

## SUMMARY

**Supporting Small Private Supply (SPS) owners is crucial to safeguarding public health, especially as several reoccurring contaminants can cause potentially severe health issues to consumers.**

**Despite existence of current guidelines and policies which outline/enforce desirable supply protection and management practices, cases of non-compliance are continuously reported. As such, we recommend that a novel national organisation is formed, similar in structure to the National Federation Group Water Scheme, to manage issues related specifically to SPSs. Based on findings from this commissioned research, their principal roles should be:**

- 1) Register all Small Private Supplies in the country (as many remain unregistered).**
- 2) Produce hotspot maps for naturally occurring groundwater contaminants.**
- 3) Enforce source protection, and relevant agricultural and domestic wastewater treatment regulations.**
- 4) Update/create regulatory and communication documents in line with the evidence-based recommendations in the present study.**
- 5) Organise periodic well stewardship dissemination campaigns at the national, regional, and local levels.**
- 6) Ensure that all Small Private Supplies with compliance issues are audited/inspected.**
- 7) Support, train, and coordinate relationships between relevant stakeholders/custodians at the national, regional, and local levels.**
- 8) Provide official training and registration of relevant service providers.**
- 9) Provide continuous one-on-one support to Small Private Supply owners.**

## 1. Introduction

Protecting drinking water resources is of paramount importance to safeguard public health, with acute and/or prolonged exposure to certain contaminants having the potential to cause serious health issues and even death to those who consume it. This is particularly relevant in light of recent EPA reports showing further deterioration in the quality of our surface and groundwater resources <sup>1</sup>.

Of all water suppliers available in Ireland, those privately owned consistently display lowest microbial and chemical quality<sup>2,3</sup>. These include Small Private Suppliers (SPSs), which are mostly (i.e. > 90%)

<sup>1</sup> Environmental Protection Agency (EPA), 2020a. *Water Quality in 2019: An Indicators Report*, Wexford, Ireland.

<sup>2</sup> EPA, 2020b. *Focus on Private Water Supplies 2018*, Wexford, Ireland.

<sup>3</sup> EPA, 2017. *Focus on Private Water Supplies 2016*, Wexford, Ireland.

groundwater-derived<sup>3</sup> and service many private and public buildings across the country (e.g., hotels, B&Bs, pubs, creches, schools, campsites, etc.).

Continuous instances of non-compliance with drinking water standards by SPSs across the country are caused by inappropriate source protection and management practices. These, in turn, may be attributable to insufficient enforcement/support by supervisory authorities (i.e. Local Authorities), largely due to limited resources, which also leads to many SPSs remaining unmonitored or unregistered<sup>2,3</sup>.

Accordingly, this brief aims to provide evidence-based source protection and management practices (with focus on most reoccurring contaminants), as well as recommendations on how these may be effectively enforced, communicated and/or encouraged.

## 2. Desirable source protection and management practices

Based on data analyses from the Environmental Protection Agency's (EPA) Groundwater Monitoring Programme<sup>4</sup> and registered SPS monitoring results compiled by Irish local authorities<sup>5</sup> from 2014 to 2019, three reoccurring contaminants were identified, namely: *E. coli* (alongside other faecal coliforms), Arsenic, and Nitrate.

Each of the three is associated with a different subset of potentially serious water-borne illnesses<sup>6, 7, 8</sup>. The protective behaviours which should be applied by owners to prevent the ingress of these, and indeed many other, contaminants into their drinking groundwater sources are summarised below. Some of these are already present in current guideline documents<sup>9</sup> however others are not, as such review of existing guidelines is strongly recommended.

- 1) **Supply location/surroundings:** supplies should be at minimum setback distances from potential contamination sources (such as farmyards, septic tanks, industrial activities, etc.) and located in a mounded area, with ground sloping away from it. The area surrounding (10 m) a supply should be, grassed, fenced (to avoid animal access), and kept free of debris.
- 2) **Drilling process:** Deeper wells are recommended to prevent contaminant ingress via groundwater recharge and shallow contaminated aquifers. However, where there is risk of naturally occurring contaminants in the area (e.g. arsenic), employing the assistance of a qualified hydrogeologist during the drilling process is strongly advised.

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<sup>4</sup> "Groundwater Quality (Excel) 1990 - 2019" available at <https://gis.epa.ie/GetData/Download> [Accessed 12 December 2020]

<sup>5</sup> "Drinking Water Monitoring Results and Water Supply Details for Ireland - Year [2014, 2015, 2016, 2017, 2018, 2019]" available at <http://erc.epa.ie/safer/> [Accessed 20 November 2020]

<sup>6</sup> World Health Organisation (WHO), 2018. *E. coli*. Available at <https://www.who.int/news-room/fact-sheets/detail/e-coli> [Accessed 21 January 2021]

<sup>7</sup> WHO, 2018. *Arsenic*. Available at <https://www.who.int/news-room/fact-sheets/detail/arsenic> [Accessed 25 January 2021]

<sup>8</sup> Ward, M.H., Jones, R.R., Brender, J.D., De Kok, T.M., Weyer, P.J., Nolan, B.T., Villanueva, C.M. and Van Breda, S.G., 2018. Drinking water nitrate and human health: an updated review. *International journal of environmental research and public health*, 15(7), p.1557.

<sup>9</sup> Guidelines to well owners are available in the EPA, Institute of Geologists of Ireland, National Federation Group Water Scheme, Geological Survey of Ireland, An Teagasc, and Department of Housing, Planning and Local Government websites.

- 3) **Protective features:** Supplies must have an appropriately sealed vermin-proof cap, and crack-free casing elevated by at least 30 cm above the chamber floor. Supply chambers should (ideally) be made of concrete and constructed above ground with a fitted cover. Chamber walls and floor must be kept dry, clean, and crack-free. To encourage these measures and the recommended supply location and protective features described in items 1 and 2, step-by-step guidelines on well construction should be made widely available to current and future private supply owners.
- 4) **Maintenance:** Supply waters should be tested annually, preferably following periods of intense rainfall and/or extreme weather events, and at least twice per year for indicator contaminants such as *E. coli*. Such monitoring is already mandatory for SPSs and must be carried out by supply owners themselves or Local Authorities, however enforcement is insufficient as evidenced in recent EPA reports<sup>2,3,10</sup>. Test results will inform whether further source protection and/or treatments are needed, as such test interpretation guidelines should be provided and widely available. Moreover, where SPS contamination issues are identified, audits should be carried out to identify contamination risks and provide tailored recommendations (including with regards to treatment) as recommended by the EPA<sup>10</sup>. It is also advised that the supply, its surrounding area, and any drinking water treatment systems (where present) are inspected/serviced annually to prevent instances of contamination.
- 5) **External practices:** The risk of contamination to wells can also be lowered through appropriate management of potential nearby sources of contamination. For this, it is of extreme importance to stringently apply and enforce appropriate agricultural practices<sup>11</sup> and domestic wastewater treatment systems maintenance<sup>12</sup> either directly by the EPA and Local Authorities, or through relevant custodians at the community level such as advisors in the Teagasc Agricultural Sustainability Support and Advisory Programme (ASSAP). These guidelines should also be kept up-to-date.

In cases where source protection measures alone are not sufficient to prevent contamination, alternative management practices (including treatment) may be employed. Available options have been cited by multiple governmental agencies<sup>9</sup>; however it is recommended that all required information is present in step-by-step guideline format to ensure their appropriate usage.

### 3. Communicating, encouraging, and enforcing desirable practices

Local Authorities are currently the sole responsible for supervising SPSs, however multiple stakeholders have a role in disseminating well stewardship behaviours, from public and private organizations to service providers. As such, coordination between them is of key importance to better

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<sup>10</sup> EPA, 2021. *Focus on Private Water Supplies 2019*, Wexford, Ireland.

<sup>11</sup> European Union (EU), 2017. *Good Agricultural Practice (GAP) for Protection of Waters Regulations 2017*.

<sup>12</sup> Environmental Protection Agency (EPA), 2010. *Code of Practice: Wastewater Treatment Systems for Single Houses*, Wexford, Ireland.

understand specific supply owners' needs, provide bespoke information and enforce desirable practices.

It is also recommended that training materials and events focused on correct dissemination are made available to regional and local stakeholders, with registration of relevant service provider (e.g., well drillers, water test facilities, treatment providers, etc.) upon completion of training. For this, it is strongly recommended that communication and education experts are employed in the development of appropriate messages and dissemination strategies<sup>13</sup>.

With regards to communication materials made available to non-expert supply owners, these must reflect updated evidence-based recommendations and be created with the help of communication experts. Dissemination of such materials should combine efforts at the national/regional level (e.g. traditional and social media campaigns, periodic mailing and/or emailing, and citizen science initiatives) and at a local level (e.g., workshops and school events). Additional support is also recommended to motivate well stewardship uptake, such as via helplines or local advisors.

The promotion and enforcement of desirable stewardship practices described above is a complex matter as there are many barriers to their uptake. To manage these, more resources than those presently available to Local Authorities are required, as evidenced in previous EPA private supply reports<sup>2,3,10</sup>. Current lack of longstanding departmental structures and monetary funding, and limitations in organisation knowledge specific to SPS issues, for example, represent key hinderances to long-term well-stewardship promotion and enforcement<sup>13</sup>. As such, a key recommendation of this research is that a specific governance organisation is formed to provide overarching guidance and support for SPSs nationally, and to work alongside Local Authorities at the regional and community levels. For this, a similar governance structure to that employed by the National Federation Group Water Scheme (NFGWS), which works closely with Group Water Schemes across the country, is suggested.

## 4. Conclusions and policy recommendations

Based on findings from this commissioned research, we recommend the formation of a novel national organisation, similar in structure to the National Federation Group Water Scheme, to manage specific SPS-related issues alongside Local Authorities. The following are the principal evidence-based recommendations, for which this new organisation which would be responsible, to promote appropriate source protection and management of private groundwater supplies and safeguard public health:

### 1) Register all Small Private Supplies in the country.

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<sup>13</sup> Mooney, S., O'Dwyer, J. and Hynds, P.D., 2020. Risk communication approaches for preventing private groundwater contamination in the Republic of Ireland: a mixed-methods study of multidisciplinary expert opinion. *Hydrogeology Journal*, 28(5), pp.1519-1538.

- 2) **Produce hotspot maps for naturally occurring groundwater contaminants (e.g. arsenic) and enforce/promote assistance of a qualified hydrogeologist during the drilling of new supplies in high-risk areas.**
- 3) **Enforce source protection, and relevant agricultural and domestic wastewater treatment regulations**, including minimum setback distances to drinking water supplies, with changes (where applicable) to the Good Agricultural Practices for the Protection of Waters and Code of Practice for Wastewater Treatment Systems for Single Houses.
- 4) **Update/create regulatory and communication documents in line with evidence-based recommendations, which:**
  - Clearly outline the risks of contamination to groundwater supplies and consumers,
  - Provide step-by-step evidence-based guidance regarding supply protection/management (including well construction and maintenance, water test interpretation, treatment options, etc.), and
  - List registered service providers.
- 5) **Organise periodic well stewardship dissemination campaigns at the national, regional and local levels** using traditional and social media; mailing and/or emailing; workshops; stands at relevant events (e.g. ploughing championship); school events; and/or citizen science initiatives (this may be particularly effective with regards to the water testing behaviour). Campaigns should also be periodically (annually/biannually) evaluated, not only to measure progress but also to improve subsequent messages, and dissemination/engagement mechanisms.
- 6) **Ensure that all Small Private Supplies with compliance issues are audited/inspected.** During these visits, contamination risks should be identified and tailored recommendations regarding source protection and treatment, where needed, should be provided.
- 7) **Support, train, and coordinate relationships between relevant stakeholders at national, regional and local levels**, ranging from public and private organizations to service providers.
- 8) **Provide official training and registration of service providers** (e.g. well drillers, water testing facilities, treatment installation companies etc), with registration upon successful completion of training. Lists of registered providers can then be made available to Small Private Supply owners.
- 9) **Provide continuous support to Small Private Supply owners** via helplines or other assistance systems at the local level (e.g. local advisors).