

Report series:

Impacts of pressures on water quality

DOMESTIC WASTEWATER TREATMENT SYSTEMS



Catchment Science & Management Unit

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Preface

This document is part of a report series that summarises the evidence on each of the main significant pressures that impact on water quality. The series currently includes reports on the following key pressures:

- Agriculture
- Urban waste water
- Hydromorphology
- Forestry
- Domestic waste water
- Industry
- Drained peat

This report series is complemented by a sister series of 46 catchment reports which describe the water quality, risk, pressures and other relevant data for each waterbody in each catchment. All reports are available on www.catchments.ie.

An online interactive mapping system, where the most up to date data can be viewed, is available at [EPA Maps](#).

Data can be downloaded from the EPA geoportal site at <https://gis.epa.ie/GetData>.

Impacts of discharges from Domestic Wastewater Treatment Systems on Water Quality

Domestic wastewater treatment systems (DWWTSs) are used to treat sewage, in the case where a house or premises is not connected to the main sewer. There are nearly half a million DWWTSs within Ireland, and the majority of these are septic tanks which serve single residential houses. They also include a smaller number of treatment systems that are designed for up to 500 people, generally found in businesses, leisure centres and hotels. Developer Provided Infrastructure (DPI) in housing estates which have not been taken in charge by the public authorities and do not have their water services connected to the public network managed by Uisce Éireann, are also included in this category. These facilities can cause pollution issues due to their discharges where systems are sub-standard and/or are poorly maintained.

Discharges from DWWTSs have been identified as the sixth most prevalent significant pressure in Ireland, impacting approximately 9% of all waterbodies 'At risk' of not achieving their environmental objective under the Water Framework Directive (Table 1 and Figure 1). This is based on the most recent characterisation assessment using data up to 2021. In total, there are 148 water bodies that have a significant impact from domestic wastewater discharge. These are broken down as follows:

- 78% from single house discharges;
- 20% from communal discharges and;
- Approximately 2% from unauthorised discharges that should be covered under Section 4 licences.

Of the 148 waterbodies with DWWTS discharge as a significant pressure, based on available data, discharges from DPI has been identified as causing impacts in approximately 18 waterbodies.

Table 1: Number of 'At risk' waterbodies with DWWTS discharge as a significant pressure

Waterbody Type	No. Waterbodies	No. At Risk waterbodies	No. Waterbodies with DWWTS identified as a significant pressure	% At Risk waterbodies (with DWWTS identified as a significant pressure)
River	3192	1337	117	9
Lake	812	142	9	6
Transitional	196	60	6	10
Coastal	112	16	3	19
Groundwater	514	94	13	14
Total	4826	1649	148	9%

In 93% of waterbodies where discharges from DWWTS is a significant pressure, additional pressures (typically agriculture) have also been identified. This is symptomatic of the widespread distribution of these pressures in the rural landscape.

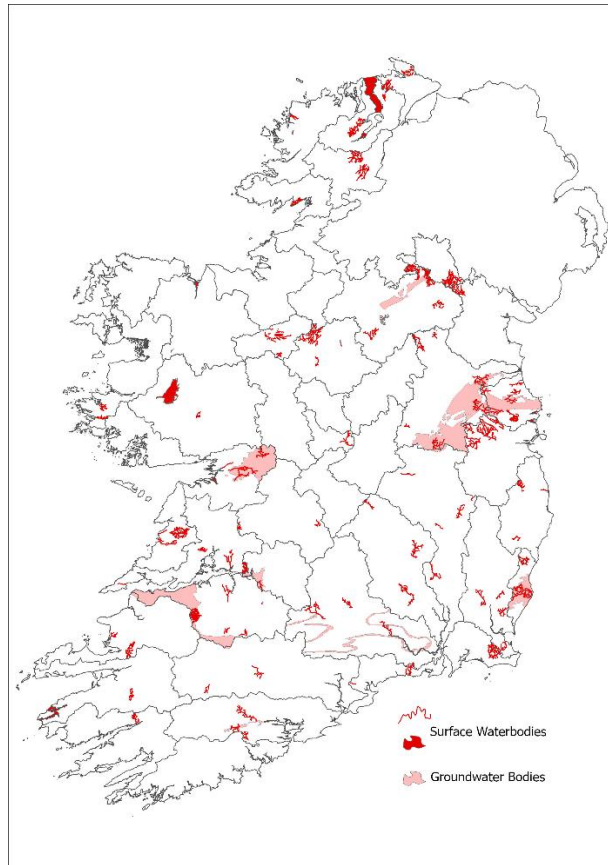


Figure 1: Waterbodies where DWWTs discharge is a significant pressure (August 2023).

The DWWTs Inspections 2022 report¹, published by the EPA, reported that half of DWWTs selected for inspection failed that inspection in 2022, and 20% were a risk to human health and the environment. Reasons for failures included operational failures (de-sludging and maintenance) and structural defect failures (illegal discharges to ditches/streams, leaks, ponding and rainwater ingress).

Water quality impacts arising from discharges from DWWTs

DWWTs can negatively impact water quality when they are located in unsuitable areas and/or when they fail to operate satisfactorily and/or are not adequately maintained. These issues can lead to nutrient and organic pollution of surface water (river, lakes, estuaries and coastal waters) and groundwater. Pollutants arising from malfunctioning DWWTs include:

- Phosphorus, primarily Molybdate Reactive Phosphorus (MRP) which can lead to eutrophication causing impacts to aquatic ecosystem health;
- Nitrogen, present as ammonia and nitrate, which also contribute to eutrophication;
- Biological Oxygen Demand (BOD) which depletes the oxygen from the aquatic environment and impacts ecosystem health;
- Microbial pollution including pathogens which can affect drinking water quality, bathing water quality and shellfish quality and cause illness.

Pollutants can enter waterbodies directly via unauthorised pipes or other connections to waters, as overland or near-surface flow (particularly during wet times when there is overland run-off), or vertically down through the soils to groundwater.

¹ [Domestic Waste Water Treatment System \(DWWTs\) inspections 2022 \(epa.ie\)](https://www.epa.ie/publications-and-reports/water/water-quality/dwwt-inspections-2022)

Nutrient losses

The EPA has estimated the sources of nutrient loads from various sectors, including nutrients from domestic wastewater discharges that can enter waterbodies (Figure 2). While discharges from DWWTs can significantly impact water quality at a local scale, their contribution to both nitrogen and phosphorus loads at the larger waterbody and catchment scales is quite small (2% at national scale). This is significantly less than the other pressures in the rural environment.

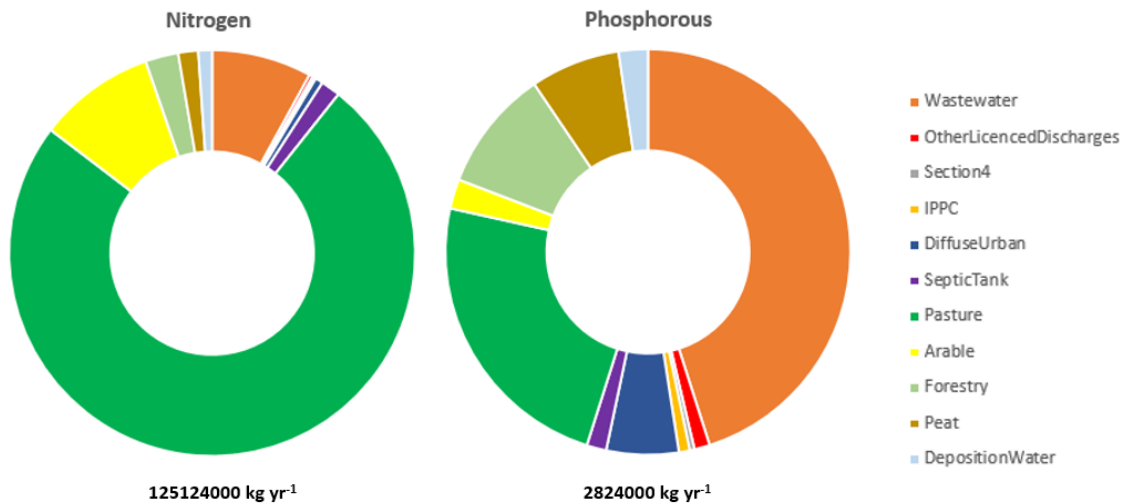


Figure 2: Load apportionment of nitrogen and phosphorous emissions to water (based on data up to 2018). Note that this is at national scale and proportions will differ for rivers and lakes at waterbody, subcatchment and catchment scales.

Nutrient losses from DWWTs can give rise to eutrophication, causing excessive plant and algal growth in our rivers and increasing the likelihood of harmful algal blooms in our lakes and estuaries. In this way, effluent from DWWTs can significantly impact the health of our waters.

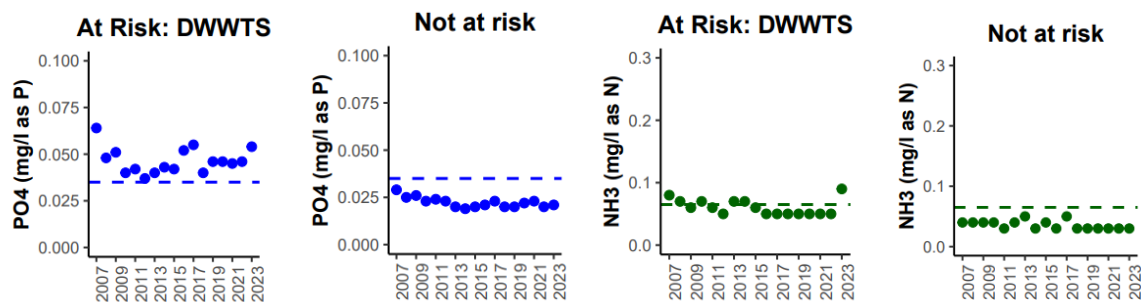


Figure 3: Average annual phosphate (blue) concentrations, and ammonium (green) concentrations in Rivers from 2007-2023 for waterbodies At risk from DWWTs discharge and those considered Not at risk. Note that some waterbodies are impacted by other pressures.

Figure 3 shows the annual average concentrations of phosphate (blue) and ammonium (green) in rivers from 2007-2023 for waterbodies 'At risk' with DWWTs discharge identified as a significant pressure and those waterbodies considered 'Not at risk'. The dashed lines represent the environmental quality standards for phosphate (0.035 mg/l) and ammonia (0.065 mg/l). Mean concentrations below the line are typically required to support good ecological status. Rivers with DWWTs discharge as a significant pressure have higher average concentrations for both phosphate (PO₄) and ammonia (NH₃) compared with those considered 'Not at risk'. However, average annual ammonium concentrations have largely been satisfactory over the last decade. In some situations it

may be the case that other rural pressures mask the DWWTs signal regarding water quality impacts. Further work will be carried out during the third cycle to explore this and refine the assessment for this particular pressure type.

Other impacts

Poorly treated wastewater from DWWTs can have a harmful effect on human health. Effluent from DWWTs contains pathogens including viruses such as Norovirus, protozoa such as *Cryptosporidium* spp., bacteria such as *Escherichia coli* and more specifically the group *Verotoxigenic Escherichia coli* (VTEC), and potentially harmful levels of nutrients such as nitrogen. Where DWWTs are located near groundwater drinking water sources, such as wells or springs, contamination can occur where the well has not been constructed according to best practice². People may also be directly exposed to raw sewage if it surfaces/pools in gardens or runs off into ditches or streams.

It is the responsibility of householders/owners to ensure their DWWTs is properly built and maintained, and not posing a threat to the surrounding environment. The EPA's 2021 Code of Practice for Domestic Wastewater Treatment Systems³ should be used for guidance when designing and installing new DWWTs. All DWWTs must be operated and maintained in accordance with Part 4A of the Water Services Act 2007 (as amended) and associated Regulations – see links below for further information.

It is recommended that household wells should be tested at least once every year to check for contamination. Information on the importance of testing your household well can be found at [Household Wells | Environmental Protection Agency \(epa.ie\)](https://www.epa.ie/AboutEPA/Information/AdviceandGuidance/Water/HouseholdWells/).

Change since the second river basin management cycle (2016-2021)

Overall, the number of waterbodies with DWWTs discharge as a significant pressure has decreased in recent years, with 165 waterbodies identified as impacted based on a 2015 assessment, decreasing to 148 waterbodies in 2021 (Figure 4). Of the 165 waterbodies identified with DWWTs discharge as a significant pressure in 2015, 136 of these have still not achieved their environmental objective in 2021 and 29 are now achieving their environmental objective. As many of these waterbodies have more than one significant pressure, the changes, or the lack thereof, cannot be solely attributed to DWWTs discharges.

² [Advice & Guidance | Environmental Protection Agency \(epa.ie\)](https://www.epa.ie/AboutEPA/Information/AdviceandGuidance/Water/HouseholdWells/)

³ [Code of Practice for Domestic Waste Water Treatment Systems \(epa.ie\)](https://www.epa.ie/AboutEPA/Information/CodeofPracticeforDomesticWastewaterTreatmentSystems/)

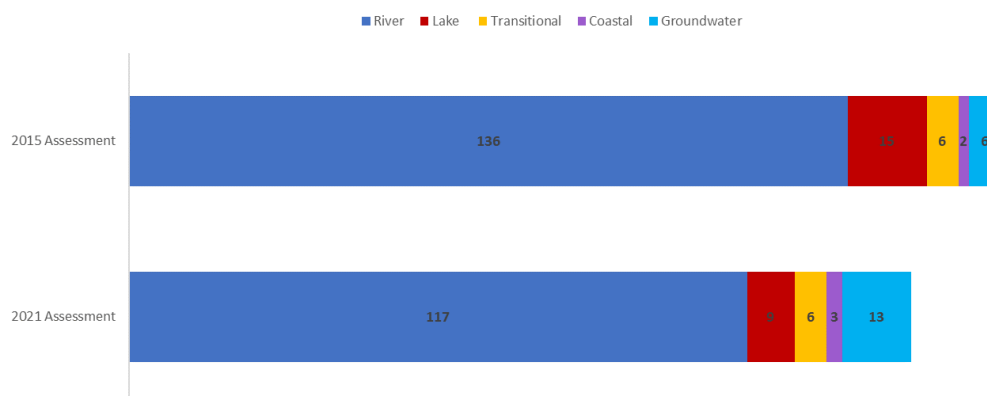


Figure 4: Change in DWWTS discharge pressures between the end of the first cycle in 2015 and the end of the second cycle in 2021

What is being done?

The National Inspection Plan

The National Inspection Plan for Domestic Wastewater Treatment Systems 2022-2026 (link below) was published by the EPA in 2021. The Plan is implemented by water services authorities (within local authorities) nationally. There are two strands within the Plan, with Strand 1 relating to inspections to be carried out to determine if DWWTSs are operating and being maintained correctly, and Strand 2 relating to engagement to ensure homeowners are aware of how to operate and maintain their DWWTSs correctly. The plan sets out a minimum number of DWWTS inspections in 2022 at 1,000, increasing to 1,200 per annum for the period 2023 to 2026. The inspections are to be targeted using a risk-based methodology that is weighted towards protection of public health and waterbodies where DWWTS are identified as a pressure.

Homeowners Grant Scheme

A grant scheme has been introduced by the Department of Housing, Local Government and Heritage to assist homeowners in carrying out remediation works, repairs, upgrading works and replacement of DWWTSs. Funding will cover 85% of the total cost of works, subject to a maximum of €12,000 (the grant increased from a maximum of €5,000 to €12,000 in January 2024). Homeowners are eligible for the grant if they fall under one of three categories:

1. The DWWTS was inspected by the local authority as part of the National Inspection Plan, and an advisory notice was issued.
2. The DWWTS serves a house located in a Prioritised Area for Action, as listed in the third Cycle River Basin Management Plan, and a letter has been issued by the Local Authority Waters Programme confirming eligibility to the homeowner.
3. The DWWTS serves a house that is located in a High Status Objective waterbody, in accordance with the 3rd Cycle River Basin Management Plan.

You can learn more on septic tank grants within high objective catchment areas and check your Eircode for eligibility here: <https://www.gov.ie/en/publication/6cc1e-domestic-waste-water-treatment-systems-septic-tanks>

The scheme is being administered by local authorities on behalf of the Department. The rural water section in each local authority should be contacted for the application form and further information.

Funding for Developer Provided Infrastructure

A multi-annual funding programme was established in 2019 for the progressive resolution of DPI water services infrastructure in housing estates, to enable the taking in charge of these estates. The latest tranche of funding of just under €14.7m was announced in mid-2023. This funding has been allocated to nine local authorities, for 21 projects providing water services to over 850 households. A list of the projects is available [here](#).

Find out more

See how the impacts of pressures on waters are assessed, such as discharges from DWWTSs, at www.catchments.ie/download/water-framework-directive-guidance-on-characterisation-methodology-v5-0-2024.

You can find all of the details regarding the National Inspection Plan for Domestic Waste Water Treatment Systems 2022-2026 at <https://www.epa.ie/publications/compliance--enforcement/waste-water/2022-2026-NIP---Final.pdf>

See the DWWTS Inspections 2022 report on [Domestic Waste Water Treatment System \(DWWTS\) inspections 2022 \(epa.ie\)](#)

The EPA's 2021 Code of Practice for Domestic Waste Water Treatment Systems can be found here: [Compliance & Enforcement: Wastewater | Environmental Protection Agency \(epa.ie\)](#)

You can view the individual waterbodies where DWWTs is a significant pressure on [EPA Maps](#).

You can find out about how to operate and maintain a septic tank here:

<https://www.epa.ie/take-action/in-the-home/wastewater/#d.en.85772>