodiversity benefits by targeting farm parcels with existing nearby wetland features to increase habitat diversity.

Water quality, climate change and biodiversity objectives can all benefit from the rewetting of organic soils if the actions are well targeted. On-going work by other organisations has identified target areas for water table management schemes. It is challenging to forecast the impacts of these voluntary measures until the uptake locations are known. These forecasts can be refined at the catchment scale as LAWPRO progress the development of the 46 catchment management plans, and the relevant sectoral action plans, with the implementing bodies.

## 2.5 Specific, targeted measures assumptions and forecast for achieving objectives

All waterbodies with significant agricultural pressures are covered by basic measures and the enhanced Local Authority agricultural inspection programme which may improve water quality. The integrated work within the Areas for Action with LAWPRO, ASSAP and the Water EIP will have significant potential to target agricultural measures. These combined actions in the Cycle 3 Areas for Action are considered as specific, targeted measures for waterbodies where Agriculture is a significant pressure.

Waterbodies within the ACRES Cooperation projects and the Waters of Life Project are also considered to have specific, targeted measures where Agriculture is a significant pressure, where at least 10% of the agricultural area in the waterbody is covered by a project. These waterbodies are more likely to benefit from targeted supplementary measures resulting in improvements to water quality. However, these specific, targeted measures are unlikely to be 100% successful at achieving the objectives in all waterbodies principally because the measures are voluntary and therefore the extent of uptake and exact locations of measures is not known at this stage.

**Forecast:** For the purposes of the national scenario analysis, the range of 10% to 40% effectiveness was evaluated for all of the agricultural measures. Improvements are forecast in 17% to 56% (174 to 573) of the 1,023 waterbodies with significant agricultural pressures.

## 2.6 Tracking progress

Tracking progress with achieving water quality outcomes from the implementation of agriculture measures, will require the collection of specific data as follows:

1. Information on the location of new farm interception measures implemented from all current programmes is needed in order to track progress with this key measure and to evaluate the effectiveness of actions.
2. Farm records of annual fertiliser purchases from the national fertiliser register will provide a spatial indicator of the annual fertiliser usage that can be related to changes in waterbody concentrations.

3. Farm scale records of other measures that have been implemented, including agricultural inspections, that may have a positive impact on water quality.

## 3 Forestry

### 3.1 Issues from forestry activities

Inappropriately sited forests and poorly-managed forest operations can negatively impact on water quality and aquatic habitats and species. Forestry is a significant pressure in 216 waterbodies. High status waters located in upland headwater catchments where trees are commonly planted are particularly at risk. The impacts are caused mainly by loss of sediment and nutrients, alteration of the physical habitat conditions (hydromorphology) of streams, and creation of acidic conditions in some settings (Table 3.1). These impacts occur during afforestation, deforestation and thinning, and when ground conditions are drained or disturbed, especially when the soils are organic as they are typically less stable than mineral soils.

**Table 3.1: The main issues, impacts and associated activities arising from forestry operations (note that a waterbody can have more than one issue).**

Key issue	Water quality/ environmental impact	Associated activities	No. of Waterbodies with issue
Hydromorphology	<ul style="list-style-type: none"> <li>Physical damage to habitat</li> <li>Alteration of natural river flow regime and function</li> <li>Bank erosion</li> </ul>	<ul style="list-style-type: none"> <li>Land drainage works</li> <li>Interception losses (mature canopy)</li> </ul>	104: Physical alteration 13: Hydrological alteration
Nutrients	<ul style="list-style-type: none"> <li>Eutrophication (phosphorus loss)</li> <li>Toxic ammonium releases</li> </ul>	<ul style="list-style-type: none"> <li>Fertilisation</li> <li>Decomposition of brash</li> </ul>	108
Excessive fine sediment	<ul style="list-style-type: none"> <li>Clogging of gravels</li> <li>Choking of river channel</li> <li>Transport of chemicals &amp; nutrients downstream</li> <li>Landslides</li> </ul>	<ul style="list-style-type: none"> <li>Thinning &amp; clearfelling</li> <li>Machinery rutting</li> <li>Site clearance/preparation</li> <li>Road construction</li> <li>Forest drainage</li> </ul>	40
Acidification	<ul style="list-style-type: none"> <li>Increased acidic runoff due to airborne pollutant capture</li> <li>Dissolved organic carbon (DOC) runoff lowering pH &amp; increasing acidity</li> </ul>	<ul style="list-style-type: none"> <li>Planting conifer species on acidic soils</li> <li>Forestry land drainage</li> </ul>	10
Pesticides	<ul style="list-style-type: none"> <li>Toxic impact to aquatic ecology</li> </ul>	<ul style="list-style-type: none"> <li>Herbicides</li> <li>Pesticides</li> </ul>	5

In the past, the wrong species of trees have been planted in the wrong places (e.g. conifers on organic soils in upland areas) which has given rise to a significant environmental impact legacy that needs to be managed as these trees mature and are harvested.

Legislation and best practice guidance for forestry activities are now in place that should prevent impacts to water quality in future. The evidence shows however, that water quality impacts are still occurring presently. The forestry Programme of Measures recognises these ongoing issues, aims to put a process in place to understand why these impacts are still occurring despite the tools that are in place, and then takes steps to address the issues through targeted measures.

### 3.2 Forestry as a solution: the right tree in the right place

Evidence shows that the presence of long-term stable forests, especially native broadleaf forests, can improve water quality. Well designed, sited and managed diverse forests can also provide significant multiple environmental benefits for carbon capture, flood mitigation, and biodiversity. The new Forestry Programme 2023-2027 aims to increase forest cover whilst also delivering ecosystem services with environmental and climate benefits. Measures such as native woodland planted in critical source areas can provide multiple environmental benefits including for water quality. The forestry sectoral action plan can be used to track the improvements made by forestry measures in waterbodies with non-forestry pressures e.g. agriculture, assuming the appropriate data are collected.

### 3.3 Mitigation actions

It is important forestry is managed within a catchment management framework, and not just at coupe scale, so that the cumulative impacts of multiple activities in the same catchment are managed together. The Forest Service is actively engaged with developing policies to achieve improved water quality outcomes and are working with LAWPRO in the Areas for Action.

Increased water setback widths, the creation of native woodland buffers, the installation of silt fences and silt traps, and the slow water damming of drains can reduce sediment & nutrient impacts. Careful application and management of herbicides and nutrients including appropriate setbacks can be effective in reducing impacts on water quality.

### 3.4 Specific, targeted measures assumptions and forecast for achieving objectives

There has been significant targeting of forestry measures in recent years and the Forest Service and Coillte are actively engaged in data-driven environmental management which may further improve these rates.

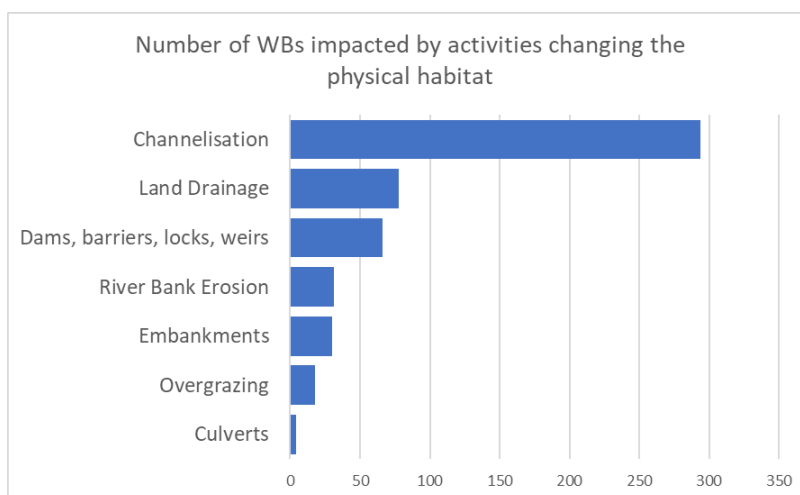
**Forecast:** Of the 216 waterbodies with significant forestry pressures, it is forecast that 10-40% (22 to 86) may have the pressure mitigated by 2027.

### 3.5 Tracking progress

The Forest Service is reviewing the impacts of forestry management practices, including looking at Coillte and privately-owned forests in relation to water quality impacts. This review will identify the specific measures required to achieve targets in all waterbodies and prevent future impacts from forestry activities. The estimated impact will be re-assessed to support the preparation of the Local Catchment Plans by LAWPRO and the Forestry Sectoral Plan.

## 4 Hydromorphology

Nearly 450 waterbodies have significant hydromorphology pressures, of which, more than 80 have a High-Status Objective. The majority of these also have other significant pressures identified. The key activities causing these declines are channelisation, dredging, land drainage associated with agriculture, forestry and peat extraction, and changes to the physical habitat conditions to facilitate urban development (Figure 4.1).



**Figure 4.1. Activities driving the significant hydromorphological pressures in waterbodies.**

### 4.1 Specific, targeted measures assumptions and forecast for achieving objectives

The planned measures to address these pressures are detailed in the Plan and include important preparatory actions such as development of a new regulatory regime and a new restoration programme, and implementation of a roadmap to improve fish migration in the lower Shannon.

Although there are many local actions, including barrier removal work, there are no clear and direct relationships that can be drawn between these actions and the achievement of the environmental objectives in those specific waterbodies with hydromorphological pressures by 2027. As part of the preparation of the Local Catchment Management Plans by LAWPRO and the Barriers Mitigation Sectoral Plan by Inland Fisheries Ireland (IFI), the impact of the planned barrier mitigation programme on Ecological Status nationally will be assessed. Overall, for the forecast of achieving objectives, there are currently no specific, targeted, waterbody-specific, implementation measures planned for Hydromorphology pressures before 2027.

**Forecast:** It is not expected that hydromorphology pressures will be fully mitigated by 2027. All waterbodies with hydromorphology as a significant pressure will have a target environmental objective date set to Beyond 2027.

### 4.2 Gaps to achieving objectives

There is considerable work to do to develop the legislation to fully regulate hydromorphological activities, building on the new Abstractions and Associated Impoundments legislation and the new draft planning guidance which is in development. These will need to be in place to provide the basis for implementation of hydromorphological measures. The Plan includes an increased focus on the

National Barrier removal programme which will help achieve the objective of the new Nature Restoration Law to make Europe's river systems more accessible and connected for fish and other wildlife. Further work is also underway by the EPA to develop the evidence base and a suite of risk assessment tools to help identify the right measure in the right place. These actions will put the building blocks in place so that waterbody specific measures to restore the hydromorphological condition can be assessed as part of the preparation of the Local Catchment Plans and implemented in future cycles.

## 5 Urban Wastewater

There are 197 waterbodies with urban wastewater as a significant pressure. Detailed measures are included in the Plan that will address some, but not all, of these by 2027. The measures include a combination of upgrades to treatment plants and networks, licence reviews, and an update of the DHLGH criteria for storm water overflows.

### 5.1 Specific, targeted measures assumptions and forecast for achieving objectives

For waterbodies with urban wastewater pressures, a specific, targeted measure is assumed to be in place where Uisce Éireann have provided a planned project completion date by 2027, even if the expected water quality improvement may not yet have been achieved. These waterbodies are assigned an Environmental Objective date of 2027.

**Forecast:** Approximately 30 waterbodies with planned measures are forecast to achieve objectives by 2027, with the remaining forecast for beyond 2027.

### 5.2 Gaps to achieving objectives

Over 160 waterbodies with significant Urban Waste Water pressures do not have sufficient measures planned to be in place by 2027.

## 6 Urban Run-off

There are 194 waterbodies with Urban Runoff as a significant pressure. The key issues are misconnections, leaky sewers, and urban drainage. Some of the substantive solutions will require planning consent which will likely extend the time for implementation, for example Sustainable Urban Drainage Systems in built up areas, and any works that may be implemented to improve drainage as a result of the Uisce Éireann drainage area plans. There are no widespread systematic plans in place to address misconnections.

### 6.1 Specific, targeted measures assumptions and forecast for achieving objectives

There are a number of actions in the Plan to develop strategies, plans, guidance and pilot projects for mitigating urban runoff through nature-based solutions. However, in waterbodies where Urban Runoff is a significant pressure, there are currently no substantive, waterbody-specific measures available that are likely to be widely implemented by 2027.

**Forecast:** It is not expected that Urban Runoff pressures will be mitigated by 2027. The 194 waterbodies with Urban Runoff as a significant pressure have a measures gap and are assigned a target environmental objective date of Beyond 2027.



## 7 Domestic Wastewater

There are approximately 500,000 Domestic Wastewater systems (such as septic tanks) serving a population equivalent of 1.4 million people. A small number of these are causing water quality problems at a scale that is sufficient to cause deterioration at a waterbody scale. There are 148 waterbodies that have a significant impact from domestic wastewater. These significant pressures are broken down as follows:

- 75% from single house discharges,
- 15% from communal discharges, and
- 10% from unauthorised discharges that should be authorised under Section 4 licences (Water Pollution Act).

### 7.1 Specific, targeted measures assumptions and forecast for achieving objectives

The Plan outlines the actions being taken to mitigate these pressures including the National Inspection Plan and grant scheme funding for upgrades to systems. These actions aim to improve the low rate of remediation of the identified systems that are causing water quality problems.

**Forecast:** Of the 148 waterbodies with significant domestic wastewater pressures, it is forecast that 10-40% (15 to 59) may have the pressure mitigated by 2027.

## 8 Regulated Activities

The significant pressures that relate to regulated activities include Industry, Extractive Industries (Peat, Mines, Quarries), Aquaculture, Waste, and impacts from Water Treatment facilities. In total there are 244 waterbodies impacted by these activities. Where any regulated activity is causing an impact, it must be addressed by the relevant authority. All commercial licenced facilities impacting on waters should be addressed as a matter of urgency. Once identified, there are established regulatory mechanisms to address these primarily point-sources of pollution.

### 8.1 Specific, targeted measures assumptions and forecast for achieving objectives

The forecast scenarios for this analysis (outlined in section 1.2) set out the expected effectiveness rates for specific, targeted measures e.g. scenario e30 sets the rates at 30% for most measure types. However, where specific measures assessments were available for EPA licenced facilities, the individual pressure forecast, based on the agreed management strategies for that facility, was used in all scenarios. Elsewhere an effectiveness rate of double the standard rate was applied, given the systems are already in place to drive mitigation.

The specific measures assessments include historically contaminated land pressures and waterbodies with historically contaminated mine sites that are not expected to achieve their objectives by 2027.

**Forecast:** It is forecast that 56 of these pressures will be mitigated by 2027.

## 9 Abstractions

### 9.1 Specific, targeted measures assumptions and forecast for achieving objectives

Abstractions have been identified as a significant pressure in 32 waterbodies that are At Risk of not achieving their objectives. Abstraction licences should soon be in place under the new regulations which should lead to specific, targeted measures that would be expected to mitigate those pressures by 2027. The expected effectiveness rates for measures to address Abstraction pressures is aligned with measures for Regulated Activities, with double the standard rate applied in each of the forecast scenarios.

**Forecast:** It is forecast that 10% to 40% (3 to 13) of these abstractions that are currently impacting on 32 waterbodies will be mitigated by 2027.

## 10 Invasive Species

### 10.1 Specific, targeted measures assumptions and forecast for achieving objectives

Invasive species are listed as a significant pressure impacting on 48 waterbodies. A number of actions to address Invasive Species are outlined in the Plan, and include for example preparation of species management plans, recruitment of biodiversity officers and the improvement of grant schemes. However, where Invasive Species are a significant pressure in a waterbody, there are currently no substantive, waterbody-specific measures available that are likely to be widely implemented by 2027. Multi-year programmes will be needed in the case of invasive species to control, maintain, and improve water quality and these will require a dedicated resource. In some cases, the invasive species cannot be eradicated (e.g. zebra mussel and some fish species). It is recommended that a review of the implications of the more permanent invasive species for achieving ecological status be carried out during the 3<sup>rd</sup> cycle to inform consideration of whether less stringent objectives should be applied.

**Forecast:** As there is a specific, targeted measures gap for Invasive Species pressures, it is not expected that these pressures will be mitigated by 2027, and all 48 impacted waterbodies will have an environmental objective date set to Beyond 2027.

## 11 Currently Unknown Pressures

When the water quality status of a waterbody declines, the impacts driving that decline are reviewed, along with the possible pressures that may be causing the impact. This review process is on-going as each new set of water quality monitoring data is reported. In some cases, further characterisation is required to investigate the pressures causing impacts through local catchment assessments as is carried out in LAWPRO Areas for Action. In a small proportion of cases, the available evidence on impacts and pressures is inconclusive and further characterisation at the local scale is required. There are currently just over 200 waterbodies assessed as having unknown pressures.

### 11.1 Specific, targeted measures assumptions and forecast for achieving objectives

It is assumed that the 107 waterbodies with Unknown Pressures within Areas for Action will have specific, targeted measures because while the pressures aren't yet known, the majority will have the types of pressures that can be addressed through the LAWPRO process, i.e. agriculture, forestry, domestic waste water and licenced facilities. These waterbodies will be characterised early in the cycle to maximise the available time to identify and implement measures before 2027.

Waterbodies with Unknown Pressures outside Areas for Action are unlikely to be adequately assessed and have measures implemented in time for 2027, and therefore will have a Beyond 2027 objective date applied. However, some of these may be addressed by the current desk-based characterisation review.

**Forecast:** Of the over 100 waterbodies that are within LAWPRO Areas for Action, it is forecast that 10-40% (10 to 45) of these will be mitigated by 2027. There is a similar number of waterbodies that are outside of these areas and it is assumed in this analysis that these will not achieve their objectives by 2027.

## 12 Overall outcomes forecast

Of the 4842 waterbodies, 2192 (45%) are currently not achieving their environmental objectives. The forecast of the environmental outcomes from the programme of measures specified in the Plan is summarised in this section in four stages:

- Firstly, the number of waterbodies with each significant pressure type is summarised alongside the measures gap i.e. the numbers that are not expected to improve (Table 12.1).
- Secondly, the numbers of waterbodies with each specific, targeted measure type is summarised, with example results to illustrate the effectiveness gap (Table 12.2).
- Thirdly, the forecast scenario results are outlined which integrate both the measures gap and the effectiveness gap based on Low, Medium, High, Very High and 100% effectiveness rates (Table 12.3).
- Finally, an overview of the objectives and all gaps for all waterbodies is presented.

Approximately half of the waterbodies that require restoration have more than one significant pressure identified. Furthermore, a significant pressure can have more than one specific, targeted measure (in this iteration, this applies only to agriculture). The analysis identified almost 3,000 waterbody-level specific, targeted measures.

### 12.1 The Measures Gap

For the waterbodies that are not achieving their environmental objectives, a gap to achieving objectives in 864 waterbodies is due to there being no specific, targeted measure in place by 2027 for over 900 pressures. These include hydromorphological pressures (448), urban-runoff pressures (194), urban wastewater (167), invasive species (48), and pressures that require further characterisation but are outside of LAWPRO Areas for Action.

### 12.2 The Effectiveness Gap

The second type of gap identified by this analysis is the effectiveness gap, where a specific, targeted measure is in place, but it is not effective enough to achieve the environmental objective in all waterbodies although some water quality improvement may be achieved. The effectiveness gap ranges from 0 waterbodies (for the 100% effective forecast) to 690 waterbodies (for scenario e10 with the lowest effectiveness rates). Agriculture is the most widespread pressure, impacting on over 1,000 waterbodies in Ireland. The effectiveness of measures to restore the water quality in these areas may have the greatest impact on the overall outcome of the Programme of Measures. Over 2,500 waterbody-level, specific, targeted measures are aimed at mitigating significant pressures in the waterbodies that require restoration (Table 12.2) and although the objectives may not be met by 2027 (due to both the measures gap and the effectiveness gap), these measures may result in some water quality improvements in a total of 800 waterbodies. Note that this analysis does not account for waterbodies that may decline in water quality in the future.

As some of these measures are voluntary or are dependent on other external factors governing their implementation, a range of assumptions are required regarding which measures, and therefore which waterbodies, will achieve the necessary environmental outcomes within the 2027 timeline. The five forecast scenarios were run based on Low (e10), Medium (e20), High (e30), Very High (e40) and 100% (e100) effectiveness rates (ER). The numbers of waterbodies with each specific, targeted measure type is summarised, with example results from the forecast scenarios for 100%, 40% (Very High) and 10% (Low) effectiveness rates are shown in Table 12.2. These forecasts can be refined at

the catchment scale as LAWPRO progress the development of the 46 catchment management plans with the implementing bodies.

**Table 12.1: The number of waterbodies (WBs)\* with a Significant Pressure Type and the proportion of these that have specific, targeted measures assigned and may see improvements by 2027, and the numbers that are not expected to improve. Note that waterbodies can have more than one pressure.**

<b>Pressure Type</b> (A waterbody can have more than one pressure)	<b>No. of WBs with Significant Pressure</b>	<b>No. of WBs without specific targeted measures: <u>improvements not expected by 2027</u></b>	<b>No. of WBs with measures: <u>may see some improvement by 2027</u></b>	<b>Measure Types</b>
<b>Agriculture</b>	1023	0	1023 (100%)	Basic measures, risk-based LA ag inspections, ACRES Cooperation Projects, Waters of Life, ASSAP and the Water EIP.
<b>Hydromorphology</b>	448	448 (100%)	0	<i>No waterbody-specific outcomes forecast by 2027</i>
<b>Regulated Activities (excl Abstractions and UWW)</b>	244	0	244 (100%)	Regulation of licenced activities.
<b>Urban Wastewater</b>	197	167 (85%)	30 (15%)	Uisce Éireann Capital Investment Programme up to 2027
<b>Forestry</b>	216	0	216 (100%)	Forestry measures.
<b>Urban Run-off</b>	194	194 (100%)	0	<i>No waterbody-specific outcomes forecast by 2027.</i>
<b>Domestic Waste Water</b>	148	0	148 (100%)	National Inspection programme and grants.
<b>Invasive Species</b>	48	48 (100%)	0	<i>No waterbody-specific outcomes forecast by 2027.</i>
<b>Abstractions</b>	32	0	32 (100%)	Regulation of licenced activities.
*The numbers of waterbodies in the Pressure Types does not account for waterbodies that may decline in water quality in the future.				

**Table 12.2: The numbers of waterbodies\* (WBs) with each measure type and the targeting assumptions, with example results from the forecast scenarios for 100%, 40% (Very High) and 10% (Low) effectiveness rates (ER).**

Measure Type	Targeting Assumption	Forecast scenario 100% ER (e100) <sup>1</sup>	Forecast Scenario 40% ER (e40)	Forecast Gap (e40 Gap)	Forecast scenario 10% ER (e10)	Forecast Gap (e10 Gap)
		No of WBs meeting targets:	No of WBs meeting targets:	WBs Not meeting targets:	No of WBs meeting targets:	WBs Not meeting targets:
Agri basic measures, enhanced LA Agri inspections <sup>3</sup>	WBs with agricultural pressures	1023	409 (40%)	614	102 (10%)	921
Agri ASSAP advice, and the Water EIP <sup>2</sup>	ASSAP waterbodies	650	260 (40%)	390	65 (10%)	585
Agri Scheme ACRES Cooperation Projects and Waters of Life <sup>3</sup>	Project Areas	125	50 (40%)	75	13 (10%)	113
Forestry measures	WBs with forestry pressures	216	86 (40%)	130	22 (10%)	194
Domestic Waste Water measures	WBs with DWW Pressures	148	59 (40%)	89	15 (10%)	133
Further characterisation, LAWPRO	WBs with Review Pressures in LAWPRO PAAs	100	40 (40%)	60	10 (10%)	90
Regulated Activities (ex Abstractions and UWW)	WBs with Pressures with Regulated Activities	56	45 (80%)	11	11 (20%)	45
Abstractions	WBs with Abstraction Pressures	32	26 (80%)	6	6 (20%)	26
Urban Waste Water - plant	Using specific info where available.	21	21 (100%)	0	21 (100%)	0
Urban Waste Water - network	Using specific info where available.	2	2 (100%)	0	2 (100%)	0

\*The numbers of waterbodies in all Pressure Types does not account for waterbodies that may decline in water quality in the future.

<sup>1</sup>The scenario with 100% effectiveness rates is unrealistic and shows the total number of waterbodies where the measures are being targeted.

<sup>2</sup>The agricultural measures overlap and waterbodies with a significant agricultural pressure will typically have one or more of the measures types.



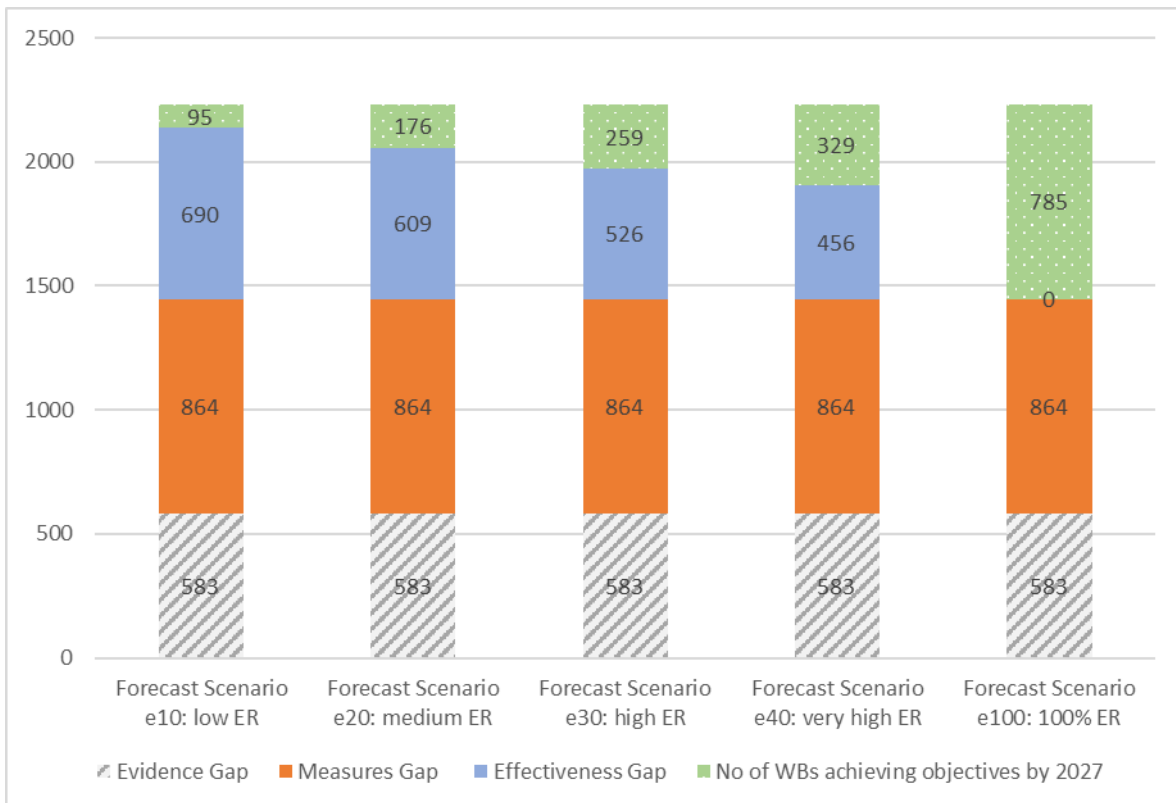
### 12.3 Forecast scenario results

The forecast scenario results integrate both the measures gap and the effectiveness gap based on Low, Medium, High, Very High and 100% effectiveness rates (Table 12.3; Figure 12.1). The measures gap remains the same across all of these scenarios at 864 waterbodies. The effectiveness gap ranges from 0 waterbodies (for the 100% effective forecast) to 690 waterbodies (for scenario e10 with the lowest effectiveness rates).

**Table 12.3: Scenario results based on Low, Medium, High, Very High and 100% effectiveness rates (ER).**

Scenario	No of WBs currently not achieving objectives	No of WBs achieving objectives by 2027	No of WBs not achieving objectives by 2027	Effectiveness Gap	Measures Gap	Evidence Gap
Forecast Scenario e10: low ER	2232	95	1554	690	864	583
Forecast Scenario e20: medium ER	2232	176	1473	609	864	583
Forecast Scenario e30: high ER	2232	259	1390	526	864	583
Forecast Scenario e40: very high ER	2232	329	1320	456	864	583
Forecast Scenario e100: 100% ER	2232	785	864	0	864	583

This analysis acknowledges that although there is a lack of information on the rate of effectiveness of many measure types, the medium (e20) and high (e30) effectiveness rate represent the likely outcomes. Based on these scenario ranges, the guideline forecast is that of the 2232 waterbodies that are not achieving their objectives, approximately 150-300 of these are likely to achieve the 2027 target. However, specific, targeted measures will be in place in an additional 500-650 waterbodies, resulting in a total of approximately 800 waterbodies with the potential for some water quality improvements.

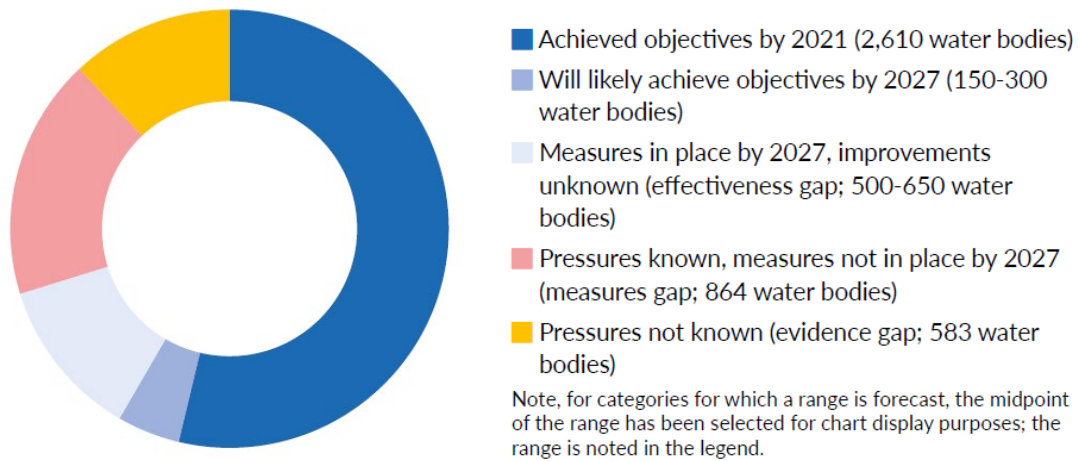


**Figure 12.1: Scenario results based on Low, Medium, High, Very High and 100% effectiveness rates (ER).**

#### 12.4 Overview of objectives and gaps for all waterbodies

This analysis has been carried out at waterbody scale. For each waterbody, consideration has been given to the target objectives, risk, impacts, pressures, and measures, based on the best available information to September 2023. The assessment includes assumptions about the likelihood of measures outlined in the Plan being in place and implemented, in a manner that is sufficient to achieve the required water quality outcome, by 2027. Where waterbodies that are impacted have more than one pressure with different outcomes, the pressure will take the longest to mitigate, or that will achieve the least favourable outcome, dictates the overall outcome for that waterbody. Figure 12.2 provides an approximate representative of the outcomes for all waterbodies. Note that where a range in likely outcomes has been determined, the midpoint of that range is used for display purposes on the chart.

## Closing the Gap: Forecast of Waterbodies Achieving WFD Objectives



**Figure 12.2. Approximate proportion of waterbodies that are forecast to have achieved their WFD objectives by 2027. Note, for categories for which a range is forecast, the midpoint of the range has been selected for chart display purposes; the ranges are noted in the legend.**

## 13 Conclusion

This gap analysis aims to quantify what the measures outlined in the draft 3rd cycle river basin management plan are likely to achieve in terms of water quality outcomes.

Of a total of 4,842 waterbodies, 2610 waterbodies (54%) had met their objectives in 2021. However, 2,232 waterbodies were not meeting their objectives (46%) and require further action. The analysis has forecasted the range in the number of waterbodies that are likely to achieve their 2027 objectives.

The analysis is carried out at a point in time, based on the best available information, at September 2023. It is dependent on knowing what the measures are and making assumptions about how they will be implemented – as further clarity is obtained on measures implementation, through the Catchment Management Plans, the Sectoral Action Plans, and with data sharing and collaboration with stakeholders, the analysis can be refined to track progress towards achieving the objectives.

The outcomes of this assessment are that:

- Out of 2,232 waterbodies that have not met their objectives, between 150 and 300 waterbodies are likely to achieve their objectives as a result of the Programme of Measures.
- A further 500-650 waterbodies will have specific, targeted measures in place and may achieve some water quality improvements depending on the level of effectiveness of the measures.
- Approximately 864 waterbodies do not have waterbody-specific measures in place and are therefore very unlikely to achieve their objectives by 2027.

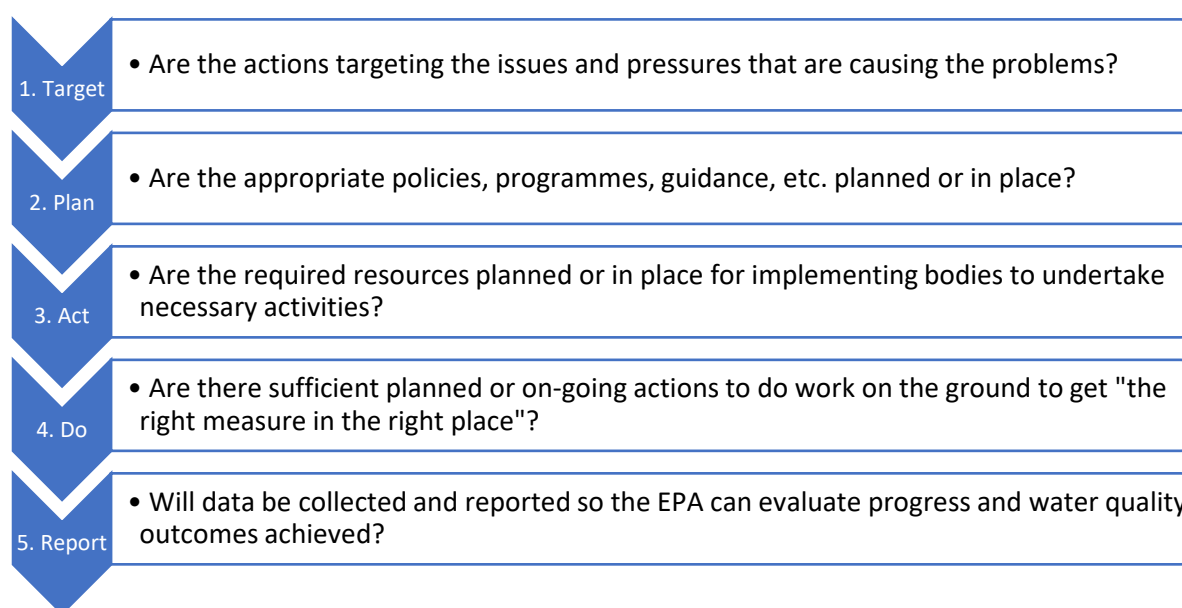
The analysis does not forecast which waterbodies may decline in quality over the period and no longer meet their objective.

In order to improve the assessment of the effectiveness of these targeted measures, information on the implementation of measures should be collected and shared. This will greatly improve the design of future programmes of measures and will enable the tracking and evaluation of progress. This preliminary analysis can be used to refine the plan and further iterations of the assessment may be required before the plan is finalised. The gap analysis will also be used by the EPA's Water Programme to track and report the water quality outcomes of the measures and the plan during the 3rd cycle.

## Appendix 1: Progress towards implementing targeted measures

### Putting 'The right measure in the right place' into action

A five-step framework (Figure A1) was used to assess the implementation of targeted measures to improve water quality. These steps are used to guide the assessment of where actions on the ground are likely to result in water quality improvements. For each waterbody that requires improvement, the characterisation process has identified the issues and pressures that are causing the problems (step1). Where a measure has the appropriate plans and programmes in place to address the issues (step 2) and the required resources are in place or will be before 2027 (step 3) for implementing bodies to undertake action on the ground (step 4), then the measure is referred to as a 'specific, targeted measure' with respect to achieving water quality outcomes. In the final step 5, information on the actions taken and monitoring data can be used over the 3<sup>rd</sup> cycle to evaluate and report on the actual environmental outcomes achieved.



**Figure A1: Framework for implementation targeted measures.**

This report reviews the targeting of measures required to restore water quality with a view to highlighting any gaps in the planning, implementation, tracking or reporting that may hinder achieving the required water quality outcomes following this 5-step framework:

A review of the implementation of measures in the plan to achieve water quality outcomes by 2027 by pressure type is outlined in sections 2 to 11 of this assessment. The key measures are summarised in Table A1 below, with each step coloured in a traffic light system to indicate the progress. This assessment framework applied to all waterbodies could be used to inform the catchment management plans, and to track progress with the overall outcomes of the River Basin Management Plan.

Step is fully established.	Step is established and data is pending.	Step is still in development or requires advancement to achieve water quality outcomes.	Step is not well developed or is impeded. Urgent action is required to achieve water quality outcomes.
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**Table A1. Example of Key Measures highlighting progress for each step. Refer to the Sectoral Action plans for up-to-date measures assessments.**

<b>1. Target</b> Identify Issues: Characterise Catchments to Identify the Problems	<b>2. Plan</b> Planning Activities KPI: Policy and programmes in place	<b>3. Act</b> Implementing Body Activities KPI: Delivery mechanism for measures	<b>4. Do</b> Take Action on Farm KPI: Spatial Data for what happened	<b>5. Report</b> Monitor progress and water quality outcomes achieved KPI: Environmental Outcomes
Agriculture examples				
Organic Pollution - 171 waterbodies	43a,b: targeting enforcement	39c: implement enhanced WQ enforcement	EPA setting out data collection requirements and templates.	Improved water quality monitoring data.
Agri Pressure on High Status Waters – 61 waterbodies	Cooperation Projects (41 wbs) *Riparian Score Card will be Key* (20wbs outside coop projects)	New Action (D): Knowledge Transfer	Spatial data of on farm interception measures with date and details of actions.	Reduced physical alteration and nutrient losses to water.
Phosphorus loss from agriculture - 874 waterbodies (Not Peat) Excess Sediment – 125 waterbodies	Water EIP - 2,500km of riverside interception measures (e.g. 12,500 hectares of native woodlands).	Implement Water EIP	Spatial data of on farm interception measures with date and details of actions.	Reduced phosphorus concentrations in rivers.
Chemical pollution from Sheep Dip identified - 65 water bodies	Focused awareness campaigns	Local Implementation	LA report actions through WFD structures.	Improved biological monitoring data.
UWW example				
Pesticides impacting drinking water - 27 public supplies had samples failing pesticides standard (2019) Broader WQ issues	Drinking water source protection regs Focused awareness campaigns	Local Implementation	LA actions reported through WFD structures.	Reduced exceedances in monitoring data.
Forestry example				
Nutrient Pollution - waterbodies	#54 Address all incidents #55 Engage in the WFD governance structures #56 Deliver training to practitioners Targeted enforcement	Actions taken across all WBs including WBs in Cycle 3 AfA	Forestry industry has demonstrated use of data-driven management	Reduced nutrient losses to water.

## Appendix 2: Prioritised pathway interception points in the Barrow Catchment

In the Barrow Catchment, there are 2,300 priority locations for possible interception measures in 61 waterbodies with significant agricultural pressures identified. Interception measures can be targeted in these Very High or High Focussed Flow Delivery Paths that coincide with High PIP-P areas. These data can be used to support LAWPRO and ASSAP in their field investigations and discussions with landholders about targeting measures. They will also support the implementation of measures in the Water EIP.

There are 1,900 of these potential interception locations identified within Cycle 3 Areas for Action and a further 400 outside of Cycle 3 Areas for Action.

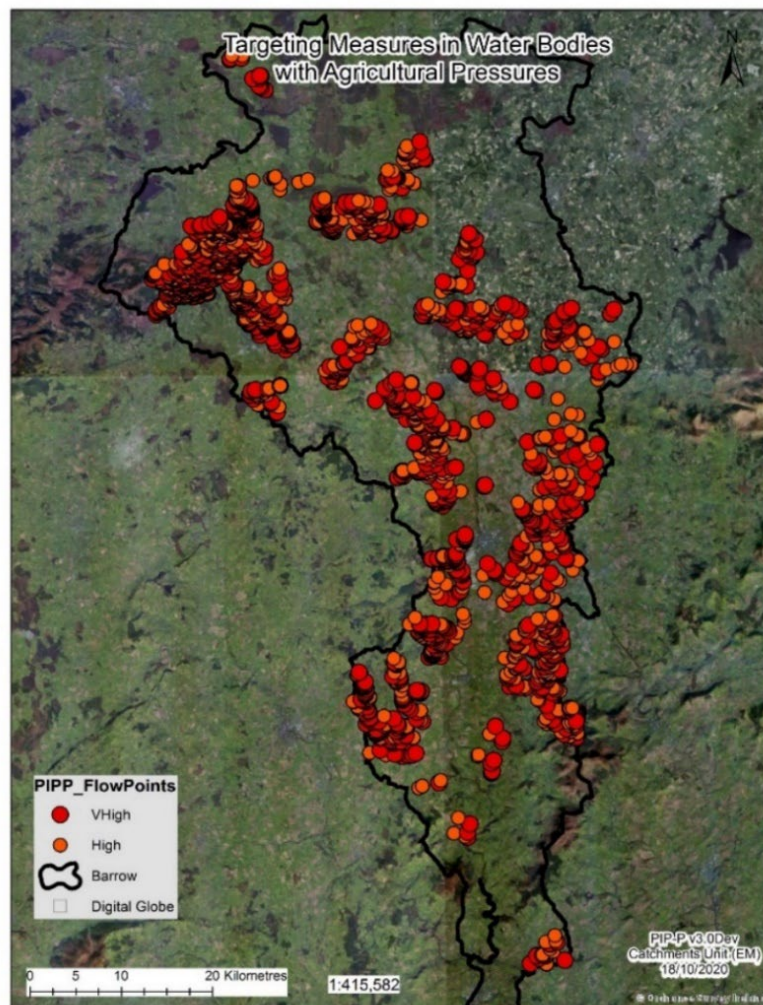


Figure A2: Potential priority interception locations in the Barrow Catchment.

# AN GHNÍOMHAIREACTH UM CHAOMHNÚ COMHSHAOL

Tá an GCC freagrach as an gcomhshaol a chosaint agus a fheabhsú, mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaol a chosaint ar thionchar díobhálach na radaíochta agus an truaillithe.

## Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

**Rialáil:** *Rialáil agus córais chomhlíonta comhshaol éifeachtacha a chur i bhfeidhm, chun dea-thorthaí comhshaol a bhaint amach agus díriú orthu siúd nach mbíonn ag cloí leo.*

**Eolas:** *Sonraí, eolas agus measúnú ardchaighdeán, spriocdhíríthe agus tráthúil a chur ar fáil i leith an chomhshaol chun bonn eolais a chur faoin gcinnteoireacht.*

**Abhcóideacht:** *Ag obair le daoine eile ar son timpeallachta glaine, táirgiúla agus dea-chosanta agus ar son cleachtas inbhuanaithe i dtaobh an chomhshaol.*

## I measc ár gcuid freagrachtaí tá:

### Ceadúnú

- Gníomhaíochtaí tionscail, dramhaíola agus stórála peitрил ar scála mór;
- Sceitheadh fuíolluisce uirbigh;
- Úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaithe;
- Foinsí radaíochta ianúcháin;
- Astaíochtaí gás ceaptha teasa ó thionscal agus ón eitleocht trí Scéim an AE um Thrádáil Astaíochtaí.

### Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaol

- Iníúchadh agus cigireacht ar shaoráidí a bhfuil ceadúnas acu ón GCC;
- Cur i bhfeidhm an dea-chleachtais a stiúradh i ngníomhaíochtaí agus i saoráidí rialáilte;
- Maoirseacht a dhéanamh ar fhreagrachtaí an údaráis áitiúil as cosaint an chomhshaol;
- Caighdeán an uisce óil phoiblí a rialáil agus údaruithe um sceitheadh fuíolluisce uirbigh a fhorfheidhmiú
- Caighdeán an uisce óil phoiblí agus phríobháidigh a mheasúnú agus tuairisciú air;
- Comhordú a dhéanamh ar líonra d'eagraíochtaí seirbhíse poiblí chun tacú le gníomhú i gcoinne coireachta comhshaol;
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaol agus a dhéanann dochar don chomhshaol.

### Bainistíocht Dramhaíola agus Ceimiceáin sa Chomhshaol

- Rialacháin dramhaíola a chur i bhfeidhm agus a fhorfheidhmiú lena n-áirítear saincheisteanna forfheidhmithe náisiúnta;
- Staitisticí dramhaíola náisiúnta a ullmhú agus a fhoilsiú chomh maith leis an bPlean Náisiúnta um Bainistíocht

Dramhaíola Guaisí;

- An Clár Náisiúnta um Chosc Dramhaíola a fhorbairt agus a chur i bhfeidhm;
- Reachtaíocht ar rialú ceimiceán sa timpeallacht a chur i bhfeidhm agus tuairisciú ar an reachtaíocht sin.

### Bainistíocht Uisce

- Plé le struchtúir náisiúnta agus réigiúnacha rialachais agus oibriúcháin chun an Chreat-treoir Uisce a chur i bhfeidhm;
- Monatóireacht, measúnú agus tuairisciú a dhéanamh ar chaighdeán aibhneacha, lochanna, uiscí idirchreasa agus cósta, uiscí snámha agus screamhuisce chomh maith le tomhas ar leibhéil uisce agus sreabhadh abhann.

### Eolaíocht Aeráide & Athrú Aeráide

- Fardail agus réamh-mheastacháin a fhoilsiú um astaíochtaí gás ceaptha teasa na hÉireann;
- Rúnaíocht a chur ar fáil don Chomhairle Chomhairleach ar Athrú Aeráide agus tacaíocht a thabhairt don Idirphlé Náisiúnta ar Gníomhú ar son na hAeráide;
- Tacú le gníomhaíochtaí forbartha Náisiúnta, AE agus NA um Eolaíocht agus Beartas Aeráide.

### Monatóireacht & Measúnú ar an gComhshaol

- Córais náisiúnta um monatóireacht an chomhshaol a cheapadh agus a chur i bhfeidhm: teicneolaíocht, bainistíocht sonraí, anailís agus réamhaisnéisiú;
- Tuairiscí ar Staid Thimpeallacht na hÉireann agus ar Tháscairí a chur ar fáil;
- Monatóireacht a dhéanamh ar chaighdeán an aeir agus Treoir an AE i leith Aeir Ghlain don Eoraip a chur i bhfeidhm chomh maith leis an gCoinbhinsiún ar Aerthruaillíú Fadraoin Trasteorann, agus an Treoir i leith na Teorann Náisiúnta Astaíochtaí;
- Maoirseacht a dhéanamh ar chur i bhfeidhm na Treorach i leith Torainn Timpeallachta;
- Measúnú a dhéanamh ar thionchar pleananna agus clár beartaithe ar chomhshaol na hÉireann.
- Taighde agus Forbairt Comhshaol
- Comhordú a dhéanamh ar ghníomhaíochtaí taighde comhshaol agus iad a mhaoiniú chun brú a aithint, bonn eolais a chur faoin mbeartas agus réitigh a chur ar fáil;
- Comhoibriú le gníomhaíocht náisiúnta agus AE um thaighde comhshaol.

### Cosaint Raideolaíoch

- Monatóireacht a dhéanamh ar leibhéil radaíochta agus nochtheadh an phobail do radaíocht ianúcháin agus do réimsí leictreamaighnéadacha a mheas;
- Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha;

- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta;
- Sainseirbhísí um chosaint ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

### Treoir, Ardú Feasachta agus Faisnéis Inrochtana

- Tuairisciú, comhairle agus treoir neamhspleách, fianaise-bhunaithe a chur ar fáil don Rialtas, don tionscal agus don phobal ar ábhair maidir le cosaint comhshaol agus raideolaíoch;
- An nasc idir sláinte agus folláine, an geilleagar agus timpeallacht ghlan a chur chun cinn;
- Feasacht comhshaol a chur chun cinn lena n-áirítear tacú le hiompraíocht um éifeachtúlacht acmhainní agus aistriú aeráide;
- Tástáil radóin a chur chun cinn i dtithe agus in ionaid oibre agus feabhsúchán a mholadh áit is gá.

### Comhpháirtíocht agus líonrú

- Oibriú le gníomhaireachtaí idirnáisiúnta agus náisiúnta, údaráis réigiúnacha agus áitiúla, eagraíochtaí neamhrialtais, comhlachtaí ionadaíochta agus ranna rialtais chun cosaint comhshaol agus raideolaíoch a chur ar fáil, chomh maith le taighde, comhordú agus cinnteoireacht bunaithe ar an eolaíocht.

### Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaol

Tá an GCC á bhainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóir. Déantar an obair ar fud cúig cinn d'Oifigí:

- An Oifig um Inbhuanaitheacht i leith Cúrsaí Comhshaol
- An Oifig Forfheidhmithe i leith Cúrsaí Comhshaol
- An Oifig um Fhianaise agus Measúnú
- An Oifig um Chosaint ar Radaíocht agus Monatóireacht Comhshaol
- An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tugann coistí comhairleacha cabhair don Gníomhaireacht agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair inní agus le comhairle a chur ar an mBord.





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