



National Federation of Group Water Schemes

Guidance on the Content and Format of Integrated Source Protection Plans

September 2025

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1 Introduction

Source protection has long since been recognised as an essential component of the multi-barrier approach to ensure the provision of safe and secure drinking water. The NFGWS has been developing a source protection strategy in collaboration with others over several years to assist its members comply with the requirements of the WFD and DWD.

This strategy has 2 phases, an initial phase consisting of a preliminary desk based assessment and delineation of the source catchment or ZOC (completed circa 2013 -2018), and a second phase (currently underway) which is developing more detailed Integrated Source Protection Plans across the sector.

This document has been prepared as a guide for those developing a group water scheme Integrated Source protection Plan (ISPP). The document is intended to act as an aid to ensure consistency of approach and reflects the many learning from piloting of the ISPP process. This document should be read in tandem with the request for tender for the specific project being undertaken, the NFGWS Framework document and the Drinking Water Source Protection Technical Guidance (2024)¹. Figure 1, which is copied from the Technical Guidance, outlines the overall framework for considering source protection.

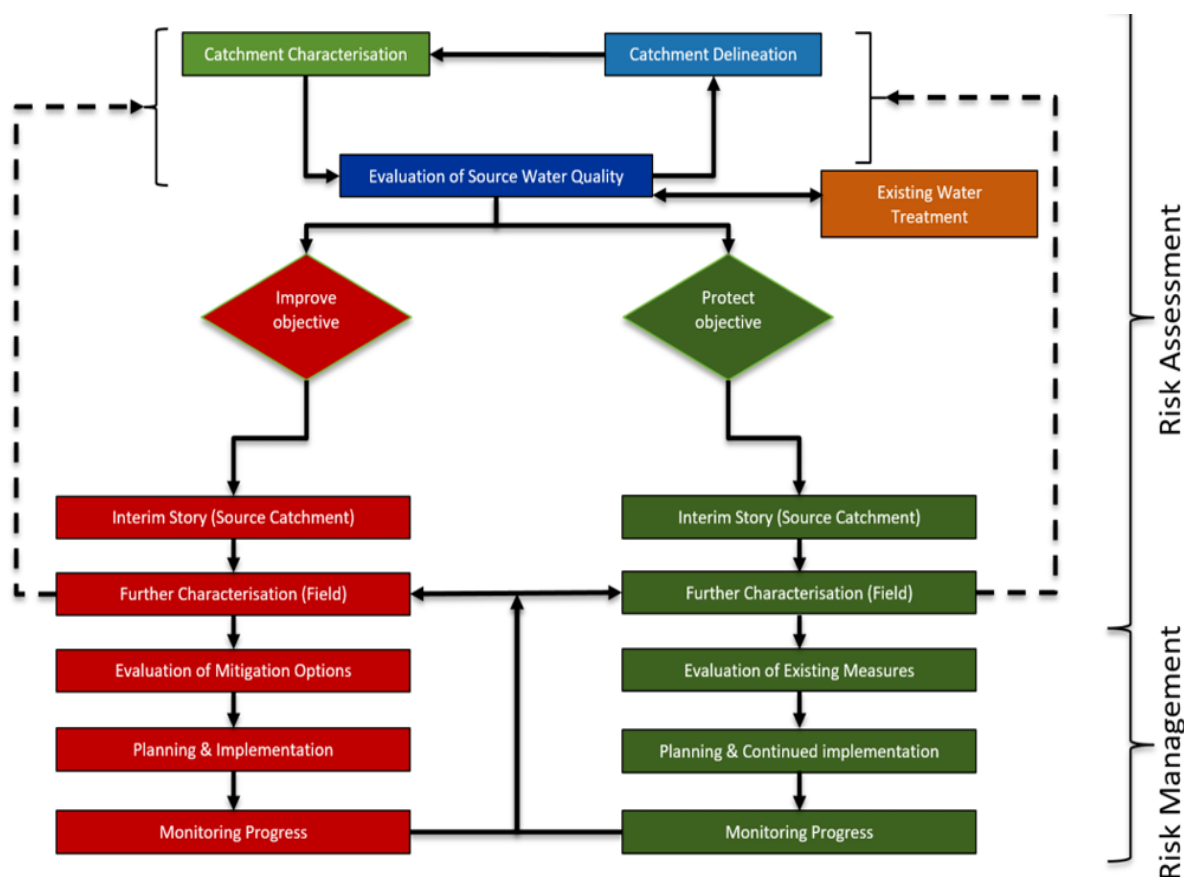


Figure 1: Recommended drinking water source protection framework

¹ <https://www.gov.ie/en/publication/411f4-drinking-water-source-protection/>

2 Overarching Principles

- 1 An ISPP is a report based on scientific characterisation of the untreated water quality and the physical setting of the catchment areas (for surface water sources) and zones of contribution (ZOCs) for groundwater sources. The **focus/objective** of the scientific component of ISPPs is to provide recommendations on **effective and efficient measures/actions** to protect or mitigate impacts on the **untreated water**, as appropriate, with **sufficient information** to enable the situation to be understood and the measures/actions to be **explained and justified**. This is captured in Section 3.6 of the NFGWS Framework which states: *“A key goal is to ensure that decisions are targeted to achieving the required objectives and therefore are efficient and effective in terms of water quality outcomes, resources required including staffing and costs, and acceptability among stakeholders”*. Establishment of ineffective and inefficient measures/actions, which do not achieve the desired water quality outcomes, not only wastes time and resources, but also devalues and undermines the source protection process and those advocating the process. Therefore, while good characterisation is essential, **it is critical to put recommendations on measures/actions at the forefront of thinking and analysis throughout the process**. For instance, **for every proposed measure/action being considered for inclusion in an ISPP, the likelihood of achieving the desired outcomes should be analysed prior to a recommendation or a decision on allocating resources to implementation**. The Waters of Life Framework of Measures and the accompanying Annexes for Agricultural Activities, Forestry, Peat Extraction, Quarries and Domestic Wastewater Treatment Systems (DWWTSs) ² provide effectiveness ratings for measures – these are recommended for consideration in proposing mitigation measures. In addition, the NFGWS Handbook of Source Protection and Mitigation Actions for Farming (NFGWS, 2020) should be used to guide recommendations on measures/actions where farming is either a *potential* or *significant pressure*.
- 2 A key principle in deciding on and establishing measures is the **“right measure in the right place”**.
- 3 In the catchment area of every drinking water source, there are human activities and therefore a multitude of pressures. For sources with an **‘improvement objective’**, the key is to review potential pressures, but to then decide on and locate those that alone or in combination are the pressures impacting on the water quality to a degree that it is ‘unsatisfactory’ – these are the **significant pressures**. Then practical, targeted measures need to be proposed for mitigating their impacts. Where the source water quality is ‘satisfactory’ with a **‘protection objective’**, deterioration caused by **potential pressures** must be avoided by targeted preventative measures.
- 4 The ISPP reports are intended to be based on good catchment science and to follow the risk assessment process required under the drinking water regulations SI No. 99 of 2023 and the catchment approaches used by the EPA Catchments Unit, LAWPRO and the Water of Life project. See Box 1 for links to sources of useful information.
- 5 The NFGWS Framework for Drinking Water Source Protection (NFGWS, 2019) provides general guidance on which ISPPs are based. The required process is summarised in both Figure 1 and in Figure 2, which is an extended version of Figure 1.
- 6 The DHLGH (2024) Technical Guidance and the EPA (2025) Guidance on Risk Assessment (RA) and Risk Management (RM) provide the required approaches to enable compliance with the recast Drinking Water Directive (EU) 2020/2184 (recast Directive).

² See links in Box 3.

Box 1

Sources of Information on Catchment Science and Management

SI No. 99 of 2023. European Union Drinking Water Regulations.

<https://www.irishstatutebook.ie/eli/2023/si/99/made/en/print>

DHLGH (2024). Drinking Water Source Protection Technical Guidance.

<https://www.gov.ie/en/publication/411f4-drinking-water-source-protection/>

EPA (2025). Detailed guidance for risk assessment and risk management of public and small private supplies. In draft currently.

LAWPRO/EPA (2022a). An overview of catchment science and management. A Guidance Handbook. Volume 1. Local Authority Waters Programme and Catchment Science and Management Unit, Environmental Protection Agency.

https://lawwaters.ie/app/uploads/2022/01/Print_CSM-Volume-1_April-2022.pdf

LAWPRO/EPA (2022b). Pressures and catchment walks. A Guidance Handbook. Volume 2. Local Authority Waters Programme and Catchment Science and Management Unit, Environmental Protection Agency.

https://lawwaters.ie/app/uploads/2022/09/Print_CSM-Volumes-23_April-2022.pdf

LAWPRO/EPA (2022c). Measured indicator parameters – catchment walks. A Guidance Handbook. Volume 4. Local Authority Waters Programme and Catchment Science and Management Unit, Environmental Protection Agency.

https://lawwaters.ie/app/uploads/2022/09/Print_CSM-Volumes-23_April-2022.pdf

Waters of Life (2023a). Framework of best practice measures and guidelines for the protection and restoration of high status objective waterbodies.

https://www.watersoflife.ie/app/uploads/2023/08/Measures_Framework.pdf

3 General Comments

- ◆ The ISPP report should be stand-alone; therefore, it needs to summarise relevant information, for instance, from earlier reports on the source.
- ◆ Unless there is an obvious reason not to, the ISPP report should follow the template and terminology given below, which are a combination of the Recast Directive and WFD terminology. Precision in terminology is important to enable consistency with the NFGWS Framework, the Drinking Water Regulations and the WFD terminology used by the EPA and LAWPRO, and to encourage clear thinking. Table 1 explains the different terms.
 - Where ‘protect’ is the outcome from the water quality assessment:
 - The report should conclude on ‘potential pollutants (hazards)’, ‘potential pressures (hazardous events)’ and ‘preventative measures’.
 - Where ‘improve’³ is the required outcome:
 - The report should conclude on ‘significant pollutants (hazards)’, ‘significant pressures (hazardous events)’ and ‘mitigation measures’.
- ◆ The text under specific headings should relate to the heading.
- ◆ There is no need for inclusion of basic scientific explanatory text.
- ◆ Maps should be at as detailed a scale as possible and should use to the colour coding on the original mapping

³ This is the equivalent of the ‘restore’ objective for WFD implementation.

- ◆ Only relevant maps need to be included (see section 5.4.5).
- ◆ If LAWPRO and/or the local authority have undertaken characterisation of the WFD sub-catchment in which the drinking water source is present, the understanding gained should be considered in the desk-based assessment.
- ◆ Where the drinking water source is **also** a waterbody that is failing to meet their WFD status objective, the responsibility for restoring the waterbody status may not rest entirely with the GWS, although it can play a significant collaborative role in restoring the water body to good status.

Table 1: Terminology linking the Recast Directive, the Water Framework Directive (WFD) and the NFGWS Framework.

Recast Directive	WFD	
Hazard means a biological, chemical, physical or radiological agent in water, or another aspect of the condition of water, with the potential to cause harm to human health. ⁱ	Issue⁴ , usually pollutant, of concern.	
	A ' Potential Pollutant ' poses a possible future threat but is not currently.	A ' Significant Pollutant ' has a substantial impact on the ecological or groundwater status and needs to be addressed to enable a waterbody to achieve its objective. Examples: nitrate, FIOs, MCPA.
Hazardous Event means an event that introduces hazards into, or fails to remove them from, the supply system of water intended for human consumption.	Pressure	
	A ' Potential Pressure ' is not currently impacting on water quality, but is present in the catchment or ZOC and could in the future	A ' Significant Pressure ' impacts on waterbody status or drinking water source. Examples: diffuse agriculture, forestry, UWWTPs.
	Objectives	
	Protect water quality	Restore/Improve water quality
	Measures	
	' Preventative ' measures, which are both 'Basic' statutory measures in WFD terminology and frequently additional voluntary measures.	' Mitigation ' measures, which are supplemental to statutory measures. Without these, the water quality objectives are not likely to be achieved. Therefore, characterisation and risk assessment are essential to enable the 'right (mitigation) measure in the right place'.

Notes:

1. See Sections 2.2.2 and Appendix 1 of the Drinking Water Source Protection Technical Guidance for further explanations.
2. As a key outcome of an ISPP is to enable the required measures to be determined, particularly those that are mitigation measures, the terms 'significant pollutant', 'potential pollutant', 'significant pressure' and 'potential pressure' are used in addition to 'hazard' and 'hazardous event' in this Guidance document.
3. The ISPP process enables i) the significant pollutants (hazards), ii) significant pressures (hazardous events) impacting on the drinking water source and iii) the required mitigation measures including their location to be determined.

⁴ Issues such as pollutants, water levels, channelisation, weirs, physical habitat that either are impacting or have the potential to impact on the achievement of the WFD objectives. As pollutants pose the main threat to drinking water sources, this document equates pollutant with hazard.

4 Recommended ISPP Report Headings

1. Introduction
2. Executive Summary
3. Methodology
4. Desk-based assessment
 - 4.1 GWS Description
 - 4.2 Evaluation of untreated water quality
 - 4.3 Catchment/ZOC delineation
 - 4.4 Evaluation of water quality data within the catchment/ZOC
 - 4.5 Pathway information and analysis
 - 4.6 Pressure information and analysis
 - 4.7 Ecological and heritage considerations
 - 4.8 Interim 'story'
5. Field-based assessment
 - 5.1 Additional water quality monitoring
 - 5.2 Catchment walk/field investigation
6. Catchment Area/ZOC Final Story
7. Preliminary Risk Assessment
8. Risk Management Recommendations
 - 8.1 Mitigation or Preventative, as appropriate, measures options
 - 8.2 Further investigations
 - 8.3 Prioritised recommended actions

Note: There may be circumstances where this template can be changed.

5 Guidance on ISPP Report Components

5.1 Executive Summary

- ◆ Brief points summarising the report should be included.
- ◆ Non-technical language should be used (target audience is the group water scheme committee and staff).

5.2 Methodology

- ◆ The following generic text can be used for this section, in addition to project specific text the consultant determines to be relevant:

"The preparation of this Integrated Catchment Management Plan (ICMP) has been completed in accordance with the staged process outlined in the aforementioned 'A Framework for Drinking Water Source Protection Plans' (2019) and the Drinking Water Source Protection Technical Guidance. The key components of the 'Framework' are illustrated in Figure 1 and Figure 2.

The primary stage of the 'Framework' process involves an assessment of the water quality in the abstraction source to determine first and foremost if the water quality is in a satisfactory condition and requires protection or is in an unsatisfactory condition and necessitates improvement. Included in Appendix 1 of the 'Framework' document are 'Guide Values' for specific pollutants that provide a reference against which individual parametric concentrations can be evaluated – see Table 2. Where 'Guide Values' have not been attributed, threshold values from alternative guidelines / regulatory sources are included, where appropriate.

Irrespective of the objective determined from the water quality assessment, the surface water catchment area needs to be established. An accurate catchment delineation is imperative when trying

to characterise the catchment and develop a Source – Pathway – Receptor (SPR) model for the scheme. The interim model / story (i.e. produced after the desktop assessment stage) aims to identify the significant pressures within an ‘**Improve**’ catchment or provide an understanding of the reasons for the satisfactory conditions within a ‘**Protect**’ catchment. Where the need for an improvement in the water quality has been determined or where there is a deficit in the quantity of untreated water quality analysis, further catchment characterisation is warranted. Further characterisation involves field scale analysis to identify the precise location of significant point source pressures and / or the extents of diffuse pollution critical source areas (CSAs). Catchment characterisation work should follow LAWPRO / EPA’s Guidance Handbooks.

One of the main objectives of the catchment component of source protection is to specify proposals or decisions, depending on the circumstances, on the protection strategies that are needed to either protect or improve drinking water sources. Sources with satisfactory water quality will still require protection strategies, while unsatisfactory situations will require more robust mitigation.”

5.3 Desk-based assessment

5.3.1 GWS Description

- ◆ Include a basic description of the scheme, for instance, details on the source, number of people supplied, treatment facilities, etc.
- ◆ Make specific reference to the phase 1 report where completed.
- ◆ Photographs of the source should be included.

5.3.2 Evaluation of water quality

- ◆ Evaluation based on all untreated water quality data, including historical and, where appropriate, treated water quality data.
- ◆ Treated water analysis should include a summary of past exceedances (if any) in the drinking water in addition to screening certain parameters, which may not be removed during the treatment processes, against the framework guide values e.g., pesticides, nitrate, etc.,
- ◆ The experience and knowledge of the GWS and NFGWS staff on the water quality situation should be included.
- ◆ The key data are those for the intake water.
- ◆ The data should be graphed, compared to the Guide Values (keeping in mind that some are mean values) and summarised.
- ◆ A distinction should be made between parameters that are relevant primarily to health and those relevant to the general water quality assessment. This distinction is made in Table 1.
- ◆ Key outcomes:
 - i) Conclusion on the presence or otherwise of *significant pollutants (hazards)* that need to be mitigated and/or *potential pollutants (hazards)* that are not *significant* but that might need to be observed in the future and for which preventative measures are likely to be needed.
 - ii) Conclusion on whether the objective is to ‘Improve’ or ‘Protect’.
- ◆ See Section 2.2 in the Drinking Water Source Protection Technical Guidance for further details.

5.3.3 Catchment/ZOC Delineation

- ◆ A confidence level (High/Low) in the boundaries should be given (see Appendix 2 ‘Proposed Protection Zones’ in the Technical Guidance (DHLGH, 2024)), as well as the basis for the boundaries e.g., for surface water sources cross check between original catchment delineation and other datasets such as the EPA Hydrotool, OPW FSU catchment delineations, etc. For groundwater sources, use the ZOC delineated by the GSI as the starting point. If changes are considered to be necessary, explain the reasons – the Groundwater Section of the GSI will review these changes.

- ◆ Where possible or relevant for surface water sources, sub-catchments within the overall catchment should be delineated.

Table 2: Untreated water guide values for the main *significant pollutants/hazards*.

Objective	NFGWS Guide ⁵ values			Drinking water standard
	Parameter	Surface water sources	Groundwater sources	
Health & Environmental	E. Coli	1,000/100 ml	100/100 ml	0/100 ml
	Nitrate (as NO ₃)	28 mg/l (mean)	28 mg/l (mean)	50 mg/l (MAC)
	MCPA	0.075 µg/l (mean)	0.075 µg/l (mean)	0.1 µg/l
	Total pesticides	0.375 µg/l (mean)	0.375 µg/l (mean)	0.5 µg/l
	PAHs	0.075 µg/l (mean)	0.075 µg/l (mean)	0.1 µg/l
	Benzo(a)pyrene	0.0075 µg/l (mean)	0.0075 µg/l (mean)	0.01 µg/l
Environmental	Ammonium	0.065 ⁶ mg/l N (mean)	0.175 mg/l N (mean)	0.23 mg/l N
	Phosphate	0.035 mg/l (mean))	0.035 mg/l P	-
	Total Phosphorus	0.025 mg/l P (mean)	-	-
	Colour	100 mg/l Pt/Co	20 mg/l Pt/CO	-

Data source: NFGWS (2019).

5.3.4 Water Quality Data within the Catchment / ZOC

- ◆ Data for other monitoring points in the catchment/ZOC where available should be used to help characterise the situation.
- ◆ For surface water sources, a minimum of one year's data will generally be needed.
- ◆ Where Small Stream Impact Score (SSIS) assessments have previously been completed in the catchment (i.e. by the Local Authority, LAWPRO etc.), these data should also be included within the section.
- ◆ For surface water sources, a 'story board' and/or a suitable table would assist in understanding the changes that are occurring between the headwaters and the source.
- ◆ The NFGWS have commenced raw water data compilation for each GWS, however these data may need to be augmented if other sources are identified. The data should be graphed, compared to the Guide Values (keeping in mind that some are mean values) and summarised.
- ◆ Checking the status of waterbodies either in the catchment area/ZOC of the drinking water source or nearby may give useful information on general water quality in the area. Where relevant the status of both surface water and groundwater bodies should be given.
- ◆ While this section will be needed in most ISPPs, it may not be for all – for instance in lake catchments with no stream or river inflows.
- ◆ The purpose of this section is to use all available water quality data to help understand the general water quality in the source catchment/ZOC.
- ◆ New parameters identified in the European Union (Drinking Water) Regulations (2023⁷ should be highlighted for further consideration and monitoring, especially where there are indications from existing monitoring or from the characterisation process that they may pose a potential hazard to the source water.

5.3.5 Pathway information and analysis

- ◆ This should concentrate on the pathways that are relevant to the *significant pollutants (hazards)* and/or pollutants that may need to be observed, and the *significant pressures (hazardous events)*.

⁵ Screening value.

⁶ Note: The value in NFGWS (2019) has been amended and is now the surface water EQS value.

⁷ <https://www.irishstatutebook.ie/eli/2023/si/99/made/en/pdf>

- ◆ There are a variety of available maps on both the EPA and GSI websites. For the purposes of the ISPPs, the following maps (with the associated terminology) should be used:
 - The appropriate soil map to use is the National Soils Hydrology map at this link: <https://gis.epa.ie/EPAMaps/Water>. It subdivides soils into freely draining and 3 categories of poorly draining. This is the information that feeds into the susceptibility and PIP maps.
 - The appropriate bedrock geology map (in general, unless there are reasons to use a more traditional geology map) is the GSI Rock Unit Groups at either of these links: <https://gis.epa.ie/EPAMaps/Water> and <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef>. One of the advantages of this map, is that the terminology is more understandable to non-geologists. Where the bedrock map does not provide useful information, for instance where there is only one rock unit, a map does not need to be included.
 - The aquifer map should always be included.
 - The appropriate subsoils map is the Subsoils map on <https://gis.epa.ie/EPAMaps/Water>. This is the same map as the Subsoils (Quaternary Sediments) map at <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef>.
 - Where nitrate or phosphate are the significant pollutants (hazards), it is worthwhile checking the susceptibility map and comparing it with the National Soils Hydrology map, as the susceptibility is based on a greater range of components, such as aquifer category and groundwater vulnerability.
 - Groundwater vulnerability maps are key maps for groundwater ISPPs and for indicating the thickness of the soil/subsoil above bedrock. Unless use is made of the information from these maps, they do not need to be included in surface water ISPPs.
 - In all limestone areas, the presence of karst features should be checked on the GSI website⁸.
 - For groundwater sources, it is essential to delineate the Inner Protection Area (SI) if not already delineated by, for instance, the GSI. The methodology for this should be proposed by the consultant in their tender response. At this juncture, it is not envisaged that long duration pumping tests will be required in small 'Protect' groundwater sources or karst groundwater sources. Where a short duration pumping test is required, this will be specifically referenced in any request for tender (i.e. typically for 'Improve' non-karst groundwater settings). Consultants should use available relevant data (e.g. pumping rate information, borehole well levels etc.) to inform the SI delineation. Where feasible, the installation of data loggers within the abstraction borehole(s) for a period during the development of an ISPP is encouraged.
 - Groundwater body descriptions⁹ provide useful characterisation information on groundwater, which could be relevant to both groundwater and surface water sources.
- ◆ A summary pathways conceptual model should be drafted.
- ◆ Links to the range of available relevant maps and videos are given in in Box 2.

5.3.6 Pressure (Hazardous Event) information and analysis

- ◆ This is based on land use maps, local information, known large point sources, PIP maps, and pressures recorded on <https://gis.epa.ie/EPAMaps/Water>, etc.
- ◆ The focus should be on the pressures (hazardous events) that are likely to be the source of the *significant pollutants (hazards)* where the objective is 'improve' and on potential pressures where the objective is 'protect'.

⁸ <https://www.gsi.ie/en-ie/data-and-maps/Pages/Groundwater.aspx#KarstFeatures>

⁹ <https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx>

- ◆ Loadings analysis should be undertaken, if feasible, where orthophosphate and nitrate are *significant issues (hazards)*. (Note that the mean flow in watercourses can be taken as the Q30 flow.) Guidance is given in Appendix 4 in LAWPRO/EPA (2022a)¹⁰.
- ◆ An essential outcome of this section is the location of critical source areas (CSAs) for the *significant issues (hazards)* or possible CSAs for *potential pollutants*. Where phosphate and/or nitrate are the pollutants/hazards of concern, the PIP maps (which are a combination of susceptibility and pressure maps) provide the CSAs. For pollutants, such as phosphate and sediment, the Flow Deliver Paths and Flow Delivery Points highlight the likely areas for focussed losses to watercourses, and therefore where pathway interception measures may be beneficial.
- ◆ Where point sources are considered to be significant pressures, evidence should, be given and their locations should be shown.
- ◆ It is usually more straightforward to decide on and locate the *significant pressures/hazardous events* in source catchments/ZOCs where the objective is 'improve' than in those where the objective is 'protect/maintain'. Some general suggestions on locating potential pressures are given in Section 4.3 in Water of Life (2023a).
- ◆ Any existing hydrological/hydrogeological abstraction risk assessment undertaken on the source should also be referenced. In the absence of such an assessment, consultants may recommend that this be undertaken in light of the requirements of the Water Environment (Abstractions and Associated Impoundments) Act 2022¹¹.
- ◆ Safeguard zones should be delineated. According to Appendix 1 'Safeguard Zones' in the Technical Guidance (DHLGH, 2024), the term 'safeguard zone' (SGZ) '*is considered a high-risk area within which targeted mitigation measures are implemented in order to a) protect the quality of water abstracted for drinking water purposes and b) to mitigate (minimize) the need for (additional) raw water treatment.*'

Box 2

Links to Relevant Maps

www.catchments.ie

<https://www.gsi.ie/en-ie/data-and-maps/Pages/Groundwater.aspx>

Links to useful videos

How to use the EPA Water Map on catchments.ie

https://www.youtube.com/watch?v=bNNQtw_6ueI

Pollution Potential Impact (PIP) Maps

<https://www.youtube.com/watch?v=YVEGin-2PKg>

How to find chemistry data on catchments.ie

<https://www.youtube.com/watch?v=JkB3nqua8Jo>

5.3.7 Ecological and Heritage Considerations

- ◆ Identify if GWS catchment/ZOC overlap with any NATURA 2000 sites or have a hydrological linkage to downstream sites, etc.
- ◆ Should overlap exist, implications will need to be considered when identifying potential mitigation and preventative options (see Section 8).
- ◆ The National Biodiversity Data Centre records for the area should be reviewed to determine if there are potential opportunities for biodiversity co-benefits for mitigation and preventative options

¹⁰ https://lawwaters.ie/app/uploads/2022/01/Print_CSM-Volume-1_April-2022.pdf

¹¹ <https://www.irishstatutebook.ie/eli/2022/act/48/enacted/en/html>

5.4 Interim Story

- ◆ Key outputs:
 - i) A summary of each of the components described in 5.4.2, 5.4.4, 5.4.5, 5.4.6 and 5.4.7, starting with the source water quality.
 - ii) Conclusions on the locations of: i) point sources that are likely *significant pressures (hazardous events)*; ii) the likely CSAs for diffuse *significant pollutants (hazards)* and *significant pressures (hazardous events)* and of those that could potentially pose a threat; iii) the locations of the flow delivery paths, zones and points where inputs are likely to be the cause of impacts or could in the future; nutrient load reductions, if estimated.
 - iii) A work plan for the source catchment/ZOC walk. This needs to include the tasks and the number of days needed.
- ◆ In circumstances where the field-based assessment is being undertaken soon after the desk-based assessment, this need only be a summary (perhaps bullet point) as an interim 'story'.
- ◆ The time required to undertake an adequate field-based assessment, particularly fieldwork days, should be assessed and recorded.
- ◆ The outcome of the Interim Story should be discussed with the NFGWS in advance of undertaking any field-based assessment.

5.5 Field-based Assessment

5.5.1 Additional water quality monitoring:

- ◆ While the NFGWS will be assisting the GWS to develop an untreated water monitoring programme, there may be situations where the need for additional monitoring is identified as part of the further catchment investigative works.
- ◆ Where such water quality data within the catchment is lacking (e.g. lake tributaries, swallow holes etc.) and would be beneficial, a monitoring programme should be designed and carried out to help identify the CSAs and pressures within the catchment.
- ◆ If it is considered that an evaluation of biological indicators in the inputting surface water would assist in locating pollution sources, a recommendation for undertaking SSIS assessments could be included in the Further Studies section.

5.5.2 Catchment Walk/Field Investigation

- ◆ Where the objective is 'improve', this should focus on: i) the *significant pollutants (hazards)*; ii) the *significant pressures (hazardous events)* (amending them, if necessary); iii) the CSAs and flow delivery paths located by the desk-based assessments; and iv) recording new *significant pressures (hazardous events)*, if present.
- ◆ Where the objective is 'protect', a brief evaluation of potential pressures (hazardous events) in susceptible or vulnerable areas should be undertaken in consultation with GWS staff. This should focus primarily on those that could contribute any of the potential pollutants (hazards) noted in the desk-based assessment.
- ◆ In any catchment/ZOC, there will be numerous pressures (hazardous events). Only those that are contributing **High** and **Medium** risk pollutants (hazards) (see Section 7.2) need to be considered in detail.
- ◆ Where phosphate and/or sediment are the *significant pollutants (hazards)*, the flow delivery pathways and delivery points shown on the PIP maps need to be field checked.
- ◆ Where phosphate is the *significant pollutant (hazard)*, knowledge of the soil P indices of fields in high PIP areas could help in focusing measures, particularly source and mobilisation control measures. Therefore, collaboration with farmers would be needed to obtain this information. In addition, this provides an opportunity to advise farmers on nutrient applications.
- ◆ Where farming activities are a *significant pressure (hazardous event)*, expertise and experience in agricultural science would be beneficial.

- ◆ For ‘improve’ objective sources, where overland/shallow subsurface flows are the dominant flowpaths, winter fieldwork might be advisable – a recommendation for this could be included in the Further Studies section.
- ◆ While undertaking the catchment walk, consideration should be given to possible mitigation/preventative options.

5.6 Catchment Area/ZOC Final Story

As a means of enabling effective risk management and as a precursor to undertaking the EPA risk assessment requirements, the NFGWS requires that the ‘Story’ of the Source catchment area/ZOC is synthesised (see characterisation process in Figure 2). This updates the desk-based Interim Story using the information from the field-based assessment. A series of bullet points is recommended which outline the water quality situation, the pathways for water and pollutants (hazards), the pressures (hazardous events), the location of CSAs (if present), pollutant load reduction analysis (if undertaken) and recommendations, if appropriate, for consultation and collaboration with other public bodies and the group water scheme members.

5.7 Risk Assessment Methodologies

5.7.1 Introduction

Drinking water safety in Ireland is steered by the Water Safety Plan Manual published by the WHO and specifically by the EPA Drinking Water Advice Note ‘Developing Drinking Water Safety Plans’ (EPA, 2011)¹². A new EPA Report ‘Implementation Guidance: Risk Assessment and Risk Management of Both Public and Private Supplies’ (EPA, 2025)¹³ is also essential. Section 3 provides a risk assessment methodology and a Risk Assessment (RA) Reporting Template, which provides the basis for reporting to the water supplier’s supervisory authority.

Undertaking a brief preliminary risk assessment is recommended as a precursor to undertaking the EPA risk assessment approach, and as an aid in deciding on the risk scores where characterisation has been undertaken and sufficient data are available. This process focuses on the pollutants (*hazards*) and the pressures (*hazardous events*) that are present in the source catchment or ZOC and makes recommendations on the category of measures that need to be established as a means of managing any risks present. This is described below. The approach is based on and parallels the process for designating WFD risk for waterbodies (Not at Risk, At Risk and Review), but uses the following terminology – Low Risk, High Risk and Medium Risk. These are based on the characterisation information and conclusions from the field-based assessment which are summarised in the catchment/ZOC story.

5.7.2 Preliminary Risk Assessment

The recommended preliminary risk assessment process is as follows:

1. Take each pollutant/hazard in Appendix 1 of the NFGWS Framework (see Table 2) and any **additional pollutants/hazards** that characterisation indicates are in the source catchment area/ZOC.
 - i) Where a concentration is above a guide value or where there is a statistically significant upward trend indicating that the guide value is likely to be breached, assign a **High** risk category.
 - ii) Where concentrations are below and not close to the guide value, assign a **Low** risk category

¹² <https://www.epa.ie/publications/compliance--enforcement/drinking-water/advice--guidance/epa-drinking-water-advice-note---advice-note-no-8-1.php>

¹³ https://www.epa.ie/publications/compliance--enforcement/drinking-water/advice--guidance/EPA_Implementation_Guidance_Final.pdf

- iii) Where concentrations are below but close (>90%) to the guide value with no upward trend, or where it is considered that there may be future significant pressures contributing significant pollutants (hazards), assign a **Medium** risk category.
- 2. Assign a pressure/hazardous event to each pollutant (hazard) of concern. Where the risk for a pollutant (hazard) is Low, only a brief evaluation of pressures (hazardous events) is required.
- 3. Link the results to the required measures categories – mitigation and preventative.
- 4. The NFGWs will use the outcomes to assist GWSs in deciding on the risk scoring in the Risk Assessment Matrix and the Risk Assessment Summary Template as required by the new EPA Guidance (see Section 7.3 and the EPA Report ‘Guidance for Risk Assessment and Risk Management of Both Public and Private Supplies’.

Two examples for contrasting arbitrary GWS scenarios are given in Table 3 and Table 4. The matrix is ‘populated’ from information derived from the desk-based and field-based assessments.

5.8 Risk Management Recommendations

5.8.1 Introduction

Risk management (RM), in particular the establishment of effective measures which address the outcomes of the risk assessment, is critical to ensuring a safe and secure water supply.

A clear methodology for RM, the information to be ‘captured and reported’ and the reporting template are given in Section 4 of the EPA Guidance (EPA, 2025) and is therefore not repeated here. This will be undertaken by the NFGWS. However, it is expected that the consultants undertaking ISPPs will provide recommendations on the mitigation and preventative measures required to manage the source water quality using the guidance in the following section.

5.8.2 Mitigation and Preventative Options

- ◆ This section is key to enabling targeting of measures as a means of ensuring that they are efficient and effective. It provides an evaluation and discussion of possible mitigation or preventative measures, as appropriate. In many of the ISPPs undertaken to-date, this component has been inadequate.
- ◆ The key principle in proposing, deciding on and establishing measures is the **“right measure in the right place”**.
- ◆ Mitigation measures are required where the objective is to ‘improve’ water quality, whereas preventative measures are required where the objective is to ‘protect’ the existing satisfactory water quality (see Section 5.3).
- ◆ The approach to selecting measures is shown in Figure 3.
- ◆ Sources of information on measures are given in Box 3.
- ◆ A new EPA Map on [Targeting Agricultural Measures](https://gis.epa.ie/EPAMaps/agriculture) is now available¹⁴. This should be accessed to get an overview of the *pollutants (hazards)* arising from farming as the *significant pressure (hazardous event)* posing a threat to water quality. Further details are given in Appendix 1.
- ◆ Any recommendations for mitigation or preventative measures (and monitoring) have resource – financial and staffing – implications for GWSs and others. It is essential that there is a defensible justification for such measures and that there is a distinction between ‘recommended’ or ‘necessary’ and ‘nice to do’ or desirable. Therefore, for any pressure that is assessed as being a potential contributor of pollutants that may be causing an impact to a degree that the untreated

¹⁴ <https://gis.epa.ie/EPAMaps/agriculture>

water quality is deemed to be ‘unsatisfactory’, it needs to be clear in the report that i) the load of pollutants arising is sufficient, ii) that there is a clear and explained pathway to the drinking water source and iii) that the particular pressure and associated pollutant is causing or making a substantial contribution to the impact, and therefore needs to be mitigated. If minor or insignificant pressures (hazardous events) (in terms of pollutant load and/or link to the receptor), which have minimal or no bearing on the untreated water quality, are highlighted in ISPPs, it could not only distract from pressures (hazardous events) that need to be mitigated, but also utilise GWS resources for no or minimal benefits, and could be focusing on and perhaps offending those pressure owners unnecessarily. Virtually every action by humans in the catchment area/ZOC of a source is a potential pressure (hazardous event) – there is no need to rank all of them with proposed mitigation actions. Therefore, as stated in Section 2 above, **for every proposed measure being considered for inclusion in an ISPP, the likelihood of achieving the desired outcomes should be analysed prior to a recommendation or a decision on allocating resources to implementation.**

- ◆ Recommended approach:
 - Distinguish between ‘prevent’ and ‘improve’ measures.
 - Mitigation or preventative measures need to be considered using the following categories (as outlined in the NFGWS Handbook¹⁵ and in Volume 1 of the LAWPRO/EPA Guidance Handbook¹⁶):
 - i) Source reduction.
 - ii) Mobilisation control.
 - iii) Pathway interception.
 - iv) Instream works.
 - Think in terms of pollutant ‘load’ arising from pressures; this helps distinguish the pressures (hazardous events) that are *significant* and can assist in ranking the pressures and, in the process, the measures.
 - Where the objective is ‘improve’, it is essential to focus on the *significant pollutants (hazards)* and *significant pressures (hazardous events)*.
 - In assessing and recommending measures, it is important to take account of the likely level of effectiveness of specific measures (the Waters of Life reports (see Box 3) will assist in this).
 - Consideration should be given to feasibility, acceptability, costs and environmental co-benefits.
- ◆ Maps of CSAs, where measures to mitigate specific pollutants of concern are recommended, should be provided. For ‘protect’ sources, locations of any proposed preventative measures should be shown on maps.

5.8.3 Further Investigations

5.8.3.1 Future Monitoring

- ◆ Future monitoring recommendations should be realistic and achievable and focussed on the needs of the source as well as the requirements of the Recast DW Directive.
- ◆ Untreated water sampling on an ongoing basis should take account of GWS resources and the risk. This can be discussed with GWSs during the progress meetings and during the presentation of the draft ISPP to the GWS committee.

¹⁵ NFGWS (2019). ‘A Framework for Drinking Water Source Protection’ at this link: <https://nfgws.ie/a-framework-for-drinking-water-source-protection-2/>

¹⁶ LAWPRO/EPA (2022a). An overview of catchment science and management. A Guidance Handbook. Volume 1. Local Authority Waters Programme and Catchment Science and Management Unit, Environmental Protection Agency. https://lawwaters.ie/app/uploads/2022/01/Print_CSM-Volume-1_April-2022.pdf

5.8.3.2 Further Studies

- ◆ Highlight future investigations outside of the scope of this ISPP that are likely to be required because of additional investigative needs, water safety planning requirements or another future legislative requirement, e.g.:
 - Hydrometric Risk Assessments (i.e. water abstraction regulations).
 - Invasive species assessment at surface water intake.
 - Internal loading, such as lake stratification studies.
 - Karst feature mapping and tracer studies.
 - Checking biological indicators using SSISs.
 - Winter fieldwork to locate flow delivery pathways and points.

5.8.4 Prioritised Recommended Actions

A summary of the prioritised actions should be provided in tabular format. It should include details on the following:

- i) Pollutant(s) (hazard(s)) of concern (either significant or potential (see Section 3)).
- ii) Pressure(s) (hazardous event(s)) contributing the pollutant(s) (hazard(s)) of concern.
- iii) Brief description of the physical setting.
- iv) Pollutant (hazard) load reductions required, if applicable.
- v) Risk category (Section 7.2).
- vi) Recommended measures (including category) to mitigate each pollutant (hazard) from the pressure (hazardous event).
- vii) Brief details on the CSAs and locations for the recommended measures.
- viii) Recommended future monitoring and assessments.
- ix) Any specific recommendations relevant to the drinking water source.

Table 3: Risk matrix for Xxxx GWS

Risk Categories and Measures			
Pollutant/hazard (<i>Significant Y/N</i>)	Risk category	Potential pressure/hazardous event (<i>Significant Y/N</i>)	Measures category
<i>E.Coli</i>	High	Farmyards (Y), DWWTSS (Y)	Mitigation
Nitrate (N)	Low	Diffuse Agriculture (N)	Preventative
Ammonium (Y)	High	Farmyards (Y), UWWTP (N), Peaty soils (N)	Mitigation
Phosphate (N)	Low	Diffuse Agriculture & Farmyards (N), UWWTP (N)	Preventative
Total P	Low	Agriculture (N)	Preventative
Colour	Low	Peaty soils (N), Forestry (N)	Preventative
MCPA (Y)	High	Diffuse Agriculture (Y)	Mitigation
Total pesticides	Low	Agriculture (N), DWWTSS (N)	Preventative
PAH	Low	None	
Benzo(a)pyrene	Low	None	
Other			
Other			
Conclusion: Mitigation measures are required for <i>E.Coli</i> , Ammonium and MCPA as the significant pollutants (hazards) from Farmyards and DWWTSS as the significant pressures (hazardous events). Preventative measures are required for the remaining potential pollutants (hazards) and pressures (hazardous events).			

Table 4: Risk matrix for Yyyy GWS

Risk Categories and Measures			
Pollutant/hazard (<i>Significant Y/N</i>)	Risk category	Potential pressure/hazardous event (<i>Significant Y/N</i>)	Measures category
<i>E.Coli</i>	Low	Farmyards (N), DWWTSS (N)	Preventative
Nitrate (N)	High	Diffuse Agriculture (Y)	Mitigation
Ammonium (Y)	Low	Farmyards (N), UWWTP (N)	Preventative
Phosphate (N)	Low	Diffuse Agriculture & Farmyards (N), UWWTP (N)	Preventative
Total P	Low	Agriculture (N)	Preventative
Colour	Low	Peaty soils (N), Forestry (N)	Preventative
MCPA (Y)	Low	Diffuse Agriculture (N)	Preventative
Total pesticides	Low	Agriculture (N), DWWTSS (N)	Preventative
PAH	Low	None	
Benzo(a)pyrene	Low	None	
Other			
Other			
Conclusion: Mitigation measures are required for Nitrate as the significant pollutant (hazard) from Diffuse Agriculture as the significant pressure (hazardous event). Preventative measures are required for the remaining potential pollutants (hazards) and pressures (hazardous events).			

Box 3

Sources of information on prevention of water pollution from pressures

NFGWS, 2020. A Handbook of Source Protection and Mitigation Actions for Farming. Published by the National Federation of Group Water Schemes. Available for download at www.nfgws.ie.

O'Connor, M. (2023). Duhallow Farming for Blue Dot Catchments. Booklet of Measures. IRD Duhallow. <https://www.irdduhallow.com/site15/wp-content/uploads/2023/04/Booklet-of-Measures-Interactive.pdf>

SMARTER_BufferZ project This EPA funded project, which is undertaken by Teagasc and the James Hutton Institute, outlines the role of riparian buffers for the effective management of Irish rivers. <http://www.smarterbufferz.ie/>

Stranooden GWS, 2023. Source Protection Pilot Project Final Report.
<https://stranoodengws.ie/images/pdf/PHASE-II-FINAL-REPORT.pdf>

Waters of Life (2023b). Framework of measures for high status objective waterbodies. Annex 1: Agriculture.
https://www.watersoflife.ie/app/uploads/2023/08/Measures_Agricultural_Activities.pdf

Waters of Life (2023c). Framework of measures for high status objective waterbodies. Annex 2: Forestry. https://www.watersoflife.ie/app/uploads/2023/08/Measures_Forestry.pdf

Waters of Life (2023d). Framework of measures for high status objective waterbodies. Annex 3: Peat Extraction.
https://www.watersoflife.ie/app/uploads/2023/08/Measures_Peat_Extraction.pdf

Waters of Life (2023e). Framework of measures for high status objective waterbodies. Annex 4: Quarries. https://www.watersoflife.ie/app/uploads/2023/08/Measures_Quarries.pdf

Waters of Life (2023f). Framework of measures for high status objective waterbodies. Annex 5 Domestic wastewater treatment systems.
https://www.watersoflife.ie/app/uploads/2023/08/Measures_DWWTSS.pdf

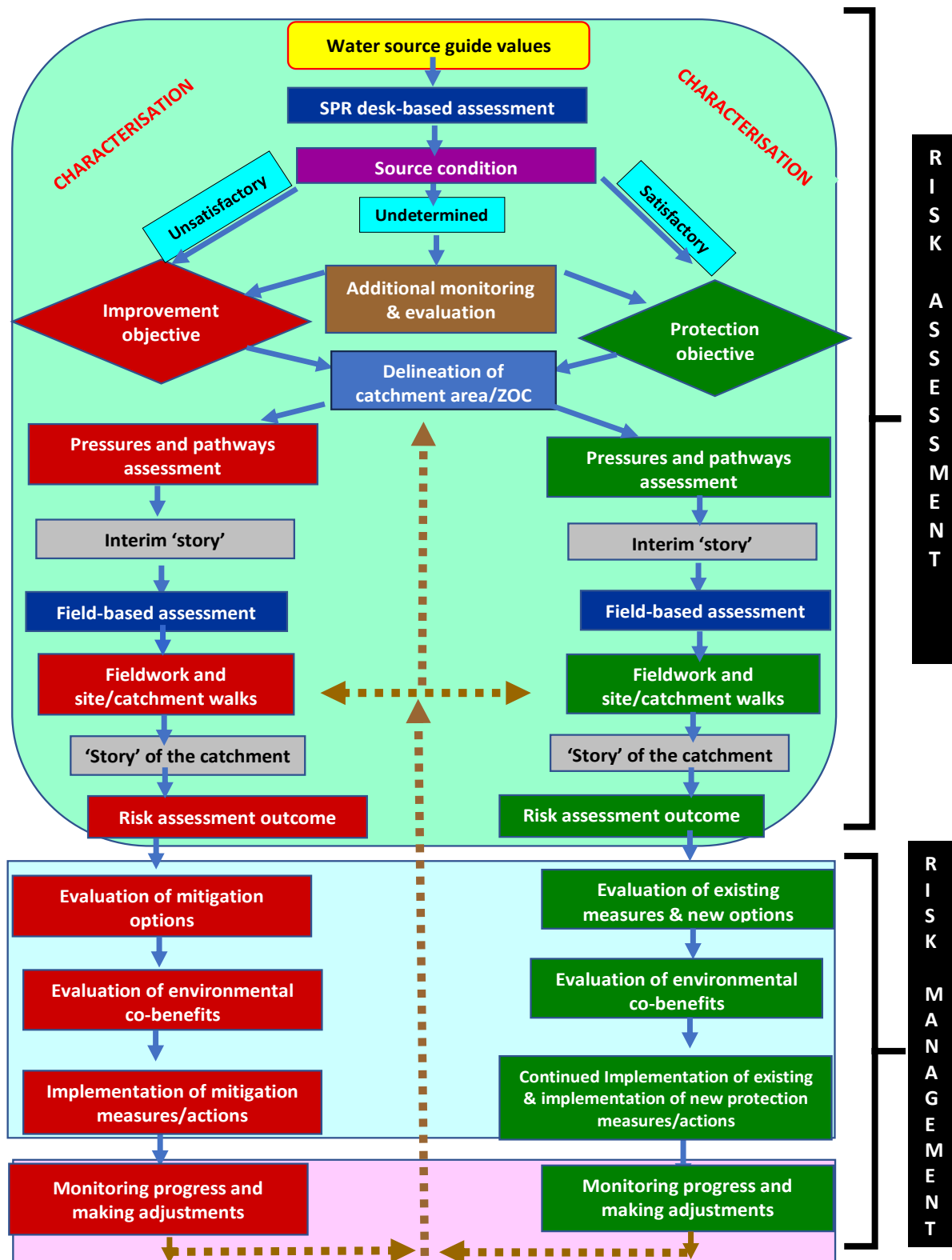


Figure 2: Flowchart illustrating the recommended process and approach for ISPPs

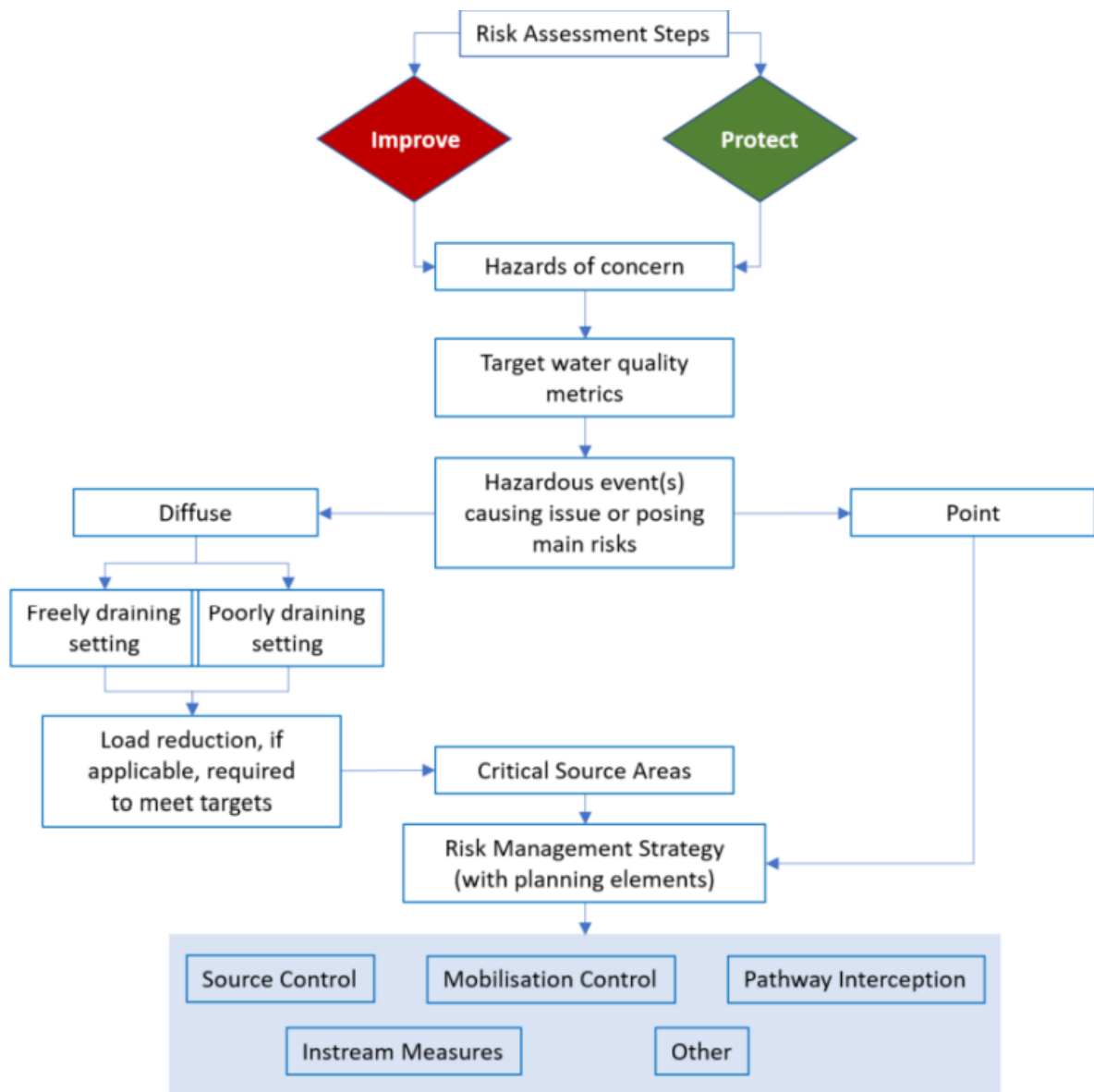


Figure 3: General approach to selecting measures (copied from the Drinking Water Source Technical Guidance).

Appendix 1

EPA targeting agricultural measures map

A new 'Targeting Agricultural Measures' layer has been added to EPA Maps: <https://gis.epa.ie/EPAMaps/Water> under the 'Taking Action' tab. The information in the map layer is available in spreadsheets for stakeholders. An overview of the map is shown in Figure 4. This shows the categories of *significant pollutants (hazards)* arising from farming that have been identified for every waterbody that is failing to meet the WFD objective, whether High or Good status. These are:

- i) phosphorus/sediment (in practice, mainly phosphate) – Navy Flag;
- ii) farm point (mainly BOD and ammonium) and phosphorus/sediment – Red and Navy Flags;
- iii) phosphorus/sediment and nitrate – Navy & Orange Flags;
- iv) farm point source, nitrate and phosphorus/sediment – Red, Orange & Navy Flags;
- v) nitrate – Orange Priority Flag; and
- vi) risk of nitrate losses (review the PIP-N map) – Orange Flag.

In all the waterbody catchment areas, targeting of 'improve' farming measures by, for instance, using the Pollution Impact Potential (PIP) maps is recommended. In the White Flag area, the water quality is not considered to be impacted by farming and therefore 'protect' farming measures are appropriate.

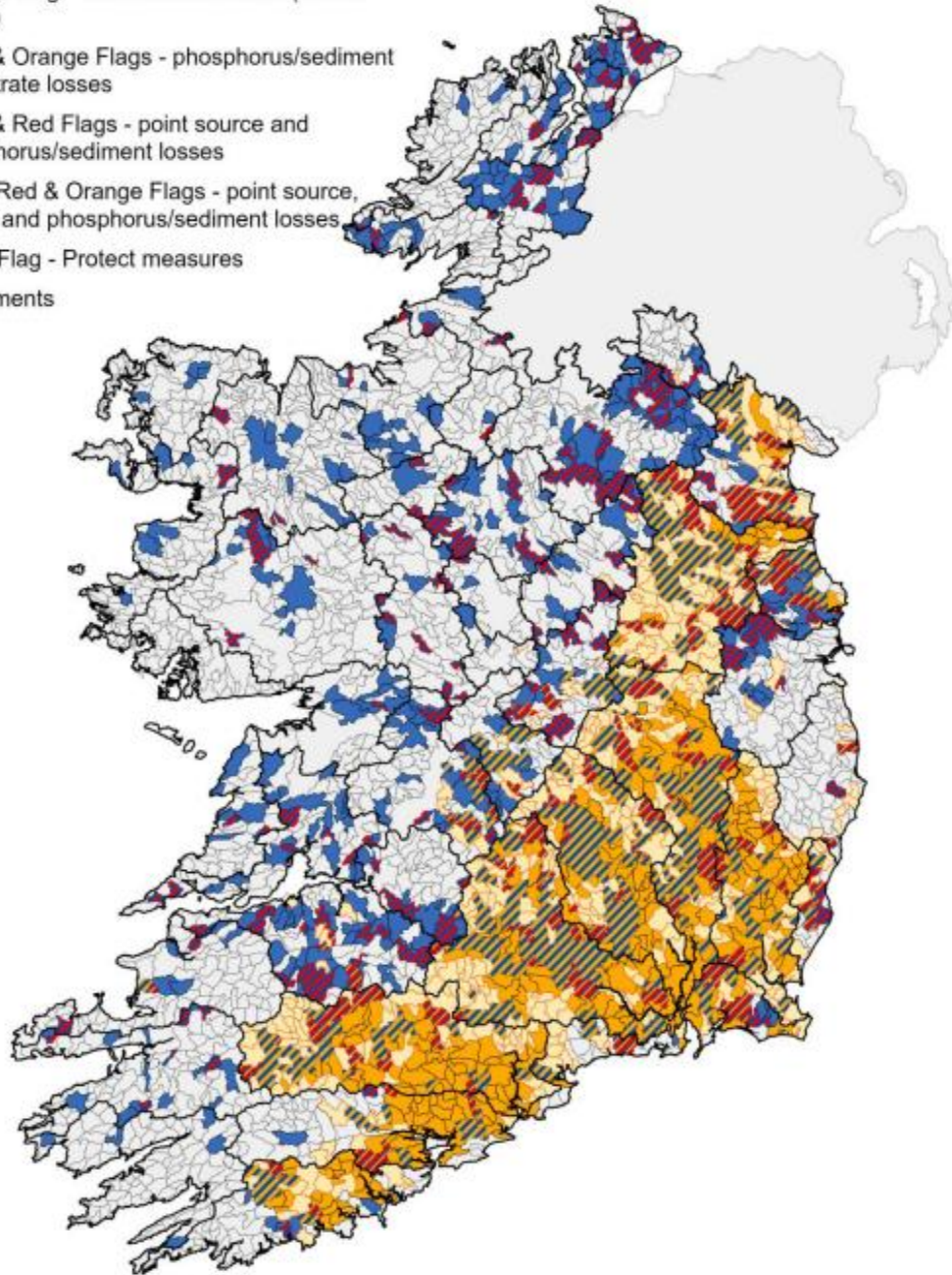
The Orange Priority Flag and Orange Flag categories take account of transitional and coastal (TraC) waterbodies as a receptor. The Orange Flag (risk of high NO₃ losses (review PIP-N)) category is based on those areas where the downstream TraC waterbody is impacted by excess nitrate, but where there is no evidence that the nitrate is >2.6 mg/l in the HSO waterbodies, and that therefore the PIP-N maps need to be reviewed to identify appropriate measures.

Figure 4 is copied from a recent EPA Report "Evidence based targeting of agricultural measures to reduce nitrogen in catchments to achieve water quality objectives" which is available at this link: <https://www.epa.ie/news-releases/news-releases-2025/new-updates-to-epa-tools-for-targeting-agricultural-measures-to-protect-water-quality.php>.

Farm and Landscape measures for Agriculture (FLAG) Map

FLAG Map 2025 R1

- Navy Flag - phosphorus/sediment losses
- Orange Priority Flag - high nitrate
- Orange Flag - risk of nitrate losses (review PIP-N)
- Navy & Orange Flags - phosphorus/sediment and nitrate losses
- Navy & Red Flags - point source and phosphorus/sediment losses
- Navy, Red & Orange Flags - point source, nitrate and phosphorus/sediment losses
- White Flag - Protect measures
- Catchments



0 10 20 30 40 50 Kms

Date: 18/07/2025
EPA Catchments (EM)
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Map 2: Farm and Landscape measures for Agriculture (FLAG) Map.

Figure 4: Overview of the “Targeting Agricultural Measures” layer on www.catchments.ie.