ZERO WASTE ALLIANCE IRELAND

Towards Sustainable Resource Management

Submission by Zero Waste Alliance Ireland to the Environmental Protection Agency

in Response to the Agency's Public Consultation on the National Inspection Plan 2015-2017 for Domestic Wastewater Treatment Systems

Túr na Gaoithe
Philipstown HBX
Castleblaney Road
Dundalk
County Louth

03 March 2015

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1. INTRODUCTION AND PRELIMINARY COMMENTS

1.1 Brief Historical Background and Current Guidance

The problem of surface water and groundwater contamination from domestic wastewater systems currently treating wastewater from single houses not connected to a public sewer has a lengthy history in Ireland. According to the Central Statistics Office[1], approximately one-third of the total number of houses in the Republic of Ireland are served by septic tanks and other single-house wastewater treatment systems. Data from the 2011 Census shows that some 437,652 households are served by individual septic tanks while 50,259 households use other individual sewerage systems. And of course these figures do not include the estimated 83,000 septic tanks in the North of Ireland.[2] The total number of single-house wastewater treatment systems in all of Ireland is therefore approximately 571,000.

This is a relatively high proportion of houses unconnected to public sewerage systems, and probably reflects the dispersed nature of rural houses in Ireland. In Sweden, for example, approximately 90% of the population is connected to centralized wastewater treatment plants, while only 10% rely on on-site

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[1] Central Statistics Office, 2012. Profile 4 – The Roof over our Heads; results of Census 2011; page 26; Urban and rural sewerage. Central Statistics Office, Information Section, Skehard Road, Cork

[2] Tim Clifford, 2011. Septic Tank Inspections are here; Site Assessor, 30 June 2011. http://www.siteassessor.com/blog/making-sense-of-septic-tank-inspections-and-ecj-ruling-against-ireland-76.html

wastewater treatment systems.[3] Nevertheless, it is estimated that sanitary systems serving individual households in rural areas contribute approximately 20% of the Swedish anthropogenic load of phosphorus to the Baltic Sea.[4]

In Ireland, as far back as 1975, the Institute for Industrial Research and Standards (long since closed down by a previous Government) published the "*Recommendation for Septic Tank Drainage Systems Suitable for Single Houses"* (SR6, 1975), the first guideline document outlining best practice for the installation and operation of septic tank systems in Ireland.[5]

This publication was followed 16 years later by an updated guidance document, the "*Recommendations for Domestic Effluent Treatment and Disposal from a Single House"* (SR6, 1991) published by the National Standards Authority of Ireland (NSAI) in 1991.[6] This document made it a requirement that a site suitability assessment must be carried out before the installation of a Domestic Wastewater Treatment System (DWWTS), and it provided instructions for carrying out the site assessment and for constructing percolation areas. The recommendations also suggested remedial measures for situations where locations were considered to be unsuitable for septic tanks.

In 2000, the EPA published a revised guidance manual, "*Wastewater Treatment Manual: Treatment Systems for Single Houses"* [7], which further defined the site assessment process and provided detailed descriptions of the types of secondary treatment systems available in Ireland at that time. Acceptable limit values for the results of percolation tests were set out in this document, together with the advice that if a site failed the percolation test, it was not suitable for the installation of a septic tank for the treatment of wastewater. From the year 2000 onwards, the site assessment process became a more complex procedure.

In late 2009, the EPA further revised and extended the guidelines, publishing a new manual entitled "*Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. ≤ 10)".* [8] The is the currently applicable document for all houses constructed since 2009; but it applies only to newly

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3 Elisabeth Kvarnström, Karin Emilsson, Anna Richert Stintzing, Mats Johansson, Håkan Jönsson, Ebba af Petersens, Caroline Schönning, Jonas Christensen, Daniel Hellström, Lennart Qvarnström, Peter Ridderstolpe, Jan-Olof Drangert, 2006. *Urine Diversion: One Step Towards Sustainable Sanitation*. Stockholm Environment Institute, Stockholm, Sweden.

4 Höglund, Caroline, 2001. Evaluation of microbial health risks associated with the reuse of source-separated human urine. Royal Institute of Technology (KTH), Department of Biotechnology, Applied Microbiology Swedish Institute for Infectious Disease Control (SMI) Department of Water and Environmental Microbiology, Stockholm 2001.

5 Institute for Industrial Research and Standards, 1975. *Recommendation for Septic Tank Drainage Systems Suitable for Single Houses* (SR6:1975). IIRS, Dublin.

6 National Standards Authority of Ireland, 1991. *Septic Tank Systems – Recommendations for Domestic Effluent Disposal from a Single Dwelling House, SR 6: 1991*. Eolas, Dublin.

7 EPA, 2000. *Wastewater Treatment Manual: Treatment Systems for Single Houses*. EPA, Wexford.

8 EPA, 2009. *Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses* (p.e. ≤ 10). EPA, Wexford.

built dwellings or extensions to houses constructed in unsewered areas, where wastewater from a single house has to be treated on-site, and where planning permission is required. It provides guidance from the assessment stage to the design, installation and maintenance stages of a DWWTS, with the aim of preventing water pollution and protecting public health.

The most significant weakness of the current guidance note is that it does not address any of the problems connected with many older houses served by existing DWWTSs which pre-date the publication of the document. In addition, it does not address the waste of two valuable resources – the nitrogen and especially the phosphorus contained in domestic wastewater. While this may not have been important from the 1970s to the 1990s, the global shortage of phosphorus has become a matter of increasing concern in the 21st century.

All modern agricultural systems are highly dependent on continual inputs of phosphate fertilisers derived from phosphate rock, a finite resource which could be depleted in a couple of decades.[9] However, long before depletion is reached, we will see a global peak in phosphate fertilizer production, estimated to occur in the next 30 years. There is a strong case for including long-term phosphorus scarcity on the priority agenda for global food security, but the more immediate effect of this scarcity is likely to be a further significant rise in the price of fertilizer, with damaging consequences for agriculture and food production. Key differences between peak oil and peak phosphorus are:

i) oil can be replaced by other forms of energy as it becomes too scarce;

ii) there is no substitute for phosphorus in food production, as phosphorus cannot be produced or synthesized commercially;

iii) oil is consumed as it is used, but phosphorus is an element which can be captured after use and recycled for further use within economic and technical limits.[10,11]

It is of strategic importance that phosphorus should not be wasted, methods should be found to conserve and recycle it; and this is one of the principal reasons why Zero Waste Alliance Ireland is making this submission to the EPA. If waste of phosphorus can be avoided, and phosphorus recycled as much as possible, this will be a "win-win" outcome, coinciding with our policy of reducing and eliminating waste (see sections 2.2 and 4.2 below).

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9 Cordell, D., Drangert, J-O., and White, S., 2009. The story of phosphorus: Global food security and food for thought. *Global Environmental Change*, Volume 19, Issue 2, May 2009, Pages 292–305.

10 White, S., and Cordell, D., undated. Peak Phosphorus: the sequel to Peak Oil. Published in Sustainable Phosphorus Futures, Global Phosphorus Research Initiative. http://phosphorusfutures.net/peak-phosphorus.html

11 Cordell, D. and Kerschner, C., 2007. Governing Global Resource Peaks: the case of peak oil and peak phosphorus, 1st version prepared for the Institutional Analysis of Sustainability Problems proceedings book, June 2007, Marie Curie Emerging Theories and Methods in Sustainability Research series, Bratislava.

1.2 European Court of Justice Ruling in Case C –188/08, and New Legislation to Implement the Findings of the Court

On 29 October 2009, in Case C –188/08, the ECJ ruled against Ireland in relation to the treatment of wastewaters from septic tanks and other on-site wastewater treatment systems.[12] The Court found that by failing to adopt the legislation necessary to ensure compliance with Articles 4 and 8 of European Council Directive 75/442/EEC (the Waste Directive) as regards domestic waste waters disposed of through septic tanks and other individual waste water treatment systems, Ireland had failed to fulfil its obligations under that Directive.

The Irish Government in its defence referred to the existing legislation at that time, and to a circular issued to local authorities in 2003 about the assessment of sites, and the design, installation and maintenance of septic tanks; and the defence referred also to the 2005 Sustainable Rural Housing Guidelines.[13] The Government indicated during the case that it intended to make both the 2005 Sustainable Rural Housing Guidelines and the 2007 Development Planing Guidelines[14] and Development Management Guidelines for planning authorities mandatory.[15] The Government also cited the provisions of the Water Services Act 2007 in connection with rural water services, but the Court dismissed this as a defence, given that the relevant provisions had not been enacted before the case had been referred to the Court. The Irish Government also argued that the Commission had not proved a link between the use of septic tanks (and other domestic wastewater treatment systems) and groundwater pollution.

The Court noted that the relevant EU legislation covered all septic tanks and individual waste water treatment systems, both old and new; but that the Irish legislation was significantly deficient in this respect. Even though the Local Government (Water Pollution) Acts 1977 and 1990 prohibited water pollution from all sources, the exemptions under those Acts for discharges of domestic sewage of less than 5 cubic metres per day excluded a large number of septic tanks (paragraph 65 of the judgment). The Court also found that the Building Control Acts 1990 to 2007 applied only to septic tanks and private waste water treatment systems constructed after 1992, and that the Planning and Development Acts 2000 to 2006 applied only to septic tanks and private waste water treatment systems constructed after 2000.

The Court also noted that the requirements of SR:6 of 1991 (see section 1.1 above), referred to in Technical Guidance Document H of the Building Control

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[12] European Court of Justice, Judgment in Case C 188/08. Failure of a Member State to fulfil obligations; Directive 75/442/EEC; Waste; Domestic waste waters discharged through septic tanks in the countryside; Waste not covered by other legislation; Failure to transpose. 29 October 2009. http://curia.europa.eu/juris/liste.jsf?language=en&num=C-188/08.

[13] Department of the Environment, Heritage and Local Government, 2005. Sustainable Rural Housing: Guidelines for Planning Authorities. Dublin, Stationery Office, April 2005.

[14] Department of the Environment, Heritage and Local Government, 2007. Development Plans: Guidelines for Planning Authorities. Dublin, Stationery Office, June 2007.

[15] Department of the Environment, Heritage and Local Government, 2007. Development Management: Guidelines for Planning Authorities. Dublin, Stationery Office, June 2007.

Standards[16], are not suited to the geological and soil characteristics generally found in Ireland (judgment, paragraph 70). It therefore found that planning permissions granted on the basis of these standards did not ensure a level of environmental and human health protection that was required under EU law.

The Court also concluded that monitoring systems must include regular inspections by local authorities of the functioning and maintenance of septic tanks and individual waste water treatment systems. While local authorities have powers of inspection under the relevant Irish legislation, and minimum standards of inspection are also required, the Court found that these powers are not exercised within a framework of regular checks and inspections at appropriate intervals. The Court rejected the argument made by Ireland that an absence of regular inspections could be justified because of the high number of septic tanks in Ireland (paragraphs 77 to 82 of the judgment).

One very relevant matter raised in Ireland's submission to the Court was that wastewaters covered by the case against Ireland were not 'waste' within the meaning of EU Directive 75/442[17] because they were not in the "*list of wastes belonging to the categories listed in Annex I*" adopted by the Commission under Article 1(a) in accordance with the procedure referred to in Article 18 of that Directive. The Court concluded that Annex I to Directive 75/442 is very broad in scope, that case-law confirmed the inclusion, in certain circumstances, of waste waters in its scope, and it was the Community legislature's intention not to exclude waste waters from the scope of Directive 75/442 (paragraph 35 of the judgment).

This is a finding with which **ZWAI** would agree completely, as it is our view (and a key point in our submission) that wastewaters are waste within the normal meaning of the term "waste"; and they may be classed as "liquid wastes" in contrast to "solid wastes". Therefore it is our submission that these "wastes" should be eliminated or reduced as far as meaningfully possible, by re-use or recycling.

In order to comply with the findings of the European Court in the above case, the *Water Services (Amendment) Act, 2012* (No. 2 of 2012) was brought into force, requiring homeowners connected to a domestic wastewater treatment system (DWWTS) to register their wastewater treatment systems and ensure that these systems did not constitute a risk to human health or the environment. Prevention or elimination of this risk was to be ensured through compliance with standards for the performance and operation of DWWTSs.

The Act also required Water Services Authorities (WSAs) (local authorities) to maintain a register of DWWTSs and to undertake inspections to regulate the discharges from these systems. The Environmental Protection Agency (EPA)

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[16] Department of the Environment, Heritage and Local Government, 2010. Building Regulations 2010: Technical Guidance Document H; Drainage and Waste Water Disposal. Dublin, Stationery Office, 2010.

[17] Commission of the European Communities, 1975. Council Directive of 15 July 1975 on waste (75/442/EEC). Brussels, Official Journal of the European Communities No L 194/39-41.

was made responsible for the development of the National Inspection Plan (NIP), for the appointment of inspectors, for the establishment and maintenance of a register of inspectors; and Agency was given the authority to supervise the WSAs in the performance of their functions under the Act.

The new legislation was also intended to assist Ireland in meeting the relevant objectives of the Water Framework Directive (2000/60/EC).

Subsequent to the passing of the Water Services (Amendment) Act, 2012, a number of Statutory Instruments were brought into force:

1. The *Water Services Acts 2007 and 2012 (Domestic Waste Water Treatment Systems) Regulations, 2012* (S.I. No. 223 of 2012), which prescribes the actions to be taken by owners of domestic wastewater treatment systems to ensure compliance with their obligations under Section 70(C)(1) of the Water Services (Amendment) Act 2012;

2. The *Domestic Wastewater Treatment Systems (Registration) (Amendment) Regulations, 2013* (S.I. No. 180 of 2013), to provide for the registration of newly constructed or installed domestic wastewater treatment systems;

3. The *Domestic Waste Water Treatment Systems (Financial Assistance) Regulations, 2013* (S.I. No. 222 of 2013), to provide financial assistance to owners of domestic wastewater treatment systems which require remediation or upgrading following an inspection and the subsequent issue of an advisory notice under Part 4A of the Water Services Act 2007; and,

4. The *Planning and Development (Amendment) Regulations, 2013* (S.I. No. 219 of 2013) which introduced a planning exemption for remedial works to an on-site domestic wastewater treatment system which had to be carried out in order to comply with an advisory notice from a water services authority in cases where septic tanks or other on-site waste water treatment systems have been assessed by the Water Services Authority as causing or likely to cause a risk to human health or the environment.

While this relatively new legislation has undoubtedly brought septic tanks and other on-site domestic wastewater treatment systems under improved control, and it applies to all systems of whatever age (thereby addressing the problem of older septic tanks and percolation areas which may have ceased to work properly, or may have been poorly located in the first place), it addresses only the problems of surface water and groundwater pollution, and does not consider wastewater as “waste” to be prevented, re-used or recycled. As we have noted in section 1.1 above, domestic wastewater contains phosphates which can be, and should be, recovered for subsequent use; and this is an issue which is a key policy area for Zero Waste Alliance Ireland.

2. ZERO WASTE ALLIANCE IRELAND (ZWAI)

At this point we consider that it is appropriate to mention the background to our submission, especially the policy and strategy of ZWAI, given that our previous submissions to Government Departments and to the EPA have primarily addressed the issues of solid wastes, their origin, prevention, minimisation, re-use, recycling, treatment and disposal.

2.1 Origin and Early Activities of ZWAI

Zero Waste Alliance Ireland (ZWAI) was established in May 1999 as an alliance of anti-landfill and anti-incineration groups from many locations in Ireland, and has subsequently developed into a national confederation of local residents' groups, supported by all of Ireland's principal environmental organisations, with the objectives of:

i) sharing information, ideas and contacts,

ii) finding and recommending environmentally sustainable and practical solutions to the growing domestic, municipal, industrial and agricultural waste management crisis in Ireland;

iii) lobbying Government and local authorities to implement environmentally sustainable waste management practices, including clean production, elimination of toxic substances from products, re-use, recycling, segregation of discarded materials at source, and other beneficial practices;

iv) lobbying Government to follow the best international practice (for example, the policies and practices of countries such as New Zealand, Australia and many other countries, regions and cities which have adopted the policy of Zero Waste) and EU recommendations by introducing fiscal and economic measures designed to penalise the manufacturers of products which cannot be re-used, recycled or composted at the end of their useful lives, and to financially support companies making products which can be re-used, recycled or are made from recycled materials;

v) raising public awareness about the long-term damaging human and animal health and economic consequences of landfilling and of the destruction of materials by incineration; and,

vi) maintaining contact and exchanging information with similar national networks in other countries, and with international zero waste organisations.

ZWAI initially had nearly 50 affiliated organisations and groups throughout Ireland, including all the principal environmental NGOs (An Taisce, Voice, Friends of the Earth Ireland, Earthwatch Leitrim, Earthwatch Sligo, Friends of the Irish Environment, Cork Harbour for a Safe Environment (CHASE), Kinsale Environment Watch, the Irish Doctors Environmental Association (IDEA)), and more than 40 active local groups developing and implementing new ways to address Ireland's waste problems.

In Galway, the efforts of the **ZWAI** group "Galway for a Safe Environment" had a major impact on the waste management policy of the City Council, resulting in a pilot-scale recycling initiative which spread city-wide with significant benefits.

2.2 Our Basic Principles

Human communities must behave like natural ones, living comfortably within the natural flow of energy from the sun and plants, producing no wastes which cannot be recycled back into the earth's systems, and guided by new economic values which are in harmony with personal and ecological values.

In nature, the waste products of every living organism serve as raw materials to be transformed by other living creatures, or benefit the planet in other ways.

Instead of organising systems that efficiently dispose of or recycle our waste, we need to design systems of production that have little or no waste to begin with.

There are no technical barriers to achieving a "*zero waste society*", only our habits, our greed as a society, and the current economic structures and policies which have led us to the present environmental, social and economic difficulties.

"Zero Waste" is a realistic whole-system approach to addressing the problem of society's unsustainable resource flows – it encompasses waste elimination at source through product design and producer responsibility, together with waste reduction strategies further down the supply chain, such as cleaner production, product repairing, dismantling, recycling, re-use and composting.

2.3 What We are Doing

Zero Waste Alliance Ireland has prepared a detailed policy document on waste management, we hold regular meetings, and we continue to lobby Government on the issue of sustainable resource management, and to express our concern at the failure to address Ireland's waste problems at a fundamental level.

In recent years, as many older landfills were closed or became better managed (primarily as a consequence of the implementation of European Directives, Irish legislation transposing these Directives, the development of a waste licensing regime by the Environmental Protection Agency, and the establishment of the Office of Environmental Enforcement in 2003), the number of affiliated groups concerned about the adverse environmental and public health effects of landfills decreased considerably in number, and ZWAI has concentrated more on the objective of ensuring Ireland's compliance with the Stockholm Convention, and on promoting the concepts of waste reduction or elimination at source, repair, re-use, recycling, and implementation of "the circular economy" as steps towards zero waste.

ZWAI strongly believes that Ireland, as an EU Member State, has a binding obligation under the Stockholm Convention to significantly reduce emissions of persistent organic pollutants (POPs). Merely holding our submissions at present levels, or preventing an increase in either toxicity or volume, is not an adequate response to the aims of the Stockholm Convention. Instead, Irish State organizations, including the Department of the Environment and the EPA, should implement policies aimed at ensuring very significant reductions in the emissions of POPs; and, in some situations, reducing such emissions to zero.

ZWAI further believes that Ireland should have a policy of not sending our wastes for further treatment or recycling in other countries, particularly in developing countries where local populations are being exposed to dioxins and other very toxic POPs. Relying on other countries' infrastructure to achieve our "recycling" targets is not acceptable from a global ecological and societal perspective.

In 2008, Zero Waste Alliance Ireland made a submission to the Environmental Protection Agency prior to the preparation of Ireland's draft National Implementation Plan (NIP) for the Stockholm Convention; and in 2012 ZWAI submitted observations on the Agency's draft NIP. **ZWAI** has also made submissions on waste tyres and household waste collection (2014), and on the proposed reduction of regional waste management areas from 10 to 3 (2015).

ZWAI continues to maintain active working relationships with Zero Waste New Zealand Trust, with the Grass Roots Recycling Network in the United States, the Community Resources Network Scotland (CRNS), with the Global Anti-Incinerator Alliance (Global Alliance for Incinerator Alternatives), and with other international environmental organisations.

It will be clear therefore, that ZWAI is primarily concerned with the very serious issue of discarded materials and goods, how these become "waste", and how such "waste" may be prevented by re-design along ecological principles. But these same ecological principles can also be applied to liquid wastes, including wastewater from domestic sources, especially in rural areas where the lack of municipal or communal sewerage systems requires each dwelling to install and maintain an individual or isolated wastewater treatment system. On the other hand, we would suggest that, for most rural homes, there is adequate land around most houses to enable a more ecological system to be installed, so that the nutrients contained in the wastewater from that house can be re-used.

Zero Waste Alliance Ireland is a registered charity, and a member of the Irish Environmental Network (IEN), and our directors are:

- Ollan Herr
- Sean Cronin
- Richard Auler
- Jack O'Sullivan

3. THE ORIGIN OF THE PROBLEM, OR HOW WE LEARNED TO TURN FERTILISER INTO WASTE

For most of humanity's existence on this planet, our excreta and food wastes served as nourishment for other animals, or were returned directly to the soil in rural areas. The cycle was closed, though imperfectly, and the nutrients which we removed in the form of cereals, vegetable crops and cattle were put back as biodegradable organic wastes.

In cities, most homes had no designated space for bodily relief, and the street was assumed to be the proper place for the disposal of all domestic wastes.[18] Medieval cities were cleaned by pigs; while ravens, kites and vultures were protected as sacred scavengers. By the mid 19th century in London, the houses of the wealthy usually contained one "privy", from which "nightsoil" was removed several times each week for spreading on land.

The invention of the water flush changed this practice. The water closet (or WC) was first used by the English upper classes in the late eighteenth century; it was placed in a closed cupboard and drained by an unventilated pipe to a cesspool in the cellar. The device became common in London, partly because of the social status it conferred on its owner. By law, the contents had to be retained in cesspools on the premises (which produced a more evil-smelling gas than the privvies they had replaced !); but, in spite of the law, an increasing number became connected to the sewers.

Towards the end of the 19th century, when piped water and the WC became common in both Britain and the United States, the capacity of domestic cess-pools became quickly overwhelmed, the surrounding soil could no longer absorb the water, and major health problems resulted. Personal hygiene had progressed at the expense of public health, and the technology of sewerage systems and large-scale sewage treatment had to be developed.

The cost of getting rid of water from households proved to be many times more costly than getting it there in the first place. This disproportion was increased when many European and American cities decided to combine the sewers for domestic wastewater with storm sewers for rainwater. Engineers relied on the ability of natural bodies of water to dilute, disperse and breakdown the wastes from sewers and treatment plants; and therefore by the end of the 19th century, the spread of faecal-borne infection via tap-water had become common, and recycling of water became an agent in the spread of disease.

Resources had to be applied either to the further treatment of sewage before disposal, or to the treatment of water supplies for domestic use. For the first half of the 20th century, public authorities chose to sterilise water supplies, using filters and chemical treatment (mainly by chlorine). In more recent decades of the last century, the emphasis has been shifted towards more complete treatment of sewage (for example, tertiary treatment and "polishing")

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[18] Illich, Ivan, 1985. *H_2O and the Waters of Forgetfulness: Reflections on the Historicity of Stuff*; p. 46. Published 01 January 1985 by the Dallas Institute of Humanities and Culture, Dallas, Texas; and published subsequently by Heyday Books, Berkeley, California, USA.

in order to prevent increasing pollution; and the legislation described in section 1.2 above was the result of this policy and practice being applied in Ireland to rural houses not connected to municipal sewerage systems.

It is relevant to note that the spread of the WC was resisted at first, even in cities where its need might be considered greatest. The contents of dry toilets in the cities were considered to be "*a mine of wealth*".[19]

In Sweden, for example, the first "official" WC was installed in 1883 but its more widespread use was very slow because of a prohibition against using water for toilet flushing purposes.[20] There was also an intense debate ongoing at that time in which health authorities and physicians argued for WCs, whereas those against flush toilets were concerned about the resulting water pollution, and they also argued that the introduction of this type of toilet would end recycling and utilisation of plant nutrients from urine and faeces in agriculture.[21] Representatives of the farmers' organisations in Sweden therefore argued against the implementation of WCs.

It would be interesting to discover whether farmers' organisations in Ireland had made similar arguments around the same period; but such further historical research is outside the scope of this submission.

France was equally slow to adopt the flush toilet, and it took over a century for Paris to follow the example of London. A report from *L'Institut de France* in 1835 rejected a proposal to adopt the WC and to channel the sewage into the River Seine. The decision was based neither on anti-British sentiment nor on concern for the water quality in the river, but on calculating the enormous economic value that would be washed down the drain with the excrement of people and horses.[22]

During the middle of the 19th century, a sixth of the area of Paris produced approximately 50 Kg per capita of fresh salads, fruit and vegetables, more than the 1980 level of per capita consumption of these foods. Some 6.5 persons per hectare were employed full time, with others engaged in sales; and over a period of four decades enough "soil" was produced to enable the growing area to be expanded by 6 % annually. The growing techniques reached maximum sophistication in the 1880s, with inter-cropping and succession-cropping giving as many as six, and never less than three, harvests per year. Winter crops

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19 Goddard, N. 1996. A mine of wealth? The Victorians and the agricultural value of sewage. *Journal of Historical Geography* **3**:274-290 (from the abstract only).

20 Cronström, A. 1986. The technical history of Stockholm - Water provision and sewerage. (Stockholms tekniska historia -Vattenförsörjning och avlopp). Liber Förlag, Stockholm, Sweden.

21 Höglund, Caroline, 2001. Evaluation of microbial health risks associated with the reuse of source-separated human urine. Royal Institute of Technology (KTH), Department of Biotechnology, Applied Microbiology Swedish Institute for Infectious Disease Control (SMI) Department of Water and Environmental Microbiology, Stockholm 2001.

22 Illich, Ivan, 1985. *H_2O and the Waters of Forgetfulness: Reflections on the Historicity of Stuff*; p. 67.

were made possible by the heat of fermenting manure, bell-shaped glass cloches, straw mats and high walls surrounding the inner-city small-holdings.[23]

According to Ivan Illich, Kropotkin's 1899 claim that the city of Paris could supply London with green vegetables, was not unreasonable.[24] It may also be surprising for us to learn that a proposal was made more than 100 years ago to export by rail from Paris the excess quantities of rich humic soil so as to fertilise the surrounding countryside. The efficiency of the re-cycling system was all the more remarkable by today's standards when the almost total absence of imported energy (in the form of fossil fuels and fertilisers) is taken into account.

Unfortunately, instead of exporting soil to fertilise the countryside, present-day cities export waste-water and the flush-toilet; while a very significant number of rural houses are served by wastewater treatment systems which contaminate groundwater and surface water ! Between 25 % and 50 % of all domestic water goes down the toilet, consuming expensively treated water where its biological cleanliness is irrelevant, and putting further demands on scarce resources.

In a global context, not dissimilar to the situation in rural Ireland at the present time, the use of the flush toilet creates significant problems. A paper entitled "*What is Environmental Sustainability in Sanitation?"*, by Robert Goodland and Abby Rockefeller in *UNEP International Environmental Technology Centre Newsletter,* states that "*for the sake of environmental sustainability, we must stop mixing human excreta with drinking water, then collecting and further worsening this mixture with industrial and non-point source wastes*".[25]

Goodland and Rockefeller based their arguments not only on the waste of resources, but on the economic costs of collecting, treating and disposal of sewage. At the time when their paper was being written, data from cities in OECD countries showed that initial construction costs of sewage disposal were around $50,000 per urban household. Overall, approximately 80-90% of the construction costs of sewage treatment and disposal systems are required for transportation of the wastewater (e.g., laying of pipes) and around 10-20% for the treatment process.

Therefore, as a consequence of the widespread use of the relatively simple technology of the flush toilet and the "water carriage" system, along with the application of other technologies upstream and downstream to mitigate its effects, we now require in Ireland:

i) larger-scale and more expensive water treatment and distribution systems to supply larger quantities of potable water than would otherwise be necessary;

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[23] Stanhill, G., 1977. An urban agro-ecosystem: the example of nineteenth-century Paris. Ecosystems, Vol 3, pp 269-284.

[24] Illich, Ivan, 1985. *H_2O and the Waters of Forgetfulness: Reflections on the Historicity of Stuff*; p. 67.

[25] Goodland, Robert, and Rockefeller, Abby, 1996. What is Environmental Sustainability in Sanitation. *Insight*, Newsletter of the UNEP International Environmental Technology Centre, Summer 1996, pp 5-8.

ii) expensive and complex sewage collection and treatment facilities serving most towns and all major cities;

iii) a means of disposing of the large quantities of sludge remaining after treatment of the sewage;

iv) costly individual on-site treatment of sewage from houses and other buildings outside towns;

v) expensive water treatment facilities to safeguard public health; yet producing, at best, a tasteless water suspected of carrying minute quantities of contaminants; and,

vi) large-scale production and application of chemical fertilisers to restore lost nutrients to agricultural land.

These technological or engineering solutions, while solving some problems, have created others, resulting in:

a) surface water and groundwater pollution by faecal bacteria and sewage-derived nutrients;

b) soil depletion and erosion in cereal growing areas as a result of intensive fertiliser use;

c) rising costs of maintaining the water cycle; and,

d) problems in complying fully with the Water Framework Directive.

4. ADDRESSING THE PROBLEM OF HOW AND WHY WASTEWATER MAY BE TRANSFORMED FROM A DIFFICULT WASTE INTO A SOURCE OF NUTRIENTS FOR PLANT GROWTH

Obviously, there are few (if any) advantages in returning to the way in which cities dealt with their wastes from medieval times through to the 19th century. Yet to the present day in many parts of Central and Eastern Europe, and throughout the Asian, African and Indian continents, rural dwellers continue to deal with their domestic wastes by disposal to soil -- with varying degrees of healthiness or unhealthiness, depending on their knowledge and practices.

Twentieth-century microbiology and our knowledge of parasites and the transmission of diseases allows us to by-pass or avoid all of the sewage-derived problems which made life uncomfortable, unhealthy or difficult for people living in earlier times, while at the same time ensuring that nutrients and organic matter are returned to the soil. The application of ecological principles, waste minimisation at source, modern knowledge of disease transmission, new construction materials and modern technology has opened up a range of domestic wastewater disposal alternatives particularly applicable to rural areas. However, it remains to be seen whether we are willing to adapt culturally and in our habits to using such alternatives.

Improvements to existing water supply, sewage disposal systems and alternative methods of disposal may be grouped into the following principal types:

i) improved percolation area design and location for septic tank systems in rural areas (addressed by the legislation listed above and by the Agency's National Inspection Plan);

ii) more common use of small-scale constructed wetlands (reed beds) for single houses or groups of houses where ground conditions permit;

iii) small-scale packaged sewage treatment plants (also addressed by the legislation listed above and by the Agency's National Implementation Plan);

iv) water saving devices and appliances in the home;

v) non-water-carriage toilets;

vi) urine separation toilets, and use of the separately collected urine as a fertilizer (see section 4.3 below);

vii) wastewater re-cycle and re-use systems; and,

viii) water metering and volume-related charges (currently the subject of widespread public debate about the scale and method by which metering and related charges are being implemented).

Unfortunately, Irish wastewater policy is focused solely on "*treating wastewater*" in an effort to minimise the detrimental effects of wastewater discharges on the aquatic environment. Our view is that a better policy would be to place equal emphasis on wastewater "*segregation*" as well as on "*the treatment of wastewater*". This would greatly facilitate "*wastewater pollution avoidance", "nutrient resource recovery*", more efficient use of water, and water recycling where appropriate.

The core of this submission from Zero Waste Alliance Ireland is to call for a very radical revision of the EPA Code of Practice and Part H of the Irish Building Regulations.

At this point it is appropriate to draw a parallel between the way in which society has improved the practice of solid waste separation and recycling. In the last decade Ireland has moved from using a single waste bin system to the provision of 3-bin systems. One stream is for waste for disposal by landfilling, one for recycling and the third bin is for material to be composted. Indeed in many towns we now provide public amenity centres where a much wider range of separated resources can be recovered. Sustainable resource recovery and recycling is almost always achieved by keeping things separate.

We are therefore recommending that different domestic wastewater streams should be kept separate. The elements of this recycling concept are already encouraged by EU Directives, and the reuse of treated water and the recycling of sewage sludge are two such examples.

4.1 Legal Support for Wastewater Re-use and Recycling

The Urban Waste Water Treatment Directive (91/271/EEC)[26] contains the following two relevant Articles which support the principal aims of our submission:

Article 12 (1): "*Treated waste water shall be reused whenever appropriate*"; and,

Article 14 (1): "*Sludge arising from wastewater treatment shall be re-used whenever appropriate*".

When referring to the re-use of sludge we believe that the reason for doing so is to recycle nutrients of N, P & K in the sludge so that these nutrients can be conserved. The use of the word "shall" in the Directive is important in this context, as it imposes an obligation rather than an option. **ZWAI** fully supports the wording in these EU obligations, and we believe that more action is needed by Ireland to reuse and recycle much more than we are doing at present.

As required by the EU Directive, Part H of Irish Building Regulations provides standards for the treatment of grey water that can be reused for gardens and toilet flushing; and the spreading of sludge on agricultural land is regulated by a

[26] EU Council Directive of 21 May 1991 concerning urban waste water treatment; OJ 30 May 1991; No. L 135/40 – 135/52.

Statutory Instrument (S.I. No. 267/2001: Waste Management (Use of Sewage Sludge in Agriculture) (Amendment) Regulations, 2001).

The standards for treatment of water intended for reuse and the treatment of sludge for agricultural use are very important, and there are rightly strict limits on the concentration of metals in sewage sludge as well as limits on the concentration of total coliforms in treated wastewater for recycling.

4.2 Necessity to Conserve and Recycle Phosphorus

As mentioned earlier in our submission (section 1.1 above), there is increasing evidence that the world's finite phosphate resources are limited. The concern is that this limited resource will be unable to keep up with the world's growing and increasing market demand for phosphorous fertilizer over the coming decades. In economics, for any amenity, product or service where there is a growing shortage, prices will begin to rise. Since there is no alternative to phosphate as a constituent of fertilizer we can only expect very serious price rises – resulting in food shortages for those who cannot pay.

To soften the economic threat of rising phosphate prices, Ireland must therefore become much more efficient than we are at present in recycling phosphorous. As it was with Charles Edward Trevelyan in the 1840's it would be ethically and morally wrong for Ireland today to pursue wasteful policies that would eventually contribute to hunger and food shortages in other poorer parts of the world.[27] Subject to reasonable regulations, the remaining planning restrictions on the recycling of phosphorous from our domestic waste water must be removed. Slowing the rise of phosphate prices by the large-scale recycling of phosphate from sewage would help to keep world food prices stable and low.

The issue of Peak Phosphorous can no longer be ignored. The issue is widely discussed on the internet, and the following are just a few examples:

http://en.wikipedia.org/wiki/Peak_phosphorus

http://ec.europa.eu/environment/natres/pdf/sustainable_use_phosphorus.pdf

http://oilprice.com/Alternative-Energy/Biofuels/As-Rock-Phosphate-Runs-Out-What-is-More-Important-Food-Crops-or-Fuel-Crops.html

http://www.americanscientist.org/issues/pub/does-peak-phosphorus-loom

At a national level, the total quantities of phosphorous being wasted to the aquatic environment from domestic septic tanks may well be small. Nevertheless, since we are discussing the issue of septic tanks from single

[27] Roberts, F. David, 2002. The Social Conscience of the Early Victorians. Stanford University Press Stanford, California 2002.

houses, we submit that phosphorous separation and recycling must be considered for the septic tank sector also.

One of the acknowledged shortcomings in the Agency's report on septic tank systems is the problematic phosphorous emissions from septic tanks. We know that there are many parts of the country where existing houses are located in areas where the percolation conditions are not suitable for septic tanks. Most of our septic tanks do not achieve this same level of environmental protection in areas where the percolation rates are too slow (for example, in County Leitrim) or too fast (for example, the limestone fields on the Aran Islands or the karst landscape in east Galway). Therefore why not prevent a phosphorous problem by separating the main source of the phosphorous in domestic wastewater and recycling it rather than trying to treat it.

Two Statutory Instruments have been approved in Ireland to regulate the spreading of nutrients from waste water onto arable land; and the application of sewage sludge is also permitted under strict conditions which impose an upper limit on the levels of metals being applied to land.[28] These regulations implement European Union policy which "*seeks to encourage the use of sewage sludge in agriculture and to regulate its use in such a way as to prevent harmful effects on soil, vegetation, animals and man.*"

If we want to return or recycle essential nutrients such as nitrogen and phosphorous to land without the risk of harmful chemicals or metals, and if we also want to avoid or greatly reduce domestic waste water pollution, one simple solution might be to use urine on land. Urine is practically free of harmful toxic metals because it is closely linked to a clean human diet. Human urine is much "cleaner" than municipal sewage sludge which contains a very wide range of chemical products that everybody tends to flush away (see section 4.3.1. below).

4.3 Separation of Urine and Its Re-use

The EPA Code of Practice for Domestic Waste Water Treatment in Table 4.1 (Range Of Raw Domestic Wastewater Influent Characteristics (I.S. EN 12566-3:2005)) states that the total phosphorus discharges from domestic houses can be between 5 – 20 mg / litre. Taking the smallest 5 mg figure with houses of 4 people, discharging 150 litres per person over 300 days per annum will therefore discharge (4 pe x 150 litres x 300 days x 5 mg / litre = 900,000 mg of phosphorous = 900 grams = 0.9 kg of P minimum per annum.

Let us assume that 1.5 litres of urine are excreted per day from each person. Assume approximately 600 kg of urine per person per year and 5 people are living in the house = 3,000 kg of urine from a house per year.

Each septic tank is therefore discharging or wasting about one kg minimum of this vitally important and finite phosphorous resource each and every year, and these are in part responsible for algal blooms in streams, lakes and estuaries.

[28] S.I. No. 148/1998: Waste Management (Use Of Sewage Sludge In Agriculture) Regulations, 1998; and S.I. No. 267/2001: Waste Management (Use of Sewage Sludge in Agriculture) (Amendment) Regulations, 2001.

Given the number of septic tanks, and given that phosphorous pollution is a problem, this is a serious lost opportunity for local farmers as phosphate prices rise.

How much pollution reduction of nutrients such as nitrogen, phosphorous and potassium from domestic wastewater and septic can be achieved by the separation of urine?

Analysis of various pollutants and nutrients in waste water					
	Grey Water	**Biodegr. Solids**	**Faeces**	**Urine**	**Faeces & Urine together**
Nutrients					
Nitrogen N	7%	8%	15%	70%	85%
Phosphorous P	14%	14%	26%	47%	73%
Potassium K	10%	37%	18%	35%	53%
Pollutants					
Faecal bacteria & viruses			100%		100%
Ingested medicines & hormones					100%

Table 4.3 Nutrients, biodegradable solids, faecal bacteria, viruses and pharmaceutical products in domestic wastewater.

As shown in Table 4.3 above, ZWAI submits that we can achieve the greatest reduction in nitrogen discharges by separating urine, i.e., around 70% reduction. A significant reduction of phosphorous can also be achieved, amounting to around 47%. Potassium, also an essential plant nutrient, can be reduced by 35%.

4.3.1 Low Concentration of Heavy Metals in Urine; Avoiding Build-up of Heavy Metals in Agricultural Land

As pointed out briefly in section 4.2 above, human urine is much “cleaner” than municipal sewage sludge, which can be used as a fertiliser only under strict conditions which impose an upper limit on the levels of metals being applied to land. Spreading of sewage sludge (including solids removed from de-sludging septic tanks) on land is controlled by a Regulation[29] which prescribe the maximum values for the concentration of heavy metals in sludge before land-spreading is permitted (see Table 4.3.1A below), and which prescribe maximum values for the concentrations of heavy metals in soil (see Table 4.3.1B below).

[29] S.I. No. 148/1998: Waste Management (Use Of Sewage Sludge In Agriculture) Regulations, 1998.

Waste Management (Use Of Sewage Sludge In Agriculture) Regulations, 1998 (S.I. No. 148 of 1998); Part II -- Maximum Values for Concentrations of Heavy Metals in Sludge for Use in Agriculture (expressed as mg/kg of dry matter)	
Parameter	**Maximum Values**
Cadmium	20
Copper	1,000
Nickel	300
Lead	750
Zinc	2,500
Mercury	16

Table 4.3.1A Maximum Values for Concentrations of Heavy Metals in Sludge for Use in Agriculture

Waste Management (Use Of Sewage Sludge In Agriculture) Regulations, 1998 (S.I. No. 148 of 1998) **Part II -- Maximum Values* for Concentrations of Heavy Metals in Soil** (expressed as mg/kg of dry matter in a representative sample, as defined in Part III of this Schedule, of soil with a pH of 5 to 7)	
Parameter	**Maximum Values**
Cadmium	1.0
Copper	50.0
Nickel	30.0
Lead	50.0
Zinc	150.0
Mercury	1.0
* Where the pH of the soil is consistently higher than 7, the values set may be exceeded by not more than 50%, provided that there is no resulting hazard to human health, the environment or, in particular, groundwater.	

Table 4.3.1B Maximum Values for Concentrations of Heavy Metals in Soil

A further Regulation[30] prescribes the maximum quantities of heavy metals which may be added annually to agricultural land (see Table 4.3.1C below).

If we now consider the very low concentration of heavy metals in human urine (see Table 4.3.1D below), we can see that it is possible to add large quantities of urine to agricultural land without the above maxima being exceeded (see Table 4.3.1E below).

[30] S.I. No. 267/2001: Waste Management (Use of Sewage Sludge in Agriculture) (Amendment) Regulations, 2001.

S.I. No. 267/2001: Waste Management (Use of Sewage Sludge in Agriculture) (Amendment) Regulations, 2001 Part II Limit Values for Amounts of Heavy Metals Which May Be Added Annually to Agricultural Land, Based on a Ten Year Average.			
Heavy Metal	**Limit Value** (kg / ha / year) [1 hectare = 10,000 m2 or 2.471 acres]	**Limit Value** (Kg per m^2) [Divide the figures in the column to the left by 10,000]	**Limit Value** (mg per m^2) [Multiply figures in the column to the left by 1,000]
Cadmium	0.05	0.000005	5.0 mg / m^2
Copper	7.50	0.00075	750 mg / m^2
Nickel	3.00	0.0003	300 mg / m^2
Lead	4.00	0.0004	400 mg / m^2
Zinc	7.50	0.00075	750 mg / m^2
Mercury	0.10	0.000001	1.0 mg / m^2
Chromium	3.50	0.00035	350 mg / m^2

Table 4.3.1C Limit Values for Amounts of Heavy Metals Which May Be Added Annually to Agricultural Land, Based on a Ten Year Average.

Concentrations of heavy metals in urine (mg/kg) from four source-separating systems in Sweden.				
Metal	**Understenshöjden**	**Palsternackan**	**Hushagen**	**Ekoporten**
Hg	0.00044	<0.0004	<0.001	0.00043
Cd	<0.001	<0.0013	<0.001	0.00058
Pb	<0.01	<0.027	<0.02	0.019
Cr	0.019	0.02	<0.006	0.013
Co	<0.005	<0.0025	<0.003	
Ni	0.061	<0.022	<0.010	0.040
Mn	0.037	<0.0045	<0.005	
Cu	2.5	3.00	0.25	1.82
Zn	0.2	0.52	0.16	0.18
Mo	0.036	0.02	0.01	
Fe	0.39	0.40	0.05	
B	0.61	0.53	0.24	

Table 4.3.1D Concentrations of heavy metals in urine solution (mg/kg) from four source separating systems in Sweden.[31]

[31] Tidåker, Pernilla, 2003. Life Cycle Assessment of Grain Production Using Source-Separated Human Urine and Mineral Fertiliser. Department of Agricultural Engineering, Swedish University of Agricultural Sciences, Report 251. 2003, Uppsala, Sweden.

Metal	Maximum concentration of metals found in Swedish urine (mg / kg)	Annual quantities of metals in 3000 litres of urine from a 5-person household (mg)	Annual quantities of metals in 3000 litres of urine from a 5-person household (Kg)	Maximum amounts of heavy metals which may be added annually to agricultural land (kg / hectare)
Cadmium	0.0013	3.9	0.0000039	0.05
Copper	3.0	9000.0	0.009	7.50
Nickel	0.061	183.0	0.000183	3.00
Lead	0.027	81.0	0.000081	4.00
Zinc	0.52	1560.0	0.001562	7.50
Mercury	0.001	3.0	0.000003	0.10
Chromium	0.02	60.0	0.00006	3.50

Table 4.3.1E Quantities of heavy metals in urine produced annually by a 5-person household (assuming that all the urine is collected); and the quantities of heavy metals which may be safely added to agricultural land without exceeding the Statutory limits.

The table above therefore clearly shows that the annual application of 3.0 m^3 of human urine on 1 hectare of land would not cause any exceedance of the heavy metal limits prescribed by the above-listed Irish regulations which control the spreading of sewage sludge. Human urine is therefore not only a useful source of plant nutrients, but is relatively free from contamination by heavy metals and is suitable for application to agricultural land.

4.3.2 Health and Hygiene Aspects of using Human Urine; and Guidelines to Ensure Protection of the Health of Users and the Public

The potential health risk of using urine for irrigating crops has always been an area of concern, even when the advantages of using it as a source of nutrients are recognised. Minimising the risk of transmitting infectious diseases is of vital importance when implementing domestic systems for recycling human urine.

The hygienic risks related to handling of source-separated urine are mainly caused by faecal cross-contamination as a result of misplaced faeces. Storage time as well as temperature will then affect the microbial reduction. Experimental survival studies indicate that gram-negative bacteria, such as Salmonella and E. coli, are rapidly inactivated, whereas gram-positive faecal streptococci are more resistant.[32]

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[32] Höglund, Caroline, 2001. Evaluation of microbial health risks associated with the reuse of source-separated human urine. Royal Institute of Technology (KTH), Department of Biotechnology, Applied Microbiology Swedish Institute for Infectious Disease Control (SMI) Department of Water and Environmental Microbiology, Stockholm 2001

The same author (Höglund, 2001) reports that bacteriophages and rotavirus are not inactivated at the low temperature of 5°C, while oocysts of Cryptosporidium (causing diarrhoeal diseases) might be less persistent. Spores from clostridia (used as an indicator organism) were not reduced at all during 80 days, neither at 20°C nor at 4°C.

Höglund's principal conclusions may be summarised as:

i) Indicator bacteria are not suitable for determining faecal contamination of source-separated urine due to a rapid inactivation of E. coli in urine mixtures and to growth of faecal streptococci within the systems studied.

ii) Enteric bacteria were rapidly inactivated in source-separated urine at both 4°C and 20°C, as the elevated pH (pH 9) caused by the conversion of urea to ammonium is beneficial for the inactivation of microorganisms in the urine; while viruses were found to be the most persistent microbial group investigated.

iii) Gram-negative bacteria such as Campylobacter and Salmonella cause most gastrointestinal infections; however, all bacteria in this group were rapidly inactivated in urine, indicating a low risk of transmitting gastrointestinal infections caused by bacteria when handling source-separated urine.

iv) The risk of transmitting infectious diseases is dependent on the storage temperature and duration of storage of the urine mixture before it is used as a fertiliser. A shorter storage time at a lower temperature will create higher risks for individuals handling the urine and for those in contact with the fertilised field or crop, including animals (see Table 4.3.2 below).

v) Further inactivation of pathogens is expected in the field, and the risk of infection by ingestion of crop will be reduced during the time between fertilisation and consumption. Protection (e.g. wearing gloves) and awareness of risks is important, especially for those handling unstored urine.

vi) Using suitable fertilising techniques and working the urine into the soil, as well as letting some time pass between fertilisation and harvesting, will decrease the exposure of humans and animals to potential pathogens. If urine is used on crops that are to be commercially processed, e.g. cereal crops, the risk of infection through food consumption is negligible.

vii) Urine collected from individual households and used for the household's own consumption involves less risk than large-scale systems, and is suitable for fertilising all types of crops if one month is allowed between fertilisation and consumption.

The relationship between storage duration, possible remaining pathogens and recommended use on crops are shown in Table 4.3.2 below.

Storage temperature	Storage time	Possible pathogens in the urine mixture	Recommended crops
4°C	≥1 month	viruses, protozoa	food and fodder crops that are to be processed.
4°C	≥6 months	viruses	food crops that are to be processed, fodder crops.
20°C	≥1 month	viruses	food crops that are to be processed, fodder crops.
20°C	≥6 months	probably none	all crops·

Table 4.3.2 Relationship between storage conditions, pathogen content[a] of the urine mixture and recommended crop for larger systems[b] . It is assumed that the urine mixture has at least pH 8.8 and a nitrogen concentration of at least 1 g/litre.[33]

4.3.3 Suggested Practices and Methodology for Recovery of Phosphorus

A. Ireland should develop a national infrastructure for the recovery and recycling of phosphorous from wastewater systems using commercial large scale anaerobic digesters, algae growing systems and large scale Struvite processing.

B. Where homes with septic tanks are located in places where percolation conditions are not suitable for traditional septic tank situations – urine separation and collection should be required for new builds and any refurbishment.

C. The separation of urine from domestic wastewater should become the first step in the implementation of an Irish national wastewater pollution prevention policy. A separate plastic tank should be provided alongside the present septic tanks for the collection and storage of domestic urine. An overflow pipe should be provided so that any excess volume will re-join the other wastewater from the conventional septic tank.

D. The spreading of urine on land or injection into soil should be approved as a sustainable agricultural use, at an application rate of 3 m^3 of human urine per hectare (this application rate is safely below the toxic metal limits prescribed by the Irish Regulation S.I. No. 267/2001 for the spreading of sewage sludge).

E. The storage period for human urine before application to agricultural land shall not be any shorter than the Swedish guideline periods in Table

[33] Jönsson, H., Vinnerås, B., Höglund, C., Stenström, T.A., Dalhammar, G. and Kirchmann, H. 2000. Recycling source separated human urine. (Källsorterad humanurin). VA-Forsk Report 2000-1, VAV AB, Stockholm, Sweden. (In Swedish, English summary).

4.3.2 above, but in Ireland a longer storage time of up to a year should be recommended to ensure that further biological hazards are minimised.

F. All new and refurbished houses, especially those near nutrient sensitive or vulnerable water bodies such as streams, rivers, lakes, aquifers and near the sea should be required to install urine-separating toilets and urinals, and to provide a separate urine storage tank as a sustainable measure to reliably reduce pollution from domestic houses.

G. The separation and storage of urine should be registered and regulated by the Local Authority and be made available to licensed farmers as a sustainable nutrient supply in accordance with S.I. No. 148 of 1998 and S.I. No. 267 of 2001. The regulations should also set minimum storage times for the urine so that the ammonia and the temperature conditions will be enough to sufficiently treat the bacteria and viruses before handling and application on the land.

H. Urine should be applied to land only during the same approved dry weather conditions as currently exist for sludge spreading.

I. Formal training should be provided by the State, so that householders, farmers and urine removal contractors operating or installing these urine separating systems or managing the land application, will be adequately trained and will have sufficient knowledge to ensure that they prevent or minimise environmental and health risks associated with the use of urine on land.

J. The plumbing and pipework within a house or building should be in compliance with a proposed new section in Part H of the Irish Building Regulations dealing with urine separating systems and composting toilets.

4.3.4 Examples of Urine Separating Toilets

There are many types of urine-separating toilets in use world wide, and a very useful review of the technology has been published by the Ecosan Sustainable Sanitation Program which is supported by the German Federal Ministry for Economic Cooperation and Development (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH).[34]

Sweden is also a leading country in the development of sustainable sanitation systems; and, since the 1990s, Swedish research has resulted in an evolution of techniques, methods and organizational structures that are far-reaching in environmental protection and sustainability. In 1995, the Stockholm Water Company initiated a research and development project on urine diversion, and the results are presented in a report entitled “Urine separation – Closing the Nutrient Cycle”, available at www.stockholmvatten.se. At that time, urine diversion was a new phenomenon, mainly implemented in eco-villages and in

[34] Von Münch, Dr. Elisabeth, and Winker, Dr.-Ing. Martina, 2011. Technology review of urine diversion components -- Overview of urine diversion components such as waterless urinals, urine diversion toilets, urine storage and reuse systems. Published by: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Sustainable Sanitation -- Ecosan Program, Eschborn, Germany; May 2011.

areas with high environmental awareness and ambition. The project generated valuable information on health, agricultural reuse, social and technical aspects.

Figure 4.3.4.1 Urine diverting flush toilets. The left hand illustration shows an example from Meppel, the Netherlands; while the right hand illustration shows an example from Stockholm, Sweden.

At the present time, there is a shift in thinking, and we are seeing the beginning of mainstreaming and large-scale implementation of the technology of urine separation, with current work focused mainly on organizational aspects, and on planning and implementation, with emphasis on global sustainability and the achievement of the Millennium Development Goals.

The Swedish EPA considers urine diversion as a solution of great potential and an option when planning for future investments to meet new legislation and environmental goals; and urine diversion has also been used as a measure to mitigate eutrophication problems along the Swedish coastline.

Closing the loop through nutrient recycling is a key sustainability challenge and this technique makes it possible without expensive treatment processes. Given the proper attention to remaining questions, such as residual pharmaceuticals and hormones, urine diversion has large potential for achieving sustainability.[35]

[35] Kvarnström, Elisabeth; Emilsson, Karin; Stintzing, Anna Richert; Johansson, Mats; Jönsson, Håkan; Petersens, Ebba; Schönning, Caroline; Christensen, Jonas; Hellström, Daniel; Qvarnström, Lennart; Ridderstolpe, Peter; and Drangert, Jan-Olof; 2006. Urine Diversion: One Step Towards Sustainable Sanitation. EcoSanRes Report 2006-1; Stockholm Environment Institute, Stockholm, Sweden.

Figure 4.3.4.2 Urine-diverting flush toilet installed in a home in Kullön, Sweden.

4.4 Our Proposed Amendments to Part H of the Irish Building Regulations

The following amendments are proposed to the building regulations especially where the correct soil conditions for percolation of wastewater after partial treatment in a septic tank is impossible to achieve.

The following shall be required to comply with Directive 91/ 271/ EEC – the EU Waste Water Framework Directive, Article 3:

- *Where the establishment of a waste water collection system would involve excessive cost, an individual system which will achieve the same level of environmental protection shall be used.*

To fully protect the aquifer and surface waters, and to recover and recycle phosphorous and nitrogen, we believe that urine separation and faecal separation with composting should be used. There are many homes in areas with very low permeability soils area, or where there is only limestone in the fields, or where there is only gravel just below a top layer of topsoil. These are situations where pollution "avoidance", "nutrient separation and nutrient recycling" must be implemented.

4.4.1 Urine separation for the purpose of separate storage and further removal

The following methods shall be approved in the building regulations to significantly reduce nitrates and phosphates from waste water discharges.

- Urine separation from waste water will be used where there is a requirement to ensure reliable and consistent reduction of nitrates, phosphates and ingested medicines in the domestic waste water discharge.

- Urine shall be separated using urinals or by the use of urine separating toilets. These toilets will be separately plumbed to the urine storage tank/s.

4.4.2 Storage periods for urine prior to application on land

- In domestic situations two urine storage tanks should be used. One will be for filling and the second for storage of at least 6 months. The farmer or the contractor who is taking away the urine must store the urine for at least a further 6 month period. The contractor must record temperatures of 20 degrees centigrade in the urine over this period. Otherwise the urine must be stored for over two full summer periods before applying to the land.

4.4.3 Avoiding sticking valves and avoiding blockages in pipes

- All urine collection pipes in buildings shall have an outside diameter of 110 mm or more to avoid the risk of complete blockages from the formation of urine sludge or struvite in the pipework. Pipework of any diameter of less than 110 mm shall not be used for the collection of urine.

- Soft water or rainwater is best used to flush urine separating toilets. This is to avoid as little calcium and magnesium in the water combing with the phosphorous in the urine. Hard water containing calcium and magnesium shall not be mixed with urine as these elements combine with phosphorous to cause pipe and valve blockages.

- Polyethylene pipes rather than PVC pipes shall be recommended as the phosphate rich solids and sludge adheres less to the more slippery polyethylene walls.

- A single pipe of 5 or 6 metres in length shall connect the toilet to the storage tank. Pipe joints, couplers, bends etc which have crevices at joints are most likely to become the location for the development of a blockage.

- The urine collection pipe shall be provided with a removable opening on one end of the pipe for easy inspection and to be able to rod or clean the pipe in case of blockages.

4.4.4 Corrosion of metal parts

- Because urine becomes strongly alkaline, no metal parts shall be used along the urine collection pipes or in the urine storage tank itself.

4.4.5 Arrangement, planning and capacity of urine storage tanks

- Urine pipes shall enter the tank at the lowest level in the tank to avoid agitation of the urine and the loss of nitrogen as ammonia
- The outside space around urine storage tanks shall be ventilated, and it shall be out of direct sunshine and in a space that will not be flooded.
- As with septic tanks, the urine storage tank will be closed off to deny unauthorised access.
- The capacity of urine storage tanks shall be calculated on the basis of 1.5 litres of urine per person per day, the number of people living in the house, and the additional volume of flush water over a period of 365 days.
- An overflow pipe in the storage tank will allow urine to be returned to the sewage treatment system.
- Though containing much less faecal bacteria than in septic tanks, the management and the emptying of urine storage tanks shall be subject to the same prudent safety measures as they apply to the emptying of septic tanks.

See Figure 4.4.5 on next page for an outline of a urine separation system for domestic use.

Proposal – That the EPA Code of Practice be amended so that the regulated use of urine on agricultural land shall be permitted as a valid way to reduce nitrogen and phosphorous discharges from domestic sewage.

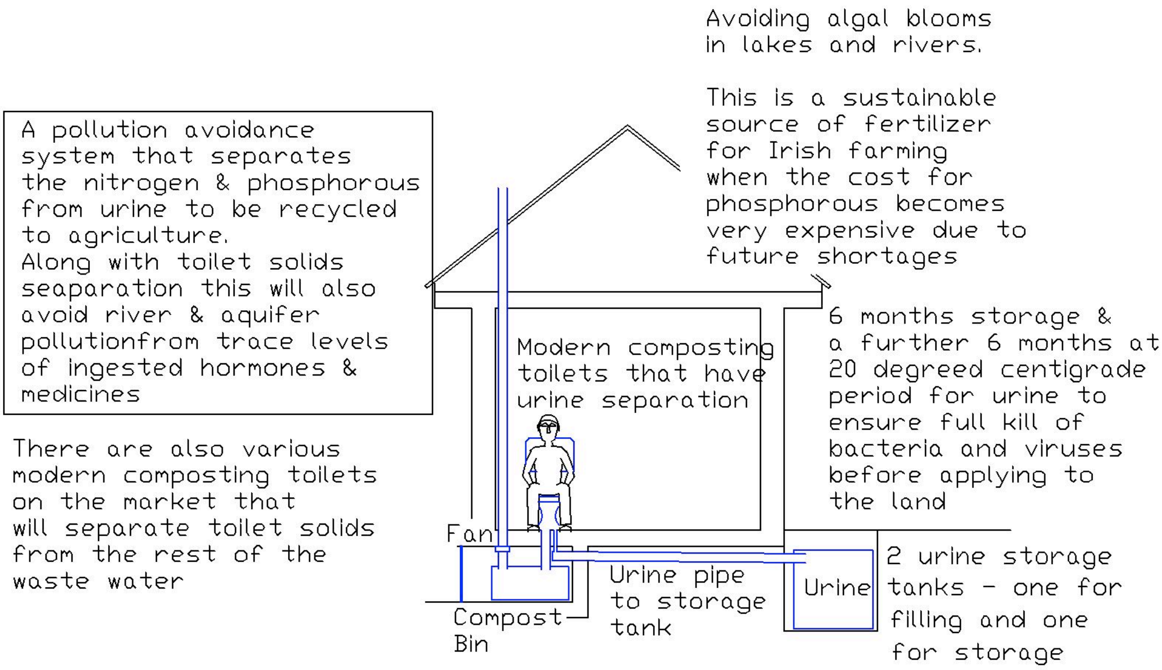


Figure 4.4.5 Outline of a Urine Separation System for Domestic Use

Our proposal is that Ireland should be the first country in the world to require separate pipes in houses for the separation of urine. Where it is feasible, urine storage tank/s should be installed in all new build and retrofit buildings.

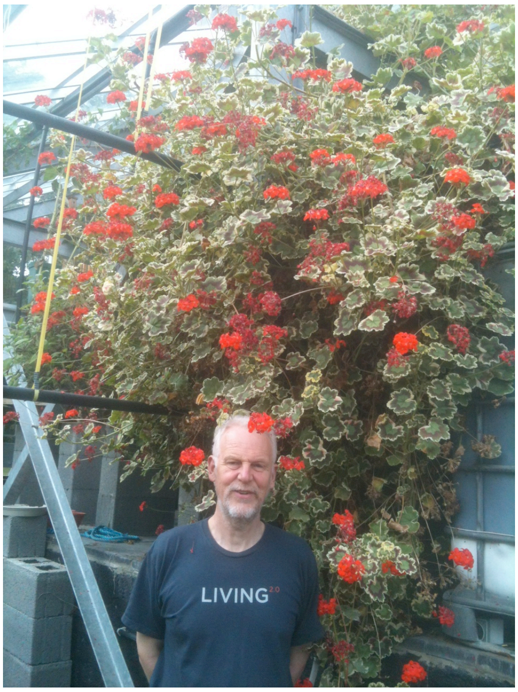
As an easy first step, houses could have urinals with low flush tap valves using the minimal amount of water to flush away the urine. Admittedly this will capture the urine from the men only but it will have a guaranteed a zero amount of faecal bacterial contamination. The storage capacity of tanks could also be smaller.

4.5 Some Further Potential Benefits to the Householder

For small families who like to garden and who want to avoid water pollution from urine, pioneering work is now demonstrating that the growing of flowers may become one of the safest ways to reuse human urine. This method eliminates any concerns about hormones, ingested medicines, faecal bacteria, coliform bacteria, nitrogen, phosphorous or potash from entering any river, lake, waterway, aquifer, drinking water source or food chain.

Owners of these small family systems claim that there eventually arises a type of competition between the production of urine by the family living in the house and the rate at which the urine is used by the flowers ! If the flowers are already mature they will quickly absorb the nutrients as fast and quickly as the humans are urinating.

If plants grown under glass are already mature, urine can be applied throughout the entire year; but if plants are grown outside, the urine may have to be stored over the winter months. Geraniums and begonias are just two types of flowers that thrive and survive in glasshouses or polytunnels during both summer and winter.



Returning nutrients to the garden is more efficiently done by growing comfrey. This plant is known to be a very big accumulator of nutrients. The leaves are cut and removed three times over the year and then placed around the base of fruit trees.

It's very probable that this system would become a very popular way to recycle nitrogen and phosphorus from human urine.

It is our submission that the EPA Code of Practice be amended so that the growing of flowers, trees, shrubs, comfrey, etc., in what would become a small nurseries attached to single houses in rural areas, should be permitted and encouraged as a valid way to utilise the nitrogen and phosphorous in domestic urine, to reduce the discharge of these nutrients to the environment, and to reduce pollution of surface and groundwater from septic tanks and other domestic effluent treatment systems.

4.6 Making Struvite

Another option for recovering phosphorous is to add magnesium to urine to make struvite. Struvite is produced by a chemical reaction in which the phosphorous in urine becomes chemically bound to the magnesium to form pellets 3 to 4 mm in diameter. Alternative chemical methods to precipitate phosphorous from waste water use calcium, iron or aluminium, but these produce a very bulky and heavy sludge which is expensive to transport.

Our proposal is that mobile struvite making trucks would travel around the country from rural house to rural house processing the stored urine to make struvite. Mobile struvite collection trucks would have the following advantages:

Low Weight Collection – They would collect pellets of struvite rather than heavy and large volumes of liquid (sludge) or (urine).

Servicing many houses at a time - The mobile struvite processing truck would be able to service many more houses at a time before returning to base than septic tank sludge or urine removal tankers can do.

No toxic metals – The struvite contains none of the toxic metals that S.I. No. 267/2001 is so concerned

Recovering Nitrogen - The chemical composition of struvite is NH_4MgPO-$6H_2O$. Apart from removing phosphorous the process also removes a portion of the nitrogen.

Slow Release fertilizer - Struvite is regarded as an excellent slow release fertilizer.

No pharmaceuticals - Struvite as a fertilizer contains none of the ingested pharmaceuticals that are excreted by humans and that subsequently enter the environment.

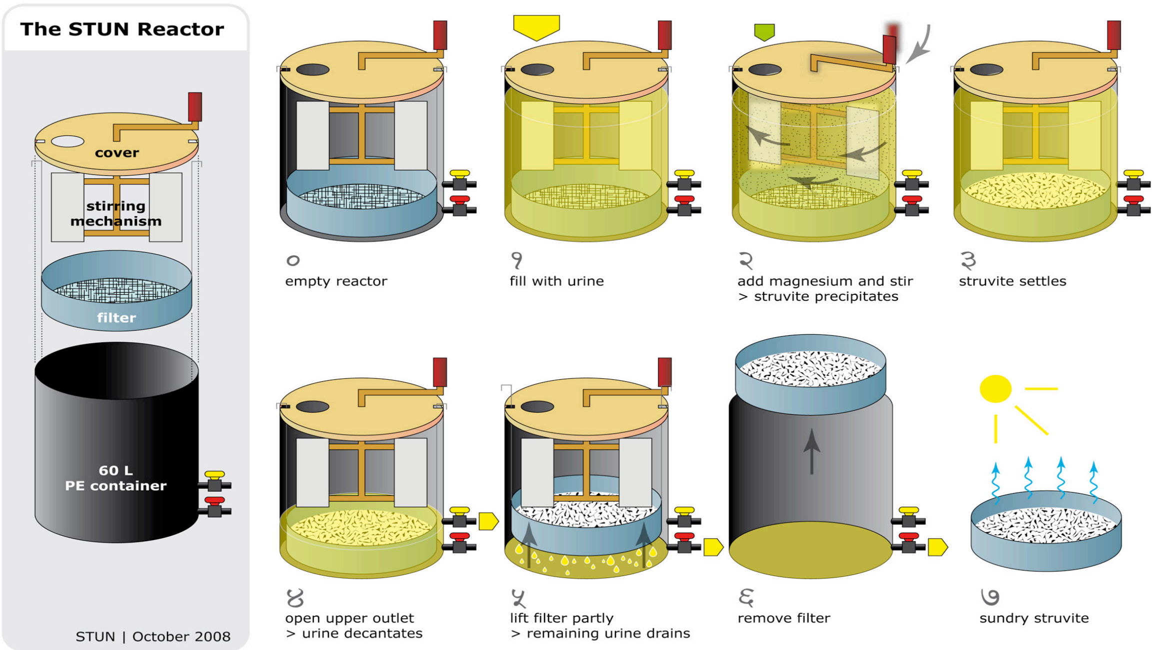


Figure 4.6 The STUN Reactor for the manufacture of Struvite

4.7 Water Saving Devices and Appliances in the Home

The average daily wastewater flow from a typical residential dwelling is approximately 170 litres/person/day (45 gallons per person per day), but can be as high as 284 litres/person per day (75 gallons/person/day). Some 25% to 30% of this quantity is used for toilet flushing, and this amount may be reduced by relatively simple means such as:

i) toilet tank inserts (4 - 8 % reduction);

ii) water saving toilets (6 - 20 % reduction);

iii) pressurised tank toilets (14 - 18 % reduction); and,

iv) compressed air assisted flush toilets and vacuum-assisted flush toilets (30 % reduction).

Other water saving devices and appliances in the home include the use of showers instead of baths, especially air-assisted low-flow shower systems and atomisers.[36] None of these devices reduce the pollution load but they achieve a saving of water at the cost of an increase in pollutant concentration in the wastewater.

In fact, the use of water for flushing toilets can be reduced to zero, as has been demonstrated successfully by the use of composting toilets (described in section 4.8 below) at public facilities and residences in the United States, Sweden and South Korea. Goodland and Rockefeller[37] noted that Sweden's entire province of Tanum is converting to composting toilets in order to reduce pollution of beaches and damage to fisheries and because it is cheaper than conventional sewage systems.[38]

4.8 Non-water-carriage Toilets

By eliminating the water flush, a considerable amount of water is saved, toilet wastes can be returned to the soil, and valuable nutrients (especially phosphorus) can be saved. Systems employing this approach include the pit privy (a hole in the ground covered with a seat in an enclosed structure – socially unacceptable in Ireland, and unsuitable for the climate of this country unless housed in a moveable outbuilding), the traditional "dry" toilet common in many rural parts of Ireland up to a generation ago, and a number of newly developed biological or composting toilets. The latter range from relatively small appliances which require only connection to an electrical supply (for operation of a motor and/or fan) and a vent pipe to remove odour, to the well-known Swedish designed Clivus system which converts both toilet and kitchen wastes into a safe and useful compost which may be applied directly to the suburban or rural garden.[39]

Small-scale simply-constructed methane digesters are also in common use throughout India and China[40]; in these digesters, the human and animal wastes from small communities are used successfully to produce methane for many years. After digestion, the slurry is spread on land as a fertiliser, giving better crop yields than undigested wastes. In the colder climate of this country some

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[36] Vale, B., and Vale, R., 1975. The Autonomous House. London, Thames and Hudson.

[37] Goodland, Robert, and Rockefeller, Abby, 1996. What is Environmental Sustainability in Sanitation. *Insight*, Newsletter of the UNEP International Environmental Technology Centre, Summer 1996, pp 5-8.

[38] Schoenbeck, Anders, 1996. The Municipality of Tanum: environmental quality determines the future. Stockholm, Solutions, pp 30-32.

[39] Harper, Peter, 1996. *Fertile Waste -- Managing Your Domestic Sewage*. Machynlleth, Wales, the Centre for Alternative Technology, 26 pp. See also Vale and Vale, *op cit*.

[40] Van Buren, A. (Ed.), 1979. *A Chinese Biogas Manual*. London, Intermediate Tech- nology Publications Ltd., 135 pp.

of the gas would be required to maintain the digester at the optimum temperature for the methane generating micro- organisms.

A small digester unit may also be incorporated in the house design and thus maintained more easily at the correct temperature. Prototype systems designed at McGill University, Montreal, Canada, and by the New Alchemy Institute at Santa Barbara, California, are illustrated in the book by Vale and Vale.[41] A number of such systems have operated trouble-free for long periods, but they require regular removal of undigested solids, attention to temperature control, and they cannot easily be retro-fitted to most existing buildings. It should be noted that most of this experimental and pilot-scale work was undertaken more than 30 years ago, but its application is even more relevant and necessary today.

Research on dry or composting toilets has been undertaken for many years in a number of countries, including the Centre for Alternative Technology in Wales. A report of the Centre's work, entitled *"Fertile Wastes: Managing Your Domestic Sewage",* cited earlier,[42] describes a number of designs suitable for installation in most houses. They have the multiple advantages of reducing pollution, saving valuable resources such as phosphorus, saving water, and generating a useful product. The primary obstacle to their acceptance appear to be cultural, perhaps "*arising from unfamiliarity and habitual fastidiousness that has been made possible by the WC*" and by the "*strangeness of not being able to perform the ritual purification ceremony of flushing*"! The Centre for Alternative Technology says that from their own experience, these inhibitions are readily overcome, and the compost produced contains a rich variety of plant nutrients and organic matter. The Swedish experience cited above supports this view.

4.9 Wastewater Re-cycle and Re-use Systems

Integrated household waste and water systems have been designed and built by McGill University (the Eco-house) the New Alchemy Institute, the Grumman Corporation, and by Westinghouse Research Laboratory at Pittsburgh. Their principal aim is to reduce water requirements, but in doing so they also eliminate the need to discharge large quantities of foul sewage. These systems use water of different quality standards for different purposes, e.g., the toilet is flushed with waste bathwater, and they incorporate some form of filtration and treatment on site.

Most of these systems are complex and require a large amount of equipment, but the cheapest and most successfully tested are those demonstrated by McGill University (Vale and Vale, *op cit*) and the New Alchemy Institute. One such system designed and operated by the latter organisation incorporates wastewater treatment based on ecological principles and using aquatic plants to purify water and recycle nutrients. These systems are, in general, suitable only for small communities or groups of houses, and would rarely be practicable for single-family rural dwellings.

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41 Vale, B., and Vale, R., 1975. The Autonomous House. London, Thames and Hudson.

42 Harper, Peter, 1996. *Fertile Waste -- Managing Your Domestic Sewage*. Machynlleth, Wales, the Centre for Alternative Technology, 26 pp.

4.10 Removal of Pharmaceuticals from Wastewater

There is one further important reason to promote the separation of urine and the use of composting toilets, that is the emerging problem of pharmaceuticals present in the discharges from our sewage treatment plants and consequently in our rivers.

An Associated Press five-month investigation in 2008 found pharmaceuticals in drinking water which was being supplied to at least 41 million people living in 24 major metropolitan areas in the United States.[43] This report confirms an earlier 2002 report by the U.S. Geological Survey which was the first nationwide study of pharmaceutical pollution in the nation's rivers and streams. Of the 95 chemicals the USGS measured, one or more were found in 80% of the streams sampled and about one-third of the streams contained 10 or more of the chemicals.

Following a parasitic outbreak, the Southern Nevada Water Authority in Las Vegas, which processes up to 900 million gallons daily at two treatment plants, invested millions of dollars in a different advanced system that dissolves ozone gas into water to destroy micro-organisms. The cheaper ozonation process isn't designed to remove pharmaceuticals, though it does take care of many compounds. Tests at the Nevada authority have shown that tiny concentrations of the tranquilizer meprobamate and an anti-epileptic drug regularly resist the treatment, as on occasion has carbamazepine, another anti-convulsant.

According to the Associated Press investigation, tests at one of five plants operated by the Metropolitan Water District of Southern California, which serves 18.5 million people, showed that ozonation failed to remove a tranquilizer and an anti-epileptic drug from the finished drinking water, according to an ongoing study.

That district and the Southern Nevada Water Authority both draw from the Colorado River, which, tests also showed, can contain several hundred parts per trillion of pharmaceuticals, including the active ingredients in medicines to treat depression and anxiety. The drugs get there because wastewater plants that drain into the river use basic treatments designed to remove microbes and industrial contaminants, not pharmaceuticals — the same scenario in many rivers nationwide.

Some of the most detailed testing was done at the Passaic Valley Water Commission in Northern New Jersey, where a drinking water treatment facility downstream from numerous sewage treatment plants chemically removes sediments from water, then disinfects it with chlorine and runs it through the extra filtering step. Although the treatment decreased pharmaceutical concentrations, some samples in the drinking water supply contained all or some of the following: the painkiller codeine, an anticonvulsant drug, and the remnants of a drug to reduce chest pains and caffeine.

[43] Removing Pharmaceuticals from Water Doesn't Come Cheap or Easy. http://www.freedrinkingwater.com/water-news/remove-pharmaceuticals-from-water-not-cheap.htm

The Associated Press investigation also reported that, even in Europe, where governments have gone much further in addressing trace levels of pharmaceuticals in the environment, there is little political will to invest broadly in advanced wastewater treatment.

Lead researcher U.S. Geological Survey hydrologist Paul Stackelberg is reported as saying that he expected tests at similar types of treatment plant anywhere in the US would produce similar results; and he also pointed out that rather than obliterating some pharmaceuticals, chlorination could chemically transform them into compounds that are even more toxic. In one laboratory study, scientists found that acetaminophen, after undergoing chlorination, reacted to form tiny amounts of two known toxic compounds — 1,4-benzoquinone and N-acetyl-p-benzoquinone imine, the latter being associated with acetaminophen overdoses.[44]

We have quoted at length from the above Associated Press investigation report even though it is not a peer-reviewed scientific paper, but it does point to a problem which is not receiving sufficient recognition in Ireland, or world-wide. At present, there is considerable scientific uncertainty about the long term effects on public health caused by ingesting low levels of pharmaceuticals in drinking water; and this is an area that clearly requires further investigation.

[44] The Associated Press; Daily News-Miner; March 18, 2008.

5. RESPONSES TO THE AGENCY'S QUESTIONS

Question 1: Despite widespread media coverage of registration and inspection of domestic waste water treatment systems, 67% of respondents to a survey had not sought out information on these systems.

Did you try to find out information?

Answer 1: Obviously we did (see above).

Question 1a: If yes, what prompted you to do so?

Answer 1a: Keen interest and concern about more efficient utilization of resources and prevention of waste.

Question 2: The review has found that the main reasons for systems failing the inspection are due to a failure to de-sludge or operate/maintain a system properly. Actions to address these issues would not qualify for grant assistance. Are you surprised at this finding?

Answer 2: Not surprised, but the issue is much more complex than the question would suggest. We are well aware that it is a legal requirement to maintain all septic tank systems and proprietary wastewater treatment systems so that they do not pose a risk to human health or the environment.

Question 3: What further supports would be helpful?

Answer 3: The Agency already provides good detailed advice on its website, but this is aimed at improving the performance of existing and planned septic tanks, and it does not address the wider issues of wastewater volume reduction, re-use of grey water, separation of the different wastewater streams from a house, urine separation and other measures suggested in our submission. It would be very good if the Agency could also disseminate information about other approaches and methods for dealing with household wastewater, including the wider issues mentioned above.

6. SUMMARY OF PRINCIPAL POINTS IN OUR SUBMISSION

- In nature, the waste products of every living organism serve as raw materials to be transformed by other living creatures, or benefit the planet in other ways; and human communities must follow this ecological principle as far as possible;

- "Zero Waste" is a realistic whole-system approach to addressing the problem of society's unsustainable resource flows – and it applies equally to domestic wastewater and to solid wastes;

- Discarded materials and substances do not necessarily become "waste", as long as there is a possibility of re-use, recycling or re-incorporation into the biosphere (e.g., by composting, anaerobic digestion or other biological transformations) without causing ecological or environmental damage; but these desirable processes become more difficult or even impossible when discarded substances or materials are mixed to form a combined "waste stream";

- For most of humanity's existence on this planet, our excreta served as nourishment for other animals, or were returned directly to the soil; providing valuable nutrients or fertiliser for agricultural or horticultural use;

- This practice carried a risk of spreading faecal-borne diseases; but our current knowledge of microbiology can be applied to ensure that this risk is reduced to negligible proportions;

- The widespread adoption of the relatively simple technology of the flush toilet throughout rural Ireland in the 20th century, and the building of large numbers of houses in unsewered areas, has led to a huge increase in the numbers of individual on-site wastewater treatment systems for domestic sewage and other wastewaters from houses and other buildings outside towns;

- The adverse environmental effects and public health risks associated with unsuitable location and inadequate maintenance of these single-house wastewater treatment systems has been well documented by local authorities and by the EPA;

- These effects include surface water and groundwater pollution by faecal bacteria and sewage-derived nutrients; with consequential difficulties in complying fully with the Water Framework Directive;

- The principal response to this problem has been to develop a registration and inspection regime, carried out by local authorities under the supervision of the EPA, with the aim of bringing all single-house wastewater treatment systems under control, and preventing further pollution of groundwater and surface water;

- Though satisfactory in other ways, this registration and inspection scheme does not consider wastewater as "waste" to be prevented, re-used or recycled; and does not address the need to recover and re-use the valuable nutrients contained in domestic wastewater;

- ZWAI therefore advocates:
  i) separation of different types of wastewater produced in houses. i.e., "black water" (highly contaminated with faecal micro-organisms), and "grey water" (discharge from bathing, showering, clothes washing, dish washing and other similar uses); and,
  ii) separation of urine from faeces, with urine being used as a source of nitrogen and phosphorus.

- In order to become truly sustainable in the long term, society must practice the re-use and recycling of wastewater to a much larger extent than is done at present; and source-separation of human urine is one promising technology which can be used to achieve this objective;

- Source-separation of human urine has the added advantage of conserving and re-using phosphorus; it is not a new technology, and can be relatively easily installed, as shown by examples from Sweden and other countries;

- This objective may be best achieved by an amendment to Part H of the Building Regulations; and,

- A further step in the direction of resource conservation would be to encourage the more widespread adoption of modern composting toilets which do not require water for flushing.

Ollan Herr and Jack O'Sullivan

For

Zero Waste Alliance Ireland

02 March 2015

6.9 EPA Supervisory Function

The EPA in its supervisory/statutory performance role will carry out reviews as outlined in the reporting schedule in Table 4 below. The EPA will continue its advisory, implementation and enforcement role and will prepare guidance, where necessary, to assist in the implementation of the new Plan.

Timeframe	Activity
Q1 2015	Report on inspections carried out during period 1st July 2014 – 31st December 2014
Q2 2016	Report on implementation of Plan in 2015
Q2 2017	Report on implementation of Plan in 2016
Q2 2018	Report on implementation of Plan in 2015-2017
2018 onwards	Reporting to take place under Water Framework Directive River Basin Management Plans

Table 4: National Inspection Plan reporting milestones

6.10 Consultation Process

We invite submissions on the proposals outlined in this Chapter. In order to assist with this, we have posed a number of questions listed below to which we would welcome your response. It would be helpful if you could number your responses with the same number as the question below. In order to assist us with the assessment of these submissions, please provide a rationale for your response to each question. Additional comments are welcome.

Submissions should be emailed to **DWWTSInspections@epa.ie** or by post to ***National Inspection Plan 2015-2017 Consultation***, EPA, McCumiskey House, Richview, Clonskeagh Road, Dublin 14 to arrive no later than **the 3rd March 2015**.

National Inspection Plan for Septic Tanks – Public Consultation

3rd February 2015:

The EPA today released a review of the implementation of the *National Inspection Plan for Domestic Waste Water Treatment Systems 2013*, for the period 1st July 2013 – 30th June 2014. The National Inspection Plan is being implemented by local authorities under the supervision of the EPA.

The review of the period 1st July 2013 to 30th June 2014 found that:

- 987 inspections were carried out by local authority inspectors.
- 52 per cent of domestic waste water treatment systems passed inspection.
- More than half the failures were due to lack of de-sludging.
- 79 per cent of the inspected systems are now compliant with the regulations, following remediation work by householders.
- Advice to assist householders in maintaining their domestic waste water treatment systems is available through local authority leaflets and websites. Extensive information for homeowners is also available on the EPA website.

The EPA now invites submissions on the proposals for the next Plan, which is proposed to cover the period 2015-2017. **These proposals are contained in Chapter 6 of the review report published today.**

Interested parties can make submissions by emailing DWWTSInspections@epa.ie or by post to **National Inspection Plan 2015-2017 Consultation**, EPA, McCumiskey House, Richview, Clonskeagh Road, Dublin 14 to arrive no later than **3rd March 2015**.

The report National Inspection Plan for Domestic Waste Water Treatment Systems: A Review of the Period 1st July 2013 – 30th June 2014 & Consultation on Proposals for 2015-2017 is available now on the EPA website.

Submission by ZWAI to the EPA in response to public consultation on the National Inspection Plan 2015-2017.

On 4 March 2015 at 16:06, Margaret Keegan <m.keegan@epa.ie> wrote:

Jack,
Thank you for your submission, we did receive it in time and will consider its content shortly.

Kind regards

Margaret

From: Jack O'Sullivan [mailto:jackosullivan2006@gmail.com]
Sent: 04 March 2015 12:10
To: Margaret Keegan
Cc: Niamh Hatchell; Ollan Herr; Dalia Smelstoriute
Subject: Submission by ZWAI to the EPA in response to public consultation on the National Inspection Plan 2015-2017.

Dear Margaret,

Thank you very much for your email yesterday to my colleague, Dalia Smelstoriūtė, confirming that the closing time for submissions to the Agency on the National Inspection Plan 2015 to 2017 for domestic wastewater treatment plants was midnight on 03 March.

That confirmation enabled me to work on the submission until after 11:00 p.m. last night, and I sent a copy by email to the Agency around seven minutes before midnight -- close to the deadline, but within the acceptable time.

By the way, I sent the submission in two formats -- Microsoft Word and PDF. The document is the same in each case, but I understand that you prefer to receive submissions in PDF format. Both are available for you to use anyway.

With kind regards,

Jack O'Sullivan

On behalf of **Zero Waste Alliance Ireland**.

****
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