Final Report – Work Package A **Project WFD96**

WFD96 Review of the Legislative Requirements and Responsibilities Relating to On-Site Wastewater Treatment Systems and Their Impact on Water Quality

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EXECUTIVE SUMMARY

Project Code: WFD96 Review of the Legislative Requirements and Responsibilities Relating to On-Site Wastewater Treatment Systems and Their Impact on Water Quality (August, 2008)

Project funders/partners:
SNIFFER,
Northern Ireland Environment Agency,
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Background to research

On-site wastewater treatment systems (OSWTSs) have been identified as a potential source of pollution to surface and groundwaters in areas where the dispersed nature of the population makes connection to a mains sewer impossible or overly expensive. In particular the release of nutrients in sensitive waterbodies can lead to eutrophication and failure to comply with quality standards established for the Water Framework Directive (WFD).

Information on the number, location and maintenance level of OSWTSs is limited, and because effluent usually drains to a sub-soil drainage field, it has been assumed that nitrogen and phosphorus are dissipated in the soil. However, research suggests that many OSWTSs may impact on water quality because of their number in an area, inappropriate siting and/or lack of appropriate maintenance.

Objectives of research

The aim of this research is:

a) to examine legislative requirements and responsibilities and identification of best practice in relation to OSWTSs and,
b) to review the scientific literature on the impacts of OSWTSs and small WWTW on water quality, identify methods used to estimate/quantify the nutrient loadings/impacts in discharges from small WWTW on water quality, and provide recommendations on a suitable methodology for use by the sponsoring Environment Agencies.

Key findings and recommendations

This interim report addresses objective a) above. It is recommended that:

- existing OSWTSs are located on a GIS database that will facilitate a rational apportionment of risk in relation to other environmental pressures and sensitivities;

- more formal arrangements are made for a systematic review of OSWTSs. This should prioritise those systems that are judged to pose the greatest risk of pollution. Such measures should include steps to ensure all systems are adequately maintained;

- for new properties, planning and environmental regulation are better integrated such that measures to mitigate environmental impact are considered both at the earliest stage in the planning process and when final approval is given;

- responsibility for the preparation of applications should be placed on the applicant in order to reduce the administrative burden on regulators and to avoid their having to give specific guidance to individual applicants. It is intended that completion of applications will rely on independent guidance on effluent treatment, so that all factors relevant to an application are considered and appropriate measures taken before the consent to discharge application is made. If possible, the use of an approved agent should be made mandatory;

- a set of qualification criteria for an approved agent or adviser on effluent treatment should be developed. These criteria should include training and a specification for soil percolation testing (such as the FAS training course in the Republic of Ireland – site Suitability Assessments for On-Site Wastewater Management). This should be supplemented with a code of practice (such as the EPA Code of Practice already in place in ROI) and an approved list of advisers/assessors who will act as agents in the application for consents to discharge[1]. Qualified agents will be expected to comply with the code of practice such that applications received are ready for assessment by the regulator;

- a database should be developed for the results of site assessments and associated decisions, including details of sites assessed as unsuitable for OSWTSs (and the reasons for this assessment). The recording of the location and circumstances of the site assessment, including reference to key criteria and the results of tests, is intended to make the assessment process transparent. An archive of assessments should be used to establish a more general overview of why certain sites or areas might be deemed unsuitable for (further) development of OSWTSs and help to identify receiving environments (surface waters and groundwaters) that are most vulnerable to pollution. This should also assist in the processing of assessments; resort to lengthy and expensive testing or assessment might be minimised if records show clearly that the outcome of previous evaluations has been unfavourable;

- where codes of practice are not already in place (such as that produced by the EPA), a revised approach to the regulation of OSWTSs should be incorporated into a formal policy towards the administration and regulation of OSWTSs which would also include a code of practice. A code of practice helps to inform the different stakeholders, makes the regulatory process more transparent and reduces inconsistency in the application of policy.

Key words: [septic tanks, On-site wastewater treatment, WFD]

[1] Consents to discharge only apply for discharges to surface water in the Republic of Ireland

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1. INTRODUCTION

This project has been commissioned to examine the impacts of a dispersed population pattern on water quality and to inform future legislation, policies and procedures to address pollution related to wastewater treatment provision in rural areas. Specifically the aim of this phase one report is to summarise the legislative requirements concerning On-site Wastewater treatment Systems (OSWTSs), to examine the current approaches to dealing with their licensing and supervision and to consider OSWTSs in the context of the developing requirements of the Water Framework Directive (WFD). A subsequent report will review the likely environmental pressures exerted by OSWTSs and their possible impacts on water quality. This work has been initiated primarily by The Northern Ireland Environment Agency (NIEA) for whom the further development of a strategy for management of OSWTSs is a key concern. The other project partners (SEPA and the EPA) have collaborated in the assessment of best practice. The extent to which measures have been implemented under these three different regulators differs on account of differing priorities and differing previous activity.

Areas inhabited by a relatively dispersed population are rarely served by a sewer system draining to a large scale wastewater treatment works operated by a municipality or water utility company. Households in such areas therefore tend to rely on stand-alone wastewater treatment systems – so called on-site wastewater treatment systems. Historically, such systems have taken the form of septic tanks or, in a smaller number of cases, cesspools. More recently, where local conditions are not suited to the operation of septic tanks, more sophisticated treatment systems have been installed. These package plants are usually characterised by aerobic treatment and the requirement for electricity to power paddles or pumps.

The scope of this document is primarily to cover treatment systems for single houses or small groups of dwellings, but the project brief requires account also to be taken of small private wastewater treatment works and small works operated by public utilities (of size up to approximately 250 population equivalent). The former type of treatment system is characterised by:

- High spatial dispersion;
- Often unknown number and location;
- Lack of information about operating conditions, maintenance and hence performance;
- Difficulty in engagement with “operators” (because their number, and their relative lack of technical and financial resources);
- Poor characterisation of the nature of the discharge – where does it go, how much of it is there?;
- In many cases impossibility of monitoring effluent quality and hence difficulty in demonstrating the need to improve.

This second group of treatment systems, being more readily classifiable as point sources of contamination, is characterised by:

- Lower numbers of systems in mainly known locations;
- The capability to monitor effluent quality;
- Clearer definition of where the discharge goes;
- The more realistic possibility of issuing a revised consent where improved performance is needed;
- Greater resources of operators.

Thus for small treatment works there is a greater probability that the well established regulatory regime of consenting, monitoring and enforcement can be applied (note the regulatory regime is slightly different between the UK and the Republic of Ireland. In the UK consents are required for all discharges to all regulated waters; in the Republic of Ireland there is an exemption for discharges to groundwater of <5 m^3/day). The main question for these treatment systems is how to ensure that the level of regulatory scrutiny applied is consistent with the pollution risk (and the assessment of such a risk).

It appears to be accepted that septic tanks or other systems can provide effluent that satisfies current quality criteria which are set in terms of BOD and suspended solids – provided the tanks are constructed to an approved design, are operating as designed and are used in conjunction with an effective form of biological treatment/dispersion such as a drainage system. Literature studies suggest that the pollution load to waterbodies from properly located and efficiently functioning septic tanks should be relatively small. Badly operated or poorly maintained systems, on the other hand, are potentially more serious sources of pollution. The implementation of the WFD has prompted a re-examination of the pollution risks associated with OSWTSs – because the WFD explicitly requires consideration of a wider range of contaminants than those currently regulated. With respect to the achievement of good status under the WFD, the control of phosphorus pollution appears to be one of the more critical factors, but not the only one. Control of microbiological contamination, inputs of nitrate etc can all be an issue.

Consideration of OSWTSs raises two main types of issue. Firstly there is the administration of OSWTSs. Various Government departments, agencies, companies and local council departments have responsibilities for OSWTSs. Roles may not always be clearly defined at a local level and the extent of implementation is sometimes unclear. The lack of an integrated approach and poor communication between stakeholders (planning departments, local authorities and environmental regulators) has the potential to limit the effectiveness of OSWTS regulation and enforcement. In short, it is unclear how to deal with the lack of knowledge about existing systems with respect to their number, location, level of maintenance etc.

Secondly, there is uncertainty about the impact of OSWTSs on water quality. This arises for four main reasons:

a) lack of information about the location, number and condition of OSWTSs, as noted above;
b) the difficulty of and general lack of monitoring of the effects of OSWTS discharges to surface water and groundwater;
c) the increasing need – driven by new legislation such as the WFD – to consider a wider range of potential pollutants than has been dealt with in the past. Historical concern has centred principally on BOD and suspended solids, with some account being taken of nutrients at larger treatment works. Under the WFD a wider range of substances, including nutrients, metals and a large number of trace organic substances has to be considered in, to use the parlance of the WFD, assessing the "pressures" that might prejudice the achievement of "good status" for a water body; and,
d) lack of a clear understanding about the relative importance of OSWTSs in relation to other pressures. In rural areas these other pressures stem from sources such as agricultural activity (e.g. use of fertilisers, plant protection products, veterinary pharmaceuticals) and forestry.

Recent research projects have examined both the above areas of concern.

A study in the Loch Leven catchment indicated that of around 750 properties served by on-site sewage treatment facilities such as septic tanks less than 10 per cent were registered with SEPA. Available data were not sufficiently robust to allow an accurate estimate to be made of the contribution of phosphorus to the loch. It was noted that a similar situation is believed to exist across the UK.

In Northern Ireland it is estimated that there are over 120,000 septic tanks, of which an important proportion is not registered or consented. A recent study carried out by the University of Ulster showed that problems with septic tanks in rural Northern Ireland were by no means unusual. This project involved intensive monitoring of three rural catchments (two encompassing 5 km^2 and one encompassing 3 km^2) in Counties Tyrone, Armagh and Monaghan during low flows in summer 2005. The state of over 100 septic tanks was assessed and categorised in relation to risk as shown below.

Septic tank risk score	**Priority**	**Tyrone**		**Armagh**		**Monaghan**	
%		No.	%	No.	%	No.	%
<30	Low	1	7	2	7	4	6
30-45	Low-Med	1	7	11	38	10	14
46-50	Med	1	7	3	10	12	17
50-60	Med-High	5	27	4	14	17	25
>60	High	5	27	9	31	26	38
Total		15	100	29	100	69	100

The report of this work (Arnscheidt *et al*., 2007) states that the incidence of high risk systems (up to 35% overall) indicates a need for urgent upgrading of infrastructure. A further interesting observation is that evidence of nutrient levels and ecological observation show that septic tank problems were not evenly distributed, but tended to be related to clusters of particularly poorly maintained systems. It might also be concluded, from a regulatory point of view, that improved supervision of septic tank systems and the application of sanctions to poor performers is a priority.

In Lough Leane, County Kerry a recent study examined the effect of wastewater treatment systems on the lake quality. The results showed that agriculture accounted for the majority of the phosphorus input to the Lough at 47%, Urban & Industrial sources in Killarney were next at 15%, followed by Septic Tanks at 12% and Forestry at 3%, with Background (or natural sources) at 23%.

Research published by O'Luanaigh *et al* (2007) investigated situations where site assessment indicated that a septic tank installation is considered unsuitable and where a secondary treatment system is recommended. The treatment capabilities of horizontal subsurface-flow reed bed systems were compared with those of a free-draining sandy subsoil, receiving both septic tank and secondary effluents. A separate assessment was made of the reed bed receiving heavily loaded septic tank effluent. Results over a 12-month period have shown the reed bed to remove only 47% of the organic load but achieve 100-1000 - fold removal in total coliforms and E.coli. The majority of nitrification was seen to occur in the first 0.3 m of subsoil for both the trenches receiving septic tank

effluent and secondary effluent respectively. The research also showed that in general the septic tank effluent has reached a comparable quality to the secondary effluent in terms of E.coli by the time the point of discharge to groundwater is reached in the subsoil. Further related research (Gill *et al.,* (2007)) was undertaken on the three-dimensional performance of four percolation areas treating domestic wastewater. At each site samples were taken at 0, 10, and 20 m along each of the four percolation trenches at depths of 0.3, 0.6, and 1.0 m below each trench to ascertain the attenuation effects of the unsaturated subsoil. The two sites with septic tanks installed performed at least as well as the other two sites with secondary treatment systems installed and appeared to discharge a better quality effluent in terms of nutrient load. An average of 2.1 and 6.8 g total N/day remained after passing through 1m depth of subsoil beneath the trenches receiving septic tank effluent compared with 12.7 and 16.7 g total N/day on the sites receiving secondary effluent. This research also confirmed that the septic tank effluent was of an equivalent quality to the secondary treated effluent in terms of indicator bacteria (E. coli) after percolating through 0.6-m depth of unsaturated subsoil.

The following sections of this report deal with the issue of OSWTSs under each regulatory authority with a review of relevant legislation and a brief discussion of how OSWTSs are addressed.

2. LEGISLATION AND CONSULTATION WITH PROJECT PARTNERS

The aim of this section of the report is to:

- review the legislation, policies, procedures and guidance relating to OSWTSs in Northern Ireland, Scotland and the Republic of Ireland;
- examine the interactions between such policies;
- consider their stage of implementation, including areas of (i) duplication, (ii) current omission and (iii) 'local' differences of approach;
- note potential changes in legislation that may impact on policies, procedures and practice; and
- summarise relevant objectives and strategic goals identified by project partners.

The overall European legislative position is summarised in Table 1. The text below discusses the principal pieces of legislation that relate to wastewater treatment in general and to OSWTSs in particular. Consultations early in the project revealed that the detailed position and principal concerns were different for the different regulatory authorities under consideration. Subsections 2.3 – 2.5 of this section deal with the separate consultations that were conducted with project partners.

2.1 Water Framework Directive 2000/60/EC

The WFD is the most substantial piece of EC water legislation to date and is designed to improve and integrate the way water bodies are managed and to improve and maintain the quality of the water environment through a continuing cycle of characterisation monitoring and management measures. Its overall aim is to improve and maintain the quality of the water environment. This is achieved by a continuing cyclic programme of characterising water status, monitoring and the planning and implementation of management measures.

The Directive came into force in 2000 and was transposed into UK and Republic of Ireland law in 2003. Member States must aim to reach good chemical and ecological status in inland and coastal waters by 2015. Although central government is responsible for compliance with the requirements of the Directive (and is the main competent authority), much of the practical implementation work has been devolved to environment agencies (referred to as competent authorities) in England and Wales (EA), in Scotland (SEPA), in the Republic of Ireland (EPA and local authorities) and in Northern Ireland (NIEA).

The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 (SR No. 544) Ref 4 were made by the competent authorities in Northern Ireland on 22 December 2003 and provide for transposition of the Water Framework Directive in relation to Northern Ireland, including provisions in relation to cross-border river basins. In Scotland transposition was through the Water Environment and Water Services Act (Scotland) 2003. The transposing legislation sets out a framework for a new tiered regulatory regime, with the type of authorisation being proportionate to the risk of harm. This has now been implemented through the Water Environment (Controlled Activities) (Scotland) Regulations 2005. The Directive has been transposed into Irish legislation (the European Communities (Water Policy) Regulations 2003, S.I No. 722 of 2003).

With respect to wastewater treatment, the WFD requires the compilation of a comprehensive inventory of potential sources of environmental pollution in each river basin. Discharges from wastewater treatment are a significant source of so-called "pressure" in respect of pollution by organic matter, suspended particulates and nutrients. Provided treatment is undertaken to best practice standards it is generally recognised that these pressures can be adequately controlled. However, failure to achieve the required

effluent quality – for reasons such as under capacity, inadequately sophisticated processes, responses to events such as flooding – is a major reason why a large number of water bodies have been classified as at risk of failing to achieve good status. OSWTSs, and septic tanks in particular, are perceived as a threat, which poses important management difficulties for the following reasons.

- Location/suitability of the receiving environment, including the likelihood that the treatment system will be effective given the sensitivity and proximity of the receiving water;
- Maintenance and operation of existing OSWTSs. Failure to maintain adequately or to operate OSWTSs correctly leads to discharges that generate pollution. Increased concentrations of phosphorus are seen as of particular concern;
- Increases in the number of OSWTSs. Expansion of the number of unsewered single properties or in the size and number of small groups of unsewered houses in rural areas threatens to lead to a proliferation of OSWTSs. In areas that are vulnerable to discharges of effluent the resulting additional load of contaminants can lead to environmental damage.

2.2 WFD Daughter Directives

Two "daughter" Directives of the WFD – one dealing with groundwater (Directive 2006/118/EC on the protection of groundwater against pollution and deterioration) and the other with priority substances (Directive 2008/105/EC on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council) have been produced by the EU and are currently in the process of being transposed, as required, into the national legislation of Member States. In England and Wales a consultation paper was published in May 2008 which specified the proposed amendments to the Groundwater Regulations 1998 that will need to be made to transpose the Directive. In Scotland transposition of the Groundwater Directive will take place in 2009 and involve minor changes to the Water Environment and Water Services (Scotland) Act 2003 and the Water Environment (Controlled Activities) (Scotland) Regulations. In Northern Ireland a consultation paper on the transposition Directive was published in February 2009. It is intended that the Regulations will be issued later in 2009, at which point the current (1998) Groundwater Regulations will be repealed. In the Republic of Ireland the Department of Environment, Heritage and Local Government (DEHLG) is currently finalising regulations in order to implement this Directive - currently entitled "A DRAFT European Communities Environmental Objectives (Groundwater) Regulations 2009 (Oct 2008) - proposals for Regulations establishing Environmental Objectives, Ground Water Quality Standards and Threshold Values for the classification of groundwater and the protection against pollution and deterioration".

One objective of the Groundwater Directive is to prevent polluting substances from entering groundwater, primarily as a consequence of the disposal of waste substances through a system preventing or limiting inputs of hazardous or non hazardous substances so as to prevent deterioration (of status) and significant and sustained upward trends in pollutant concentrations.

A small number of standards that must be used to assess status are included - nitrate (50 mg/l as NO_3) and pesticides (0.1 µg/l individually and 0.5 µg/l as a total value) but Member States are required to develop threshold levels for other classes of substances (a minimum list is specified) that might prejudice achievement of good status. Regulatory standards are not defined by the Directive.

The list of substances produced by the Joint Agency Groundwater Directive Advisory Group (JAGDAG) on the basis of persistence, bioaccumulation and toxicity (PBT) will be used as a basis for deciding which substances should be classes as 'hazardous'. Whilst OSWTSs are probably not a major source of any of these substances this does not mean that OSWTSs should not at least be considered as potential contributors to groundwater pollution.

Directive 2008/105/EC is intended to reduce concentrations of certain priority substances in surface water. It is unlikely that OSWTSs will constitute a significant source of these substances, though a formal assessment will need to be undertaken as any direct or indirect discharge has the potential to contain such substances.

Table 1 Summary of European Legislation relating to Wastewater Treatment

Regulation	Purpose
Water Framework Directive (2000/60/EC)	Aims to maintain and improve the aquatic environment
Groundwater Daughter Directive (2006/118/EC)	Protection of groundwater against pollution and deterioration
Priority Substances Daughter Directive (2008/105/EC)	Prevent or limit discharges of dangerous substances to surface water
Dangerous Substances Directive (76/464/EEC)	Protection of aquatic environment from discharge of dangerous substances
Groundwater Directive (80/68/EEC)	Protection of groundwater against pollution caused by specified dangerous substances
Quality of Water Intended for Human Consumption (80/778/EEC) and Quality of Water Intended for Human Consumption Directive (98/83/EC)	Defines quality standards and monitoring requirements.
Urban Wastewater Treatment Directive (91/272/EEC)	Defines treatment standards and monitoring requirements
Nitrates Directive (91/676/EEC)	Promotes reduction of contamination by nitrate from agricultural practices
Sewage Sludge Used in Agriculture (86/278/EEC)	Controls the disposal of sludges to land
Freshwater Fish Directive (78/659/EEC)	Establishes water quality to support fish
Shellfish Directive (91/692/EEC) (amended by Council Regulation 1882/2003/EC)as Directive (2006/113/EC)	Establishes water quality to support shellfish
Bathing Water Directives (76/160/EEC and 2006/7/EC)	Establishes bathing water quality standards

Note: under the WFD programmes of measures must include measures required under the following Directives:

(i) The Bathing Water Directives (76/160/EEC and 2006/7/EC);
(ii) The Birds Directive (79/409/EEC) (1);
(iii) The Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC);
(iv) The Major Accidents (Seveso) Directive (96/82/EC) (2);
(v) The Environmental Impact Assessment Directive (85/337/EEC) (3);
(vi) The Sewage Sludge Directive (86/278/EEC) (4);
(vii) The Urban Waste-water Treatment Directive (91/271/EEC);
(viii) The Plant Protection Products Directive (91/414/EEC);
(ix) The Nitrates Directive (91/676/EEC);
(x) The Habitats Directive (92/43/EEC) (5);
(xi) The Integrated Pollution Prevention Control Directive (96/61/EC).

2.3 Review of Legislation, Policies, Procedures and Guidance - Northern Ireland

The text and Table 2 below describe the relevant legislation in force in Northern Ireland. Subsequent sections of this report deal with similar responses to the same European legislation in the jurisdictions of SEPA and the EPA – though, to avoid undue repetition, not in so much detail.

2.3.1 The Water (Northern Ireland) Order 1999

The Water (Northern Ireland) Order 1999 (Statutory Instrument 1999 No. 662 (N.I. 6)) is the primary legislation dealing with discharges to water. This sets out the legal framework for consenting and the control of water pollution and confirms the need for discharges to be consented. This legislation makes it an offence to knowingly or otherwise permit trade or sewage effluent to enter surface waters or groundwater without the consent of the Department of the Environment.

With respect to OSWTSs, all effluent discharges from domestic (and non-domestic) premises which are not connected to the public sewer require the consent of the Department of the Environment, where a discharge to a waterway or groundwater is proposed.

It is specified that a consent will include conditions relating to the quality and quantity of the effluent discharge. A consent to discharge effluent from a single domestic property is granted by the Department of the Environment, subject to the recommendations made by the local Environmental Health (Rivers) Officer. The conditions are formulated to ensure that the receiving waterway or the underground stratum, if it is to a soakaway, can sustain the discharge. A register of domestic discharge consents is held by NIEA.

2.3.2 The Water and Sewerage Services (Northern Ireland) Order 2006

This Order sets out the legal framework for water undertakers, including, in part VI, duties to provide and maintain a sewerage system. Articles 154 to 174 establish the circumstances governing the supply of sewerage services to the undertaker's customers, including new connections to the sewerage system. Article 154 places a duty on the undertaker to provide sewerage services for drainage for domestic purposes when requested to do so. However, Article 200 enables undertakers to make charges for sewerage services provided by them. This includes charges for connecting new premises to the water and sewerage system.

Provision is made for the undertaker forcibly to adopt sewers and drains under Article 159. It can also be requested to adopt sewers, drains or wastewater treatment works built after 1973 by the owners of those facilities. Guidance is under development to determine where the undertaker has a duty to provide a sewer if the drainage of any premises is having an adverse environmental effect (Article 157). Exercise of this provision is subject to guidance issued by the Department for Regional Development with individual disputes subject to determination by the Northern Ireland Authority for Utility Regulation – the economic regulator.

Article 163 gives owners or occupiers the right to have their premises (or any privately owned sewer) connected to the public sewerage system for the purpose of discharging foul or surface water. Articles 164 and 165 provide for the making of connections to the sewerage system; this can be carried out by the undertaker or by the person wishing to make the connection as long as it is supervised by the undertaker.

2.3.3 Planning Legislation - The Planning (Northern Ireland) Order 1991

This legislation sets out a general framework by which aspects of planning and development are controlled in Northern Ireland. With respect to OSWTSs the approach to be adopted in the planning process for rural areas was described in detail in the report "A Planning Strategy for Rural Northern Ireland, September 1993" An updated version of this document can be found at:
http://www.planningni.gov.uk/index/policy/policy_publications/rural_strategy.htm

This document describes the strategy for rural Northern Ireland and gives detailed policy under a range of topics such as towns, villages, regeneration of rural settlements, dispersed rural communities etc. A Strategy Policy – numbered SP1-SP19 was devoted to each of these topics. Subsequently, these more general policies have been superseded by planning policy statements (PPSs) which deal with specific topics including housing, agriculture, tourism, design, sport, public services and utilities.

Draft PPS21
Most significantly in relation to water management, a new planning policy statement, "Draft Planning Policy Statement PPS21 Sustainable Development in the Countryside" was published in November 2008 for consultation. This document deals in greater detail with many of the issues covered in the 1993 document and replaces the previous PPS14 which many observers concluded was more restrictive of development. Challenges to Draft PPS14 led, in September 2007, to a legal ruling that it had been issued (by DARD) without adequate authority. The Department of the Environment responded to this ruling by taking responsibility for PPS14, by reissuing it as an official but provisional policy and by initiating a review of the policies it contained. This review resulted in the publication of PPS21.

In Policy CTY 16 "Development relying on Non-Mains Sewerage" within draft PPS21 it clearly states that "planning permission will only be granted for development relying on non-mains sewerage, where the applicant can demonstrate that this will not create or add to a pollution problem". The policy places explicit emphasis on the fact that approval for a septic tank will depend on the applicant demonstrating that the development will not create or add to a pollution problem and the need to provide adequate evidence to support this assertion. The importance of the Water Framework Directive is emphasised and the need to assess the risks of pollution of surface and groundwaters is noted.

The responsibilities of different agencies (and possible discrepancies/overlaps) are also noted in draft PPS21 by the inclusion of the statement that "the planning and pollution control systems are separate but complementary systems of control and regulation designed to protect the environment from harm as a result of development and related operations. Pollution controls seek to protect public health and the environment. Planning controls are concerned with the appropriate use of land and the impact of development on the environment." This statement explicitly differentiates between the two roles, whilst at the same time implicitly acknowledging a considerable overlap (particularly with respect to water management).

Paragraph 5.86 mentions the provisions of the Water Order 1999 which requires the consent of the NIEA for any discharge of trade or sewage effluent to surface or groundwater. However, paragraph 5.87 indicates that planning permission might be requested before a discharge consent is applied for. This potential conflict is dealt with by specifying that the Planning Service will consult with NIEA and the Environmental Health Department of the local council in relation to applications. Whilst this is entirely sensible, it would seem to put the NIEA in the position of having to provide an advance ruling about a consent application that might be made in the future. This awkward position is reversed in paragraph 5.89, in which it is stated that planning permission will be refused where a consent to discharge is unlikely to be forthcoming due to pollution risks. This paragraph allows NIEA to identify certain areas where a pollution risk exists that is sufficient to warrant no further development relying on non-mains sewerage arrangements, and, in appropriate circumstances, for this to be highlighted in the relevant development plan for the area.

Table 2 summarises the main items of legislation relating to wastewater treatment in Northern Ireland. Table 3 list the bodies with responsibility for such treatment.

Table 2 Summary of Northern Ireland Legislation relating to Wastewater Treatment

Northern Ireland		
Environmental protection	The Water (Northern Ireland) Order 1999 (No. 662 (N.I. 6))	Powers in relation to water conservation and cleanliness; promotion of water management programmes; powers to make regulations controlling water abstractions and powers to control discharges to surface and groundwaters.
Drinking water and wastewater treatment	The Water and Sewerage Services (Northern Ireland) Order 2006	Aims at transferring responsibility of water and sewerage services to a government owned company. New regulation of these services to be implemented. Sets out the framework for the introduction of domestic charging for water and sewerage services.
Wastewater	The Urban Wastewater Treatment Regulations (Northern Ireland) 2007	Implements Urban Wastewater Treatment Directive (91/271/EEC)

Northern Ireland		
Waste and Contaminated land	Waste and Contaminated Land (Northern Ireland) Order 1997 Waste Management Licensing Regulations (Northern Ireland) 2006 [only relevant to application of sewage sludge to non-agricultural land, otherwise the Sludge (Use in Agriculture) Regulations (Northern Ireland) 1990 apply]	Creates powers to license waste treatment and disposal operations. These Regulations implement (in part), Council Directive 75/442 EEC on waste ("the Waste Framework Directive") and Council Directive 1999/31/EC on the landfill of waste ("the Landfill Directive"). Includes amendments to: Waste and Contaminated Land (Northern Ireland) Order 1997 Groundwater Regulations (Northern Ireland) 1998 Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations (Northern Ireland) 1999 Controlled Waste Regulations (Northern Ireland) 2002 Pollution Prevention and Control Regulations (Northern Ireland) 2003 Waste Management Licensing Regulations (Northern Ireland) 2003 Landfill Regulations (Northern Ireland) 2003 Hazardous Waste Regulations (Northern Ireland) 2005
Pollution prevention and control	Pollution Prevention and Control Regulations (Northern Ireland) 2003	These Regulations are made under Article 4 of the Environment (Northern Ireland) Order 2002. They set out a pollution control regime for the purpose of implementing the Integrated Pollution Prevention and Control Directive (Council Directive 96/61/EC) and for regulating other environmentally polluting activities not covered by the Directive
	The Pollution Prevention and Control (Amendment) Regulations (Northern Ireland) 2007	These Regulations amend the Pollution Prevention and Control Regulations (Northern Ireland) 2003 (the “PPC Regulations”).
Dangerous substances	The Surface Waters (Dangerous Substances) (Classification) Regulations (NI) 1998	Prescribes a system of classifying the quality of inland freshwaters, coastal waters and relevant territorial waters. It creates a system for classifying waters according to the presence in them of concentrations of the dangerous substances listed in the Schedules. Sampling requirements are prescribed in regulation 4. Regulation 5, by modifying section 4C of the Water Act (Northern

Northern Ireland		
		Ireland) 1972, requires (and enables) the Department of the Environment to establish water quality objectives for those dangerous substances by applying the classifications prescribed in the Regulations.
Shellfish	The Surface Waters (Shellfish) (Classification) Regulations (Northern Ireland) 1997 (under revision)	Prescribes the quality required of shellfish waters to ensure a suitable environment for shellfish growth
Bathing water	The Quality of Bathing Water Regulations (Northern Ireland) 2008	
Agriculture	The Sludge (Use in Agriculture) Regulations (Northern Ireland) 1990 (Northern Ireland) 1990	These regulations implement Council Directive 86/278/EEC on the protection of the environment, and in particular soil, when sewage sludge is used on agricultural land. They prohibit the use of sludge from sewage treatment works and septic tanks being spread on agricultural land unless specified requirements are fulfilled.
Groundwater	The Groundwater Regulations (Northern Ireland) 1998	Implements Groundwater Directive (80/68/EEC). Controls discharges of List I and List II substances to Groundwater This legislation aims to prevent pollution of groundwater.

Table 3 Summary of bodies with responsibility for aspects of wastewater treatment in Northern Ireland

Body	Responsibility	Relevant Legislation
Northern Ireland Environment Agency (an Agency of the Department of Environment)	Environmental Protection	Legislation in Table 2
Water Appeals Commission	Determination of appeals on discharge consents	
Northern Ireland Authority for Utility Regulation	Decisions on disputes relating to the undertaker's duty to provide a public sewer. [Article 157 of WSSO 2006 not yet commenced]	
Northern Ireland Water – formerly the Water Service	Provision of Water and Sewerage Services	
Planning Service (an Agency of Department of Environment)	Development control and planning policies	

2.3.4 Notes made after meeting with NIEA on 22/7/2008

The purpose of the meeting was to interview NIEA staff concerning their opinions on project outputs and the requirements and feasibility of any proposed changes in the way the consenting of OSWTSs is handled. It was also seen as valuable to have a practical insight into the processes and systems in current use.

Summary of the process of issuing consent to discharge

Single dwellings
The initial application involves the applicant supplying relevant information including: name of applicant, address, plans of the site and site location, details of proposed discharge and method of treatment, fees and information concerning their agent (if appropriate).

This application is received centrally and logged by NIEA and the details are forwarded to the area office relevant to the site.

A water quality inspector then deals with the application – including reviewing the validity of the need for an OSWTS (rather than discharge to sewer) examining the proposals in relation to the site and locality and supervising a percolation test. The inspector then completes a form as the basis for the acceptance/rejection of the proposal and returns this to the central office.

NIEA staff review the recommendations, check for completeness and consistency, enter the details on the database and inform the applicant of the decision.

Topics discussed

The current system was reviewed. The present system had no fundamental drawbacks; it has been designed to meet the legal requirement that all discharges to surface and groundwater have to be subject to a consent. It satisfies this aim, though not without some practical problems and inconsistencies of approach which any new proposals would need to address. The main issue was identified as the fact that the administration of the system has become more cumbersome than it should be, owing to the need for NIEA staff to follow up deficiencies in applications received and the fact that too much time was spent by staff providing advice that should be obtained by applicants from other sources. At the final stage noted above, too many inconsistencies or omissions are leading to applications having to be followed up or reprocessed. The need to advise applicants was seen not only as unnecessarily time consuming, but also as likely to lead to difficulties in the job of enforcing consent compliance by potentially compromising the independence of the Regulator.

It was felt that the resources currently used to process over 4,000 domestic consent applications per year could be better directed towards the objectives of assessing compliance with consent conditions and addressing the environmental impact of OSWTSs. It emerged there were several levels at which the policy and practicality of consenting and pollution control for OSWTSs needs to be addressed. These are listed below.

1. Dealing with new applications, largely in relation to new properties.

This appears to be the area most in need of a revised approach. Administrative resources might be released in two ways:

Ensuring that applications are completed properly and fully;
Establishing links with the planning system that guide applicants to make early provision for their consent application.

This is a process issue that will need to be explored with the operational side of the Planning Service.

2. Dealing with the compliance of existing OSWTSs with current consents.

In Northern Ireland it is estimated that there are over 120,000 septic tanks, of which an important proportion is not registered or consented. The issue here is that OSWTSs by their nature are often not amenable to direct compliance monitoring. The majority of such systems discharge (to surface water directly or indirectly, or to an underground stratum) via a sub-surface irrigation system that cannot be sampled because it is diffuse and underground. Consequently, most compliance assessment is carried out as a result of perceived non-compliance – when there is observed pollution in surface water or complaints of odours of sewage. Assessment takes the form of inspection of the system, examination of any evident discharges and possibly tracer testing with dyes. Where inspection identifies non-compliance, a process to lead to remediation by the permit holder is set in motion.

3. Dealing with changes in future consenting policy arising from the implementation of the WFD and in particular to fit in with river basin management plans (RBMPs).

Current consents are set exclusively in terms of BOD and suspended solids. As noted above, the consent serves more as an administrative tool that makes it possible to prescribe remedial action where OSWTSs are found to be performing badly – rather than as a performance standard in its own right. Future implementation of the WFD will need to take account of the possible impact of OSWTSs on water quality. This will involve BOD and suspended solids but will also include other parameters such as phosphorus, nitrogen species and possible trace contaminants such as pharmaceuticals and personal care products. It is likely that, in this regard, consents will be used to implement RBMPs by limiting the use of OSWTSs in sensitive areas or to specify a form of treatment that is likely to meet the local requirements for pollution control.

Other issues

There was also an indication that the operation of the current system could benefit from more effective use of IT tools – in particular by having all the documentation relating to a consent (including site plans and site location diagrams) available electronically. Another worthwhile possibility was to ensure that the locations and reference data for consented discharges were incorporated into a GIS database to allow ready identification of locations, in order to facilitate better identification of areas where there are concentrations of OSWTSs and to make it possible to cross check data for site conditions (soil type, depth, permeability, issues with water table, etc) with nearby sites.

The problem of existing properties having an OSWTS that was not subject to a consent was discussed. This tends to arise mainly for historical reasons - in older properties that have not changed ownership where the need for a consent has not been recognised. When such properties are offered for sale or re-mortgage the fact of the missing consent is usually highlighted during conveyancing or by a financial organisation. This seems to be both an effective method and offers the main practical approach to regularising the position of unconsented discharges of this type.

Draft proposals suggested after the meeting

1. Emphasis should be placed at the planning application stage on the requirement for discharges to be consented. Guidance provided by PPG4 should be used as part of the planning application process. This will require the early engagement of the Planning Service.
2. It should be a requirement for applicants for planning permission to make an early assessment of the likely suitability of their proposed method of effluent treatment and to provide details of this with their application. It should be made clear at outline planning. Again, this will require the early engagement of the Planning Service.
3. In order to improve the quality and consistency of applications for consent to discharge, it is recommended that an independent system of approval for independent advisers/agents to applicants could be developed. A set of criteria should be developed through, for example, a trade association, which an approved agent or adviser on effluent treatment (including soil percolation testing) must satisfy. These criteria would be the basis for the provision of training and advice and should be supplemented with a code of practice and an approved list of advisers/assessors who will act as agents in applications for consents to discharge. It is intended that this will lead to the availability of independent guidance on effluent treatment so that all

relevant factors will have been considered and appropriate measures taken before the consent to discharge application is made. If possible, the use of an approved agent should be made mandatory. Agents who fail to submit satisfactory (or accurate) applications could be removed from the approved list.

4. Means by which annual maintenance of OSWTSs can be ensured should be considered. Although desludging or other appropriate maintenance is already a requirement, it may not take place. The offer of a free annual desludging service by NI Water is helpful in this respect, but the requirement to take advantage of this offer would promote best practice operation of OSWTSs. In Northern Ireland, dischargers might be required to produce evidence of satisfactory maintenance whenever consents are reviewed.
5. It is recommended that NIEA should pursue the existing policy of ensuring that all solicitors dealing with banks and building societies are reminded (or made aware) of the requirements of the Water (Northern Ireland) Order 1999 so that this procedure of extending consents to all relevant addresses can continue.
6. The transfer of consent-related data (particularly locations) to a GIS format is strongly recommended. This would facilitate the integration of consenting policy for OSWTSs with river basin planning, will identify areas and water bodies that are under pressure from OSWTSs and help to maintain consistency in the approach to consenting. This process would be greatly assisted if all consent-related data (including maps) were transferred into an electronic data base format.

A database should be developed for the results of site assessments and associated decisions, including details of sites deemed unsuitable for OSWTSs.

Larger Treatment Works

Although large treatment works are outside the scope of this project it is important to consider the impact of smaller (multi-property) treatment works on receiving waters where (as is often the case in rural areas) the receiving waterway is of limited dilution or the sustainability of the year round flow in the waterway is in doubt. NIEA is currently developing a policy for the consenting of such works. The aims of this policy which might be seen as a model, in principle, for consenting single house treatment systems are to make the consenting process transparent, to provide a transparent method for assessing such applications and to make it possible to justify the decision making process to external parties.

The following summarises the process applied to catchments of area smaller than 2 km^2:

- Once the catchment has been identified as of this size, field staff visit to confirm the presence of a water course (if none is present, consent is refused);
- The volume of the proposed discharge is considered. If this is less than 3 m^3 per day it is proposed that a consent should be permitted (BOD 5 mg/l suspended solids 5 mg/l). NIEA will not accept more than one consent application for a single development/site.

Other provisions are specified for larger proposed discharges and catchments of greater area. One of the most important factors that is taken into consideration for larger discharges or smaller potential dilutions is the assessment of the sustainability of year round flow in the water course.

2.4 Review of Legislation, Policies, Procedures and Guidance - Scotland

Discharges to water are regulated under the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act) as implemented by the Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR) which came into force in April 2006. The new regulatory regime encompasses those discharges previously regulated under COPA (Control of Pollution Act).
(http://www.scotland.gov.uk/Publications/2005/05/0995747/57525).

Three levels of control, known as authorisations are applied under CAR including;

1. General Binding Rules (GBRs) – only used for low risk activities
2. Registrations – used for low risk activities, which cumulatively pose a risk to the environment
3. Licences – where site specific controls are required.

Regulation of OSWTSs is by Registration (discharges of <15 p.e.), or Licence (discharges of >15 p.e.). Monitoring is obligatory for systems >100 p.e. which require a complex licence as shown in Table 4.

Systems which were in existence prior to 1st April 2006 and previously regulated under COPA, were automatically deemed to be authorised under CAR but the details of smaller systems (at Registration level) have not yet been transferred onto the CLAS database (this will be a gradual process that may take several years as there are many thousands of authorisations). Systems not authorised under COPA, e.g. single dwellings, will gradually be authorised under CAR as those responsible for such discharges are required to apply for authorisation and this will invariably come to light when the property changes ownership, e.g. as part of a house sale. As a result, the number of OSWTS currently unmapped and unsupervised will slowly decrease.

Table 4 Level of CAR Authorisation for Discharges of Sewage Effluent

General Binding Rule	Registration	Simple Licence	Complex Licence
Not applicable to sewage discharges	<15 p.e.	>15-100 p.e.	>100 p.e.
Not applicable to sewage discharges	Systems: Constructed before 1 April 2006 <50 p.e. Constructed after 1 April 2006 <15 p.e.	Systems: Constructed before 1 April 2006 >50-100 p.e. Constructed after 1 April 2006 >15-100 p.e	Systems: >100 p.e.
Not applicable to sewage discharges	-	Low significance CSOs (Surface waters only)	Medium and high significance CSOs (Surface waters only)
Not applicable to sewage discharges	-	-	Emergency overflows (Surface waters only)

Source: SEPA (2005)

Summary of process of issuing consents to discharge

The application and consenting processes is set out in two documents;

1. Regulatory method (WAT-RM-03) Sewage Discharges to Surface Waters (SEPA 2007).

2. Regulatory Method (WAT-RM-04) Sewage Discharges to Ground Waters (SEPA 2006a).

The application and consenting process for new discharges to groundwater and surface water as defined in WAT-RM-04 and WAT-RM-03 is illustrated in Figure 1 with a description of the process below.

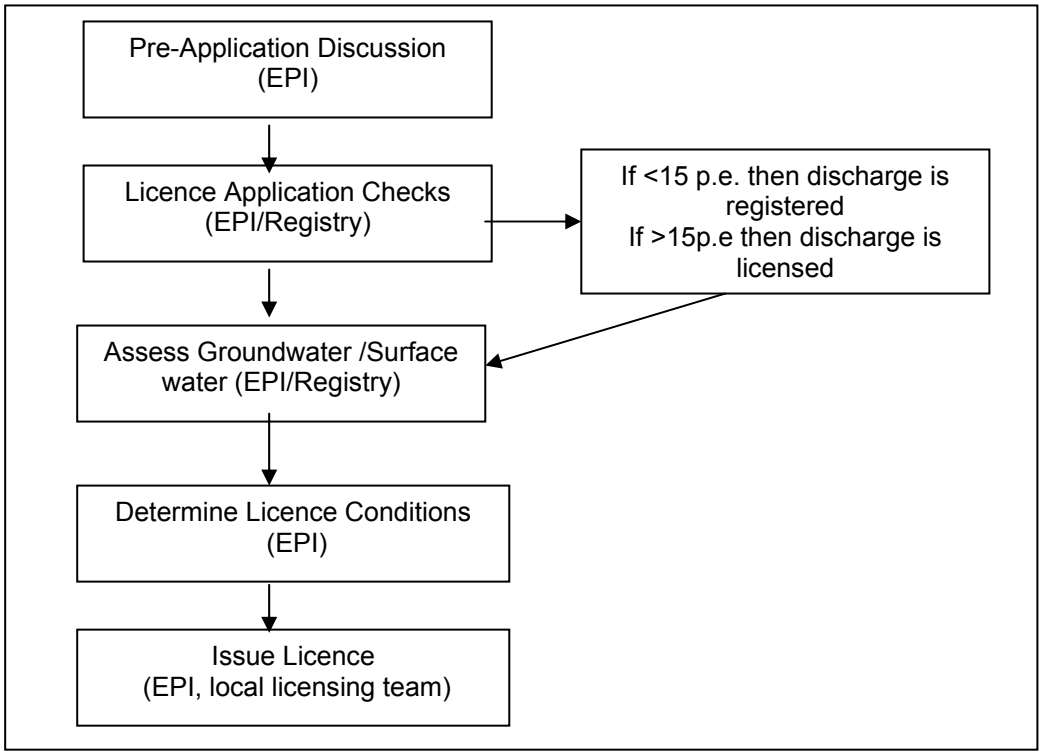


Figure 1 Application and consenting procedure for discharges to groundwater and surface waters. (Source WAT-RM-04 and WAT-RM-03)

1. Pre-application discussion with the Environmental Protection and Improvement department (EPI). The purpose of this is:

    - to discuss proposal and level of treatment with the proposer. Advise on fees and forms;
    - to check whether it is feasible to connect to public sewer;
    - to determine the Population Equivalent;
    - to determine the type of application needed, i.e. Registration if ≤15 p.e., Simple licence if 15-100 p.e., Complex licence if.>100 p.e.);
    - to check for presence of other water users or sensitive receptors e.g. abstractions, designated sites.

2. Licence Application Checks with EPI and Registry. Purpose is:

    - to check forms, completeness of information etc;
    - to check relevance of other legislation;
    - to consult with other bodies such as SNH and other users;
    - to consult with internal experts such as hydrogeologists, ecologists etc.

3. Assess groundwater/surface water (EPI). Purpose is:

    - to check discharge location using GIS;
    - to check class of waters, sensitive, protected areas (SSSI,SPAs);
    - to check nearby abstractions;
    - to check ground conditions, slope, percolation value (vp), depth of unsaturated zone (groundwater only);
    - to check relevance of other legislation such as UWWTD, priority substances;
    - to determine discharge targets, environmental quality standards.

4. Determine licence conditions, setting environmental standards taking into consideration factors such as:

    - constituents of discharge;
    - flow conditions and requirements for monitoring;
    - interactions with other water users and other discharges;
    - objectives of groundwater/ surface water body;
    - level of treatment required to achieve environmental quality standard.

5. Registry and EPI Issue Licence following approval from unit manager or local licensing team.

    - Licence limits and data entered onto - CLAS database, monitoring requirements onto NEMS database.

Overlap with planning policies

Planning policy on OSWTS is dealt with through SEPA's general policy on drainage to public sewer; this is contained in WAT-PS-06-08 'Provision of Wastewater Treatment in Settlements' (SEPA 2006b) available at:
http://www.sepa.org.uk/about_us/idoc.ashx?docid=41490e7e-d019-4c20-9179-a14ca8ca7d34&version=-1

In this policy it is stated that, 'The pollution control regulatory regime cannot adequately address proliferation of private systems in sewered areas. However, the planning regime provides an appropriate strategic mechanism to address connection to a strategic wastewater drainage network in settlements and urban areas'.

SEPA is a statutory consultee under the Town and Country Planning (General Development Procedure) (Scotland) Order 1992 and uses this position to promote connection to public sewage systems.

However, it is thought that Scottish Water will not be able to provide enough strategic capacity in order to cope with recent increases in new housing developments. Proposals have been made to put the onus onto housing developers to provide the extra money required by Scottish Water to connect new developments to the network. Concerns have

been raised that this extra cost may encourage private wastewater systems rather than deter them.

SEPA's general policy on 'Provision of Wastewater Treatment in Settlements' sets out a number of policy principles in order to prevent further increases in private wastewater treatment systems.

Planning policy principle 1: Where a settlement is served by a public sewerage system, it is SEPA's opinion that new developments should connect to the public sewerage system.

Planning policy principle 2: Through the consultation process for all appropriate development plans, SEPA will promote the inclusion of policies which require development proposals to connect to the public sewerage system.

Planning policy principle 3: SEPA will oppose development in or close to a settlement served by a public sewerage system which proposes individual/private wastewater drainage arrangements.

Planning policy principle 4: SEPA will not oppose interim solutions in areas with a constrained sewerage system where appropriate upgrade of the system has been agreed. Such temporary solutions, which include individual/private treatment systems, shall not have an unacceptable impact on the water environment.

Planning policy principle 5: SEPA will work with Scottish Water, as detailed in the Memorandum of Understanding 'Management of Development Constraints Caused by Sewerage Systems and Wastewater Treatment Works', to assess the constraints and allow connection to the public sewerage system whenever possible whilst ensuring protection of the water environment.

Planning policy principle 6: SEPA will engage with the land use planning process to ensure that proposed developments do not compromise environmental quality or fragment the public sewerage system.

Planning policy principle 7: SEPA will engage with Scottish Water and the planning authorities, on a regular basis, to review development constraints and available environmental capacity.

Planning policy principle 8: SEPA will not oppose environmentally acceptable private sewerage provision for dispersed housing in small settlements with limited or no public sewerage system. Proposals for larger scale developments will be assessed on a site by site basis considering the drainage scheme presented.

Monitoring and Cumulative Impacts

General water quality monitoring for ecology, microbiology and chemical quality is undertaken in order to comply with European legislation and to ensure that water body quality standards and thresholds are not exceeded. Septic tanks and small wastewater systems may be investigated and monitored if these are thought to be causing pollution.

Monitoring is obligatory for systems >100 p.e. in order to check compliance with numerical standards.

Monitoring for smaller systems will only be undertaken if they are considered to pose a high risk to the environment, and risk assessments are not carried out on a case by case

basis. However, the cumulative risk is assessed by general water quality monitoring and where water quality is less than good, the quality of additional discharges are controlled to ensure that they will not prevent a return to good water quality.

Significance of OSWTSs

Where the public sewerage network has not been developed, significant numbers of properties are reliant upon OSWTSs. This is particularly the case for isolated dwellings in rural areas.

As a result of a lack of monitoring data the impact on groundwater and surface water quality from OSWTSs has not been adequately quantified. This will be partially addressed in the future via the implementation of the WFD monitoring requirements and additional site specific monitoring where poor water quality is identified.

A large number of nutrient sensitive areas have been designated in Scotland under the Nitrates Directive and Urban Wastewater Treatment Directive though the contribution of OSWTSs to poor water quality is unknown. Major investment from Scottish Water and improvements to private systems may have contributed to a decrease in the number of designated bathing water sites failing to meet the Bathing Waters Directive criteria

Efficiency of the current system

The current CAR system came fully into force on the 1 April 2006, therefore it is unlikely that any significant changes to this system will be made in the foreseeable future. However the system is currently under review to address gaps in policies and guidance and to iron out any anomalies.

Turn-around times of applications are significantly quicker than under the previous COPA system, whereby a registration must be processed within 30 days compared with four months under the old system and licences for discharges greater than 15 p.e are now determined within 4 months (The Journal Online 2006).

Applicants can apply online and are supplied with guidance documents to facilitate this. This further aids in reducing processing time and also allows application fees to be reduced as a result of the reduction in administrative resources needed.

2.5 Review of Legislation, Policies, Procedures and Guidance – Republic of Ireland

The paragraphs below summarise the essential detail of relevant Irish legislation. Further information can be obtained at http://www.environ.ie/en/Legislation/

Primary Irish Legislation pre WFD

Prior to the advent of the WFD, the principal legal framework for the prevention and control of water pollution was contained in the Local Government (Water Pollution) Act, 1977 (No. 1 of 1977) and the Local Government (Water Pollution) (Amendment) Act, 1990, (No. 21 of 1990).

Local Government (Water Pollution) Regulations, 1978 (S.I. No. 108 of 1978) These regulations concern procedural matters regarding licensing of discharges to waters and to sewers, appeals to An Bord Pleanala, registers of licences, etc.

Local Government (Sanitary Services) Act, 1962 (No. 26 of 1962) Section 8 enables a sanitary authority in certain circumstances to require the owner of a premises within their

district to connect the premises to the public sewerage system, or to the public water supply system.

European Communities (Water Policy) Regulations 2003 (Statutory Instrument 722)

The WFD is only one of a number of items of EU legislation that apply to Ireland as to other Member States (see section on Northern Ireland Table 1 for a summary). The WFD was transposed into Irish law by the European Communities (Water Policy) Regulations 2003 (Statutory Instrument 722) in December 2003. This designates the Irish Environmental Protection Agency (EPA) and local government authorities as 'Competent Authorities'. It states which duties under the Directive are the responsibility of each Competent Authority and provides a framework for coordination between these bodies for carrying out the duties under each Article of the Directive. The EPA is designated as the 'Competent Authority' with responsibility for (amongst other things) reporting to the EU Commission; identifying and mapping River Basin Districts; mapping and categorizing water bodies for the purposes of Article 5 of the WFD and drawing up a programme of water quality monitoring as well as generally facilitating and promoting "coordination of activities for the purposes of Articles 4, 5, 7, 10, 11, and 13 of the Directive". The "local government authorities acting jointly" are designated competent authorities for the purposes of the establishment of environmental objectives and programmes of measures and the making of RBMPs. The regulation of OSWTSs therefore falls to the 34 local authorities.

The scope of primary legislation has been defined in a number of statutory instruments (SI), the most relevant of which are:

Nitrates and phosphorus

- S.I. No. 213. European Communities (Protection of Waters against Pollution from Agricultural Sources) Regulations, 2003.
- Under the Council Directive 91/676/EEC (Nitrates Directive), the S.I. No. 378 of 2006 European Communities (Good Agricultural Practice for the Protection of Waters) Regulations 2006 came into effect in February 2006.
- The following are published guidelines which were in practice but were not incorporated into existing legislation. These guidelines are now superseded by the above regulations (S.I. No. 378 of 2006).
- S.I. No. 258 of 1998. Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998.

Water Pollution

- Water Services Act 2007 (SI No. 30 of 2007)
- Local Government (Water Pollution) Act 1977 (SI No.1 of 1977).
- Local Government (Water Pollution) (amendment) Act 1990 (SI No.21 of 1990).
- Local Government (Water Pollution) Regulations 1978 (SI No.108 of 1978).
- Local Government (Water Pollution) Regulations 1992 (SI No.271 of 1992).
- Local Government (Water Pollution) (amendment) Regulations 1996 (SI No.184 of 1996).
- Local Government (Water Pollution) (amendment) Regulations 1999 (SI No.42 of 1999).
- Protection of Groundwater Regulations, 1999 (SI No. 41 of 1999).
- European Communities (Water Policy) Regulations, 2003 (SI No 722 of 2003).
- Local Government (Water Pollution) (Amendment) Regulations, 1999. S.I. No. 42 of 1999.

Planning and Building Control

The Policy Framework

All planning authorities are required to make a development plan every six years under the provisions of the Planning and Development Act 2000, as amended. The development plan sets out the overall strategy for the proper planning and sustainable development of the planning authority's area and must, inter alia, include certain objectives relating to:
"the conservation and protection of the environment.." (Section 10(2)(c))

A development plan may also specify objectives for any of the purposes referred to in the First Schedule to the Act of which Part IV (1) including:

"Protecting and preserving the quality of the environment, including the prevention, limitation, elimination, abatement or reduction of environmental pollution and the protection of waters, groundwater, the seashore and the atmosphere".
These legislative provisions enable the measures needed to identify and conserve water quality generally and groundwater specifically to be put into effect in the context of providing for the sustainable development of an area including the rural housing.

National Spatial Strategy

The NSS recognised sustainable rural settlement as a key component of delivering more balanced regional development. It set out a rural settlement policy framework to be adopted into development plans which took account of the differing rural development contexts and differing demand for rural housing. Implementation of the policy framework in development plans was through the development management process at local level.

Sustainable Rural Housing Guidelines

The Minister for the Environment Heritage and Local Government published planning guidelines under section 28 of the Planning and Development act 2000 on Sustainable Rural Housing in 2005. The guidelines expanded on the rural policy framework in the NSS. In particular, the guidelines highlighted that sites for new houses in unsewered rural areas must be suitable for the installation and operation of on site wastewater treatment systems taking into account local ground conditions. The Guidelines highlighted the need for both new and existing houses to adhere to the highest standards in terms of both installation and maintenance of wastewater treatment facilities to ensure the protection of water quality.

Development Management Process

The implementation of the policy framework set out above is through the development management process at local level. The aim of protecting water quality is a key criterion in the assessment of planning applications for new dwellings in unsewered areas. Site assessment is a key part of the process. This deals with the characterisation of the ground conditions of the site and then the selection of an appropriate wastewater treatment system. The objective of site characterisation is:

- to determine whether or not the site can adequately treat the wastewater;
- to check that the treated wastewater will percolate away; and
- to check that the minimum site separation distance between the system and other local features (site boundaries, wells, watercourses etc) can be achieved.

Septic tanks serving single houses must comply with the Irish Standard Recommendations SR6 of 1991 for Domestic Effluent Treatment and Disposal from Single Dwellings, issued by the National Standards Authority of Ireland (NSAI). It is the intention that SR6 shall be replaced by the new EPA Code of Practice for Wastewater Treatment Systems for single houses when this is published in the near future. The DoEHLG plans to amend TGD-H, - Drainage and Wastewater Disposal - to call up the EPA Code of Practice Wastewater Treatment Systems for Single Houses as soon as it is published. The Code provides guidance on the site suitability assessment, the selection of an appropriate treatment system, design criteria for treatment systems and installation operation and maintenance.

Systems serving groups of houses should comply with the European Standard EN12566 (or previously British Standard B.S. 6297: 1983).

It is recommended that a suitably qualified installer should install wastewater treatment systems. Installers are responsible for the testing of the system after installation, to ensure that it is working effectively. In some cases planning conditions require that the installation should be certified.
Some reference to maintenance should be included.

Note the Circular Letter SP 5-03 emphasised the need to monitor compliance with the conditions on planning permissions granted, including a regular programme of testing and monitoring the performance of individual wastewater treatment and disposal systems.

- Planning and Development Acts 2000 - 2006 and Regulations 2001- 2006 (includes amendments introduced by the Strategic Infrastructure Act – see Regulation S.I. No. 685 of 2006.
- Building Regulations 1991 – 2008.
- Technical Guidance Document H (Drainage and Wastewater Disposal).
- Irish Standard Recommendations SR6 of 1991 for domestic effluent treatment and disposal from single dwellings.
- BS 6297:1983 (incorporating amendment No. 1 of 1990) A Code of Practice for the Design and Installation of Small Sewage Treatment Works.

Guidance

- EPA Wastewater Treatment Manual: Treatment Systems for Single Houses 2000.
- Sustainable Rural Housing – Guidelines for Planning Authorities- DEHLG 2005
- Development Management – Guidelines for Planning Authorities DEHLG 2007
- Development Plan Guidelines – Guidelines for Planning Authorities DEHLG 2007
- Draft EPA Code of Practice 2008. Wastewater Treatment Systems for Single Houses (pe <10).
- The Department of Environment, Heritage and Local Government issued a Circular Letter (SP 5/03) to planning authorities on 31 July 2003. This Circular drew the attention of planning authorities to the vital importance of sound development plan policies relating to the protection of surface and ground water quality, the importance of good location and design of necessary development in rural areas and the then current standards for onsite wastewater treatment systems.
- Department of Environment, Heritage and Local Government circular BC16/06. This and associated guidance provides interim advice to local authorities in relation to packaged wastewater treatment plants in the light of the adoption of EN 12566:3. It also advises that the 2nd edition of the EPA manual (i.e. CoP) will provide performance levels that can be generally applied to these systems. In the interim it refers to the wastewater treatment standards of the IAB of BOD 20; SS 30; NH4 20.

- EPA Wastewater Treatment Manual: Treatment Systems for Small Communities, Business, Leisure Centres and Hotels 1999.

Domestic, commercial and industrial developments must obtain planning permission from local authorities or, if appeals arise, from An Bord Pleanála, under the Planning and Development Act. The Department of Environment, Heritage and Local Government has issued guidance on best practice to local authorities about development plan policies, development control and enforcement standards and practices. In 2000 the EPA published guidance manuals explaining the investigation and design requirements for systems serving individual premises. Small discharges of domestic sewage <5m^3/d for domestic effluent (from a typical septic tank serving a single dwelling) via a percolation area are exempted from Water Pollution Acts licensing, though all discharges to surface waters require a Water Pollution Act licence).

It is recognised by the planning authority that the 15,000-17,000 rural houses being built every year add to pressure on water resources and could be accounting for some of the decline in standards reported by the EPA (57% of groundwater sampling locations examined in a recent survey were contaminated by faecal coliforms). It is also recognised that establishing that it is possible to provide safe drainage on the site is a key precondition to the granting of permission. With regard to existing OSWTSs, their number and location was, until recently, not clearly defined. However, since the census of 2006 and following measures taken in response to the WFD to create GIS-based records of water treatment methods, the picture is now much clearer.

- Firstly census data from 2006 show that, of a total of 1.5 million households, there are approximately 420,000 unsewered properties served by septic tanks and around 30,000 properties using proprietary treatment systems http://beyond2020.cso.ie/Census/TableViewer/tableView.aspx?ReportId=1855.
  The counties with the highest percentage of one-off housing units built since 1991 were County Galway (52%), Roscommon (43%), Donegal (41%) and Monaghan (40%).

- Secondly, the GIS based methodology has helped to identify the location and density of OSWTSs by plotting the location of all postal addresses (available from An Post) and superimposing on this the outline of all sewered areas (largely only urban areas and towns). The GIS view so obtained can be interrogated to identify and locate all unsewered properties. Importantly, data on the location and density of OSWTSs can then be used to prioritise areas in which action on OSWTSs (restriction of further installation, investigative inspection or monitoring, moves towards improved treatment etc) can be taken. This makes the use of GIS a key component of OSWTS management.

Since 2003, the Department of Environment, Heritage and Local Government has recommended that groundwater protection schemes are incorporated into County Development Plans. Groundwater Protection Schemes are county-based projects that are undertaken jointly between the Geological Survey of Ireland GSI and the respective Local Authority. The aim of these groundwater protection schemes is to preserve the quality of groundwater, particularly for drinking water purposes. The overall approach follows recommendations produced by the DEHLG, EPA and GSI (1999), (see also Witkowski (2007)).

Risk to groundwater is defined through assessments of Groundwater Vulnerability, Aquifer potential, and Source Protection Areas. Datasets of vulnerability, aquifer potential, and source protection areas are generated by the GSI using field mapping in combination with

readily available existing information and a limited amount of targeted drilling and testing. The vulnerability and aquifer datasets cover the entire land surface of a given area, while the source protection area datasets are specific to the catchments of selected groundwater supply sources. The three datasets are merged to produce Groundwater Protection Zones. Once the groundwater protection zone is defined for an area, the hazards posed by selected human activities can be evaluated to assess the appropriate risk management measures, or Groundwater Protection Responses, for these activities. Approximately half of the local authorities have completed schemes in place, with the remainder having reached a draft stage.

Discussion

In the Republic of Ireland a new risk assessment methodology, in addition to the GWPS is under development as part of plans to implement the WFD. This methodology is based on the concept of "pressure-pathway-receptor" and has been proposed as part of the process of implementing programmes of measures under the WFD. It may be summarised as:

- Identification of areas of high OSWTS density (pressure);
- Examination of surface water and groundwater pathway susceptibility – use of risk maps of soils, subsoils and aquifer type to identify areas where impact might be significant (pathway). Here the two questions are: "will effluent percolate through the soil without saturation or ponding?" and "will the effluent be treated adequately before a relevant water body is reached?" Issues of soil depth and permeability, the likelihood of flooding for surface waters and water table level for groundwater are critical to risk;
- Consideration of the sensitivity of the receiving water, surface water and groundwater (receptor).

The need for a common standardised approach to the control of OSWTSs is recognised as a means of overcoming the variations in policy and practice in different areas. This, it was felt, required the development of an improved code of practice for site testing and closer attention to the supervision and verification of inspections. An updated version of guidance for single house treatment systems is currently at the pre-publication stage. For clustered developments, where the discharge to groundwater through percolation will be greater than $5m^3$ per day, a new EPA Guidance document is under consideration.

It is recognised that OSWTSs do not always pose an important risk in terms of pollution control or to the achievement of good status under the WFD. The key message is that the response to OSWTSs should be proportional to the risks they pose. The ability to prioritise administrative and pollution control effort to areas where the risk is greatest is critical if resources are to be used most effectively. This ability to prioritise leads to the optimisation of planning and control measures. Two main risk issues have been identified.

- risk of contamination of groundwater (in particular groundwater used for drinking water abstraction) by chemical pollutants and micro-organisms. This risk – that of percolation not providing sufficient treatment - is greatest in areas where the soil/subsoil is of insufficient depth and where aquifers are fast flowing;
- risk of the effluent not being dispersed, leading to ponding, impaired treatment and possible overflow and pollution of surface waters. This is associated with potential pollution by nutrients, suspended matter and oxygen demand. It is most prevalent in areas of low permeability and is exacerbated by a high probability of flooding or increases in the level of the water table.

The importance – to the risk assessment process – of seasonal occupation of unsewered properties has been raised as a particular concern in the Water Framework Directive

programmes of measures project. Research reported by Van Cuyk et al., (2001) suggests that intermittent occupation is likely to lead to poor ammonia removal by nitrification or denitrification. Overall, it appears that OSWTSs might pose a greater risk of poor nitrification, especially when associated properties are occupied intermittently. (Nevertheless, it is stressed that continuously operating systems used under optimum conditions can provide final effluent with ammonia concentrations less than 1 mg N/l (Harman et al., 1996)).

Approaches

The approach that is currently adopted for dealing with applications includes the following existing steps or proposed actions:

- Site characterisation - Compilation of information on the location of proposed OSWTSs, including details of the treatment system and percolation area (information provision should require input from authorised expert who will be suitably qualified and can be relied upon to supply minimum required data). The characterisation of sites and the collection of data on the possible pathways of pollution – soil type, depth, and aquifer data includes a standardised approved and uniform method of site testing (to include inspection and percolation testing). In 2000 FAS (the Training and Employment Authority), in conjunction with the Geological Survey of Ireland, Tipperary (SR) County Council and the EPA, developed a course 'Site Suitability Assessment for On-Site Wastewater Management'. The course is open to consultants and local authority personnel and provides comprehensive training on the EPA Manual 2000. Approximately 1000 participants have completed the FAS course. Approximately 23 local authorities (excluding Dublin) require that the site suitability assessment should be carried out in accordance with the EPA manual 2000. (Currently, 3 local authorities use the National Standards Ireland recommendation SR6). Approximately 10 local authorities have set up panels of approved assessors, 2 are in the process of doing so and 2 local authorities carry out the site assessment themselves for a fee;

- Verification of this information – or at least implementation of a formal system for checking a proportion of data;

- Production of plots of the data in relation to other discharges, local soil characteristics, geology, proximity to surface water bodies and distance from sewered areas. This has already been implemented in some areas, for example by Limerick County Council using a GIS database;

- Recommendations concerning the acceptability of proposals (likelihood of consent to discharge, need for alternative approaches);

- Development of measures to undertake further site investigation where risk is high by reason of inherent risk of the proposed discharge or the accumulated pressure of many discharges;

- Consideration of follow-up measures to ensure adequate operation and maintenance (see below);

Follow-up measures to be applied to existing OSWTSs can include:

- Inspection of high-risk locations to verify satisfactory operation of OSWTSs. Such inspections provide a valuable means of gaining a better insight into the main issues relating to OSWTSs;

- Inspection of locations where potential pollution has been reported – with testing (sludge depth, dye tests etc) as appropriate;

- Verification that required maintenance activity has been carried out – documentary evidence at appropriate intervals e.g. when consents are issued (again targeted on high risk areas).

Further Proposals

The development of programmes of measures as part of the implementation of the WFD has resulted in number of further proposals that are under consideration for action in the future. (Developed by the Western River Basin District -WRBD).

Building Regulations
Building Standards section is currently committed to the inclusion of the EPA Code of Practice for Single Houses in the review of Part H of the Building Regulations.

Inspection Programme of Existing Systems
The use of GIS risk mapping/decision support system to prioritise the locations to be targeted for a programme of work on inspections and maintenance has already been implemented by some Local Authorities but could be made more routine.

Database and Action Tracking System
Proposals for the development and maintenance of a database and action tracking system for OSWTSs are under consideration.

New OSWTS Development
Facilitation of the assessment of the risk of pollution at planning application stage using the GIS (regional review) risk mapping /decision support system and the codes of practice. Initially this might be used on an area basis for site characterisation, but could eventually be extended as part of the criteria for individual sites (though expert judgement would still need to be used).

Management of Existing and Proposed Systems
Similarly, a risk assessment approach could be used to prioritise investigations of OSWTS maintenance and to determine a requirement for de-sludging (dependent on measured scum and sludge build-up, generally related to size of tank and house occupancy level).

2.5.1 Republic of Ireland – other notes

Cavan County Council – introduction of bye-laws
http://www.cavancoco.ie/cccws/templates/general/tge_index.aspx?str_ID=273

One example of an innovative approach is provided by Cavan County Council. Investigations of OSWTSs by Cavan County Council (where over half of the population is served by on-site systems) have prompted a programme of more stringent control. Research suggests that many systems were not working properly. A 2002 pilot survey found that more than one third of on-site systems were defective. Many tanks were poorly maintained (not desludged) or poorly designed; in extreme cases, wastewater was by passing percolation systems, entering streams by channels, pipes or across the ground. Septic tanks were the cause of 30% of water quality complaints investigated in the county.

This led to the adoption of water pollution bye-laws (2004) http://www.cavancoco.ie/cccws/publish/general/documents/d272149041105.pdf which specify controls for the design, operation and maintenance of single house OSWTSs. The main provisions are:

- Emphasis of the need for an approved and properly functioning wastewater treatment system.
- Requirement for an assessment, by an approved competent person within a year.
- Measures for improvement where necessary.
- The duty to inform about faults and to propose and implement remedial measures.
- Desludging at specified or recommended frequencies.
- Mandatory connection to public sewer where feasible.
- Accessibility for servicing.
- Inspection every seven years, record keeping and record availability.

3. APPROACHES ADOPTED IN OTHER COUNTRIES

3.1 Finland

Finland is a country that, having a highly dispersed population, might be expected to share similar problems with OSWTSs as the UK and Ireland. Around 19% of the population of approximately 5.2 million is not served by municipal sewers. This corresponds to 350,000 properties having OSWTSs. The Finnish authorities have issued the 2003 On-Site Wastewater Systems decree which sets out requirements for OSWTSs.

These include a wastewater system report on existing systems, to describe the method of treatment and nature of the system used. This report is kept at the property and must be made available to the authorities on request.

A detailed wastewater system plan for a new system or when an old system is improved. The plan is made separately for each case, considering the use of the property and its neighbouring areas, the local terrain, and other relevant circumstances. It is recommended that such a plan can most conveniently be compiled by specialists on domestic wastewater management planning. The specialist visits the property and makes the necessary preliminary examinations. Such specialists can be found by consulting a firm or organization within the wastewater branch of a municipal environmental authority.

The accompanying guidance states that the phosphorus load from unsewered properties is five times as high as that from municipal treatment.

The Finnish Environment Institute (SYKE) collects reliable information on wastewater treatment equipment and methods that are generally available in Finland, and provides that information for the public on the Institute's website in Finnish.

Treatment criteria are based on the reduction of the so-called person-equivalent load for dispersed settlements. This is the average load of untreated wastewater generated by one resident measured as grams per day (g/d) - (BOD_7) 50 g/d, total phosphorus 2.2 g/day and total nitrogen 14 g/day. The environmental loading generated by domestic wastewater must be reduced by at least 90% for organic matter (BOD_7), by at least 85% for total phosphorus and by at least 40% for total nitrogen, compared with the load in untreated wastewater. Untreated loads are based on nominal input values as shown below. Provision is made for systems in which urine and faeces are separated by dividing the notional load as follows:

Origin of loading	**Organic matter, BOD_7**		**Total phosphorus**		**Total nitrogen**	
	g/p/d	%	g/p/d	%	g/p/d	%
Faeces	15	30	0.6	30	1.5	10
Urine	5	10	1.2	50	11.5	80
Other	30	60	0.4	20	1.0	10
Person equivalent load	50	100	2.2	100	14	100

3.2 Venice

The city of Venice does not have a modern sewage system. More than 10% of households are served by septic tanks; more than 100 small treatment plants, dealing with groups of properties of population equivalent 100 – 350, account for the remainder.

Whilst this situation is clearly not directly relevant to the position in dispersed rural communities in North West Europe, it is worth noting that the city authorities undertake a routine programme of septic tank inspections. More recently however the need to exert better control over the small treatment plants has been recognised, leading to the establishment of a centralised monitoring system that reports directly on breakdowns, downtime and flow by-pass. This has resulted in a significant increase in the reliability of small treatment works and a corresponding reduction in discharges of untreated effluent. As a result, plans are under development for the replacement of groups of septic tanks with membrane bioreactors. It is envisaged that such plants will meet discharge standards set in terms of minimum percentage reduction of BOD (70%), COD (75%) and suspended solids (50%).

3.3 France

In France around 14 million people use a septic tank as their primary source of waste treatment. This is a relatively large proportion of the population of about 65 million.

On the 3rd of January 1992 all towns and villages in France saw their responsibilities increased. The local authority (Maire) is responsible for wastewater treatment, including septic tanks (fosse septique). In many cases the authority appoints a syndicate or a professional body to enforce the law. They are generally known as S.P.A.N.C. (Service Public de Assainissement Non Collectif). SPANC is scheduled to inspect all households before 2012. During the visit an engineer will check :

- the access to the tank;
- the condition of the tank, is it leaking? is it cracked?;
- the location of the tank ;
- the ventilation of the tank;
- the volume of the tank;
- the sludge level;
- the drain going to the filtration system;
- the nature of the soil;
- the proximity of water source, above and underground;
- the filtration system.

The engineer is required to provide a report on the system and to explain how to proceed with any required changes.

Householders are allowed 4 years to rectify problems that are identified; after this time period the Mairie can have the required work carried out and invoice the householder directly. The inspection process is financed via an addition to water charges.

3.4 England and Wales

These countries (taking England and Wales together) are predominantly urban with a highly developed public sewer system. Consequently, the control of pollution from OSWTSs tends not to be as important as other water management issues.

About 800,000 septic tank systems operate in England and Wales, serving about 4% of the population. Approved Document H2 of the Building Regulations sets out the minimum requirements to be followed. Before effluent can be disposed of by soaking into the ground the consent of the Environment Agency is required under the provision of the Water Resources Act 1991.

3.5 Germany

In Germany, at re-unification in 1990, there was a significant proportion (around 25% of a population of 15 million) of the population of the former German Democratic Republic (DDR) relying on septic tanks. Subsequently, substantial investment in infrastructure has reduced this to a level at which the overall proportion of the German population not on mains sewers is relatively small.

3.6 Belgium

Whilst Belgium, as one of the most densely populated countries in the world, does not have a substantial dispersed rural population, a recent report on the operation of small scale effluent treatment throws light on OSWTSs' performance. Approximately 10% of the population is served by on-site wastewater treatment. Research by Moelants et al (2008) investigated the performance of package treatment plants, as distinct from septic tanks. Twenty three (<5 pe) systems were examined including, 8 submerged aerated filters, 3 bioreactors, 5 moving bed bioreactors, 4 activated sludge systems and 3 reed bed systems.

The researchers' initial premise was that although such plants met design criteria sufficient to meet both the requirements of the European CE mark and the more stringent (performance-based) Belgian BENOR standard, their performance in practice could be degraded by poor maintenance. The study found that more than half the systems failed to meet national effluent quality requirements (COD <180 mg/l, BOD <50 mg/l and SS <60 mg/l). The principal source of problems was overflow of sludge. The extensive (ie reed bed) system performed better than the compact systems. This was explained by the fact that the extensive systems have no or few mechanical parts, require minimal maintenance and are able to respond better to variable loading. The report concluded that certification of the treatment system can only underwrite adequate treatment efficient when it is combined with regular and appropriate maintenance, preferably through a maintenance contract. For the more complex aspects of maintenance two proposals are advanced: to enforce centralised maintenance via a water utility; or to require householders to produce evidence of an ongoing maintenance contract with an approved organisation such as the supplier or their agents. It is suggested that owners should also provide evidence of satisfactory performance such as an independent certificate of analysis. Finally, the issue of the lack of stability of many package plants to varying input load is discussed. It is noted that compact systems in particular often take several months to stabilise, even when seeded with active sludge. Interruptions of load, such as might happen in holiday accommodation, can also be problematic.

3.7 New Zealand

The New Zealand government has estimated that in some regions at least 20 per cent of homes rely on some form of OSWTSs. Ageing septic tanks represent the majority of on-site wastewater systems installed in New Zealand. It is recognised that in many areas wastewater systems are not providing adequate levels of treatment and are having an adverse impact on human health and the environment. Failing systems are creating

human health risks from the overflow or ponding of effluent; compromising the use of lakes, rivers, estuaries and beaches for recreation and aquaculture; and leading to contamination of groundwater and surface water supplies, which affects the quality of drinking-water supplies and may increase the occurrence of algal blooms.

These effects occur because of a range of factors, including poor maintenance, sensitive receiving environments (lakes, rivers, streams, etc.), high-density residential areas, shallow groundwater, and unsuitable soil types. Ongoing maintenance backed up by regular inspections is seen as a significant factor in improving performance. The Ministry for the Environment aims to improve the management and environmental performance of domestic on-site wastewater systems to reduce the risks to human health and the environment. A discussion document was issued in July 2008. This aims to assess different policy options for improving the management and environmental performance of on-site systems, such as using non-regulatory measures, amending existing legislation, developing a national policy statement, and developing a legally enforceable national environmental standard.

The proposed standard for OSWTSs is that owners of properties with on-site wastewater systems in specific locations will be required to hold a current warrant of fitness that confirms their on-site system is functioning properly and is being maintained to an appropriate standard.

The proposed standard would authorise regional councils to implement a scheme that requires property owners with an on-site system to hold a current warrant of fitness (WOF) for their system. To obtain a WOF, a system will be required to pass an inspection. Inspections will be carried out every three years.

The proposed standard would apply to domestic on-site systems that are operated as permitted activities under rules in regional plans.

Interestingly, the authorities have drawn back from the proposal to apply the standard to all properties with an on-site wastewater system – on the basis that it would be too costly. “Applying a standard to 'everyone everywhere' would create significant pressures on local government resources and would mean that only limited resources could be focussed on the problem areas.”

The suggestion, therefore, is to target areas that have known problems with the performance of on-site systems, or where there is an actual or potential risk to the environment from higher densities of on-site systems.

4. DISCUSSION

Discussion with the Regulators sponsoring this project indicates that each organisation views the issues from a slightly different perspective, though all face more or less the same set of problems – the management of existing systems, the administration of new applications and the control of potential pollution – with particular reference to the WFD. In Scotland, the initial priority appears to be location of existing systems. In Northern Ireland, the primary issues are the administration of the large number of new applications for single house systems and the assessment of the location and impacts of existing systems. In the Republic of Ireland, attention is focussed on the threat posed by OSWTSs to vulnerable water bodies (and the identification of these water bodies against a background of other pressures). Nevertheless, in each case, the resolution of the perceived top priority problem will lead on to the need to consider the whole question of controlling OSWTSs. Figure 2 summarises the options available. It is stressed that each Regulator is aware of all these possibilities, though limitations in available resources has meant that: a) effort has not always been available to pursue all options; and, b) different approaches have been adopted by different administrations. It may not be possible to address all aspects of OSWTSs, but as part of this review it is worthwhile to consider each aspect. The main points are listed below under the headings “existing systems”, “new properties” and “actions”. Figure 2 illustrates the various issues and options.

Existing systems

Here there is a need to locate all existing OSWTSs and to make best use of the information once it is available. In many areas there is a lack of knowledge about:

- the location and age of on-site systems;
- their state of maintenance;
- the extent to which any such systems are in groups (and hence might pose a cumulative risk of pollution);
- the vulnerability of the receiving environment (this includes the soil type, thickness, permeability, proximity to watercourses, available dilution, proximity to water abstraction points, SPAs etc);
- other pressures that might compete with OSWTSs for regulatory attention.

Once this information is available, the next step is to use it to formulate a management strategy for existing systems. This is discussed under actions below.

New Properties

The fact that, in the UK at least, new properties require some form of authorisation offers the opportunity to capture data on their nature and location in order to assess the risk they pose and to respond accordingly. This process is underpinned by the provision of clear guidance about the type of systems that might be acceptable, the different conditions that have a bearing on the choice of system and the information required to process an application. Whilst existing guidance is of high quality there is always room for improvement - e.g. the inclusion of more information concerning the constraints that might apply and the performance standards that systems might be expected to achieve. The use of independent experts as currently used in the Republic of Ireland (acting on behalf of the applicant) to compile and submit the application, with periodic assessments by the Regulator seems to offer the best possibility of streamlining the application process. The establishment of a group of experts would require a process of training and registration to be set up but would reduce the administrative burden on the Regulator (as well as ensuring an appropriate regulatory role to be adopted). On receipt of applications the

Regulator (environment agency or local authority) will be in a position to determine whether or not an authorisation could be issued – in the light of data provided in the application as well as background information relating to water body status, vulnerability and wider river basin management planning issues.

Actions - what to do about OSWTSs

One of the areas where there is most concern is that of what (if anything) to do about OSWTSs. Action currently taken in relation to OSWTSs is usually limited to reactive responses to complaints of smells or reports of pollution. In such cases pollution control officers are likely to visit the relevant area to make an assessment. This can be difficult for two main reasons.

The first is logistical. There may be so many septic tanks that the task of visiting them all is too large to be resourced. Even when a complaint narrows down the area of likely investigation, lack of reliable data concerning the location of all tanks makes it difficult to design a comprehensive assessment programme.

The second problem is technical. The outflow of the septic tank itself does not necessarily reflect the likely impact of the final (post soakaway) effluent, which may be of much improved quality. Although examination of the post tank effluent might be a means of determining whether of not desludging has been neglected, the overall impact cannot be determined in this manner. Access to the final effluent of a septic tank and soakaway is usually impractical because the effluent is released below ground and subsequently travels to groundwater or to a nearby surface waterbody, depending on the local conditions and site layout.

Hence current assessments of pollution from septic tanks tend to rely on more indirect or circumstantial methods. For example, septic tanks might be seen as a source of pollution where a type of pollution (e.g. by nutrients) cannot be attributed to other sources and where observed impacts tend to be co-located with a concentration of septic tanks. Dye tests offer a means by which pollution can be confirmed (and demonstrated to the householder). Alternatively the use of modelling together with knowledge of the likely quality of effluent, taking into account the overall likely treatment performance, might suggest that OSWTSs constitute a serious risk of pollution.

In order to minimise potential pollution, a number of actions need to be considered. How these issues might be formalised into a regulatory policy remains to be decided, but the important factors are:

- Appropriate construction, siting and maintenance of drainage systems. Drainage systems should be of a size that allows adequate percolation of the volume of effluent treated and that facilitates adequate removal of residual contaminants. This raises the questions of how construction might be supervised and how testing of the suitability of a given site can be assessed in a manner that is simple, accurate and fair;

- Maintenance. Septic tanks need to be desludged at appropriate intervals [recommendations vary – desludging is suggested at least once a year according to PPG4, but a minimum of once every two years is specified by SEPA, once a year by EPA] and provided with a suitable form of secondary treatment (usually a percolation area) – that is, one that is not subject to ponding, flooding or immediate run-off to a watercourse or groundwater body. Other treatment systems are subject to different maintenance needs.

Assessment of impact

Improved tools for impact assessment are needed. For any given treatment system, the likely impact on receiving waters (groundwater or surface water) will depend on:

- the initial pollution load and the level of treatment achieved (this depends on the system itself and the conditions of maintenance and operation) – see EN 12566;
- the attenuation of contaminants between the effective discharge point and the point at which the receiving water is impacted (a characteristic of the location of the system, the nature of the soil (percolation characteristics) and distance to the receiving water;
- the type of receiving water (river, lake, groundwater);
- the volume of effluent and the available dilution in the receiving water (a characteristic of the system and its location);
- factors that affect the above – such as weather, season – and those that affect the impact itself, such as season (organisms that might be affected may or may not be present, depending on the time of year);
- the variability of factors such as volume, concentration and flow.

These factors represent a complex set of variables that make it difficult to envisage widespread detailed evaluation of individual treatment systems. Nevertheless, consideration of the above should make it possible to formulate some simple guidelines on which to base a worthwhile evaluation of likely impact. As noted above a fundamental requirement is to be able to locate all septic tanks. Once this has been achieved it is then possible to consider the likelihood of impacts. This could be approached in three ways.

The most promising approach is that by which the process of risk assessment is facilitated by incorporation of data into a GIS-based electronic format. This is invaluable as a means of prioritising action and ensuring that such resources that might be available can be used to best effect. Such an approach is already in use in the Republic of Ireland. – Groundwater Protection Schemes. The use of GIS mapping tools and data resources such as postal addresses and census data offers the possibility of a cost effective assessment of the location and density of OSWTSs. Combination of this with data on soil and subsoil type and depth, aquifer classification, flood management information etc, in conjunction with the use of modelling and cross reference to River Basin Management Plans, provides a powerful tool by which to prioritise risks posed by OSWTSs. Of course it would be still possible, but not so effective, to prioritise risk without the use of GIS – by use of a database of OSWTS locations.

Once priorities have been assigned, the action taken could vary from the purely administrative, requiring records of maintenance, reissue of more stringent consents, limitation on the further installation of OSWTSs, to monitoring and practical assessment of contamination. The approach of trying to identify impacts from monitoring data is limited by lack of data (and lack of time to evaluate data). It may not be possible to evaluate contaminant levels in watercourses and, by excluding the possible effects of other sources of pollution, to determine the areas where septic tanks are the most likely cause of observed pollution. However, this approach, rather than trying to check OSWTS discharges, has the benefit of targeting the most likely sources of problems (and therefore not wasting effort on areas where there is not significant pollution). However, the drawback of this strategy is that there is a danger that it might be implemented in a purely reactive way that does not fit in with the philosophy of the WFD - in which a more positively interventionary approach to water management is encouraged.

Legislation

One point worth emphasising about the different regulatory regimes is that the UK requirement for a consent for any discharge to surface or groundwater provides a powerful means of controlling discharges. For OSWTSs legislation on consenting can b used to ensure adequate effluent treatment system design and also to enforce improvement where problems occur. However whether or not it is feasible to use the legislation as the primary means of controlling OSWTSs is another matter. It is arguable that in many areas it is not cost effective to enforce and monitor compliance with this legislation for OSWTSs - the effort required is not justified by the benefits – and that other parallel approaches are needed.

In the Republic of Ireland exemption from licensing under Section 4 of the Water Pollution Act is allowed for domestic sewage discharges not exceeding 5 cubic metres in volume in any period of 24 hours which is discharged to an aquifer from a septic tank or other disposal unit by means of a percolation area, though building regulations provide substantial guidance about the design and construction of such systems.

These differences will lead to different ways of formally dealing with OSWTSs – though the overall aim of prioritising action where pressures from OSWTS are of primary concern is the same.

4.1 Comments on Other Countries Approaches

From the information obtained for relatively few other countries it can be seen that OSWTSs are recognised as a potential problem, wherever they constitute a substantial part of an area's sewage treatment infrastructure. The main strategy for old systems seems to be inspection – though few sources are frank about the two critical issues a) of not knowing where OSWTSs are and b) the costs of a system of inspection and follow-up. For new systems the approach is to establish a system of permits either for the specification of any system to be installed (see EN12566) or for a standard of effluent treatment to be achieved. The problem with the former approach is that a given specification for an OSWTS does not in any way guarantee that the effluent will not pollute the receiving environment (treatment system performance is relatively poor in terms of contaminant removal; it is unreliable and sensitive to operational parameters. Plus the sensitivity of receiving waters varies).

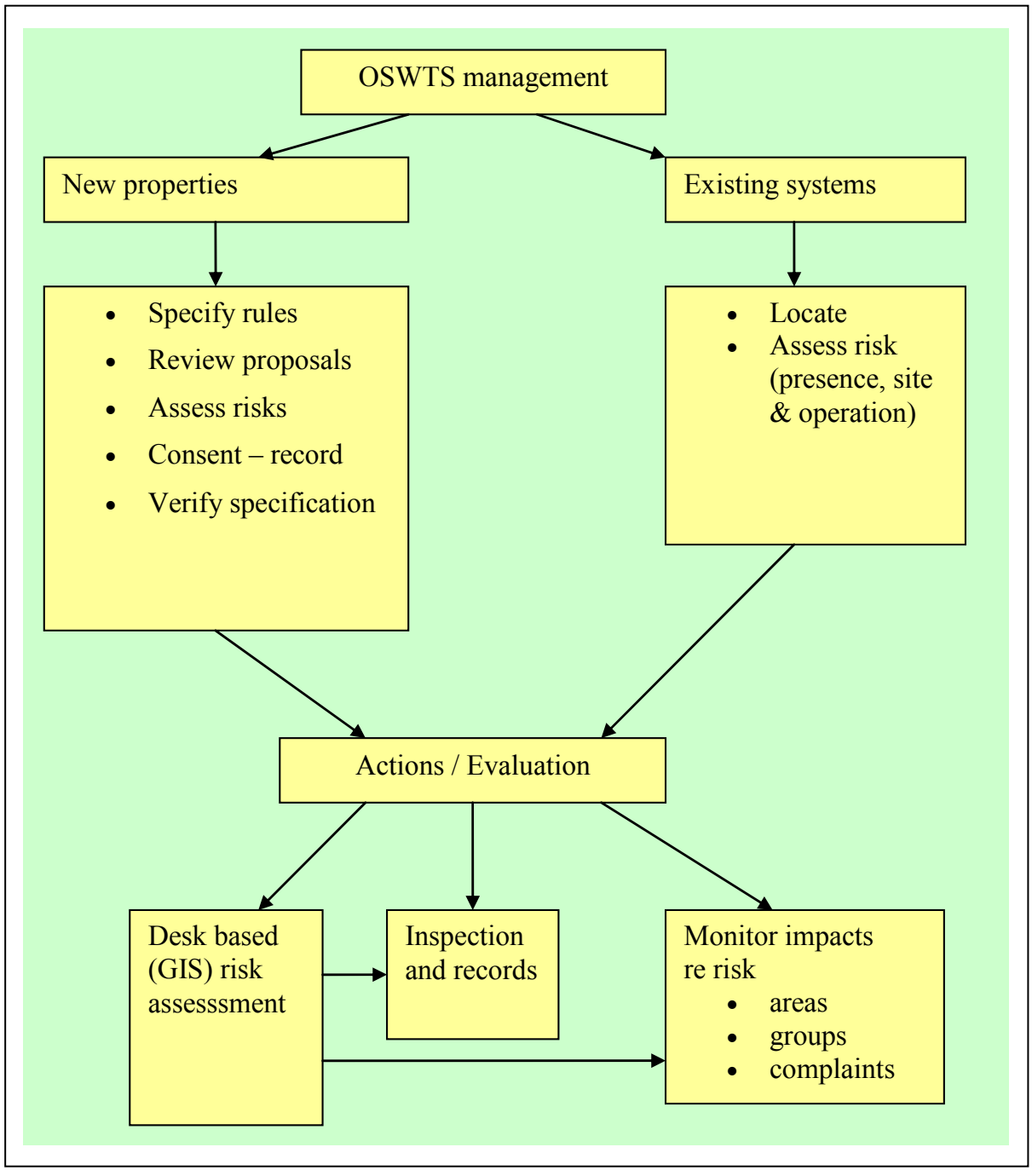
4.2 European Standardization of Small Wastewater Systems

The development of a European standard for small wastewater treatment systems (CEN European Standard 12566) is on-going. The main headings of this report are:

- Part 1 (EN): Prefabricated septic tanks; (published in 2000, first amendment in 2003);
- Part 2 (CEN/TR): Soil infiltration systems; (published in 2005);
- Part 3 (EN): Packaged and/or site assembled domestic wastewater treatment plants; (published in 2005);
- Part 4 (EN): Septic tanks assembled in situ from prefabricated kits;
- Part 5 (CEN/TR): Pre-treated effluent filtration systems; (in preparation);
- Part 6 (EN): Prefabricated treatment units used for septic tank effluent; (in preparation);
- Part 7 (EN): Prefabricated tertiary treatment units; (in preparation).

Each section includes the following chapters: description of the scope of the standard, normative references, terms and definitions, specifications and requirements, evaluation of conformity and installation instructions. In addition, annexes of the five product standards, i.e. parts 1, 3, 4, 6 and 7 include descriptions of the necessary testing procedures (e.g. water tightness test, treatment efficiency test, structural behaviour test). Parts 2 and 5, are codes of good practice, describing methods of construction for small wastewater treatment system (infiltration and different filter beds with or without reeds).

Figure 2 Flow chart for OSWTSs



5. DRAFT RECOMMENDATIONS

The principal objectives of the initial part of this project were to formulate recommendations concerning policy and legislation with respect to OSWTSs, to identify areas in which more effective working relationships between the relevant organisations would improve the efficiency and effectiveness of OSWTS planning, consenting, regulation and enforcement and, for each such area, the appropriate actions, actors, relative timescales and priorities.

It is not considered feasible, or particularly necessary, to consider changes in legislation, so the recommendations given below are made on the basis of addressing the management of OSWTSs, both in the light of current problems and in order to respond to the developing needs of the WFD.

It is strongly suggested that any agreed proposals are made part of a formal policy towards the administration and regulation of OSWTSs which would also include a code of practice. A code of practice would help to inform the different stakeholders, make the regulatory process more transparent and reduce inconsistency in the application of policy.

Existing systems

1. Establishing the locations of existing systems should be prioritised in relation to the perceived data gaps. All three regulatory bodies (NIEA, SEPA and EPA) have concerns in this area and until there is adequate confidence about the number and distribution of OSWTSs the risks and pressures they pose cannot be fully evaluated. This information can only be made best use of if it is collated and presented in a form that makes it possible to respond to risk and assess the current position and future developments in an informed way. To this end, it is recommended that OSWTS locations should be incorporated in a GIS system that can be used to locate existing systems and to assess the risks they pose to groundwater or directly or indirectly to surface waters.

   The use of mapping technology is recommended as part of the development of wider strategies to control pollution because it can be used:

   - to identify the pollution pressures in an area and to aid in an assessment of the relative importance of contamination sources;
   - to assist in the assessment of risks posed by new discharges (including OSWTS applications) that might increase existing pollution risks; and
   - to help in the prediction and diagnosis of the causes of potential future pollution thereby contributing to the prioritisation of remedial measures taken under the WFD.

   This process would be greatly assisted if all consent-related data (including maps) were transferred into an electronic data base format;

2. It is proposed that more formal arrangements are made for a systematic evaluation of existing OSWTSs. This does not necessarily mean an exhaustive programme of inspection or monitoring. Although some other countries in a similar position claim to have gone down this path, whether or not the proposed programmes are carried out fully is debatable. A more effective approach would be to use data on the location of OSWTSs in conjunction with other information to prioritise inspection and surveillance. This other information would certainly include the mapping and characterisation of water

bodies already undertaken (and ongoing) for the WFD – in order to facilitate an evaluation of OSWTSs in relation to other pressures and to ensure action on OSWTSs is taken in the knowledge of the wider issues. Other key inputs to this prioritisation process would be data on soil type and depth, information on the age of properties (and hence OSWTSs themselves) and any data on maintenance;

3. Means by which annual maintenance of OSWTSs can be ensured should be considered. The ready availability of desludging services (eg in Northern Ireland from NI Water) is helpful in this respect, but the requirement to take advantage of such services would promote best practice operation of OSWTSs. In the Republic of Ireland, an element of compulsion has been proposed by means of the introduction of local authority bye-laws. The issue of cost is obviously important here. Nevertheless, it is difficult to envisage a worthwhile change in approach that would be of negligible cost. The need for costs to be in proportion to risks and likely benefits (in comparison with other WFD-related measures) has to be borne in mind. Two other approaches might be of value:

    - dischargers might be required to produce evidence of satisfactory maintenance whenever consents are reviewed; and

    - a programme of reviewing the maintenance records of all OSWTSs might be established. The disadvantages of all these "across the board" policies are that they are administratively burdensome and, because they would need to apply to all OSWTSs, they would not target areas where OSWTSs pose the greatest risks. Overall, it is recommended that these measures be considered and that recommendations 1 and 2 above are given priority;

4. As a low-cost means of locating unregistered OSWTSs, the existing policy of ensuring that all banks and building societies are reminded (or made aware) of the requirements of pollution control legislation should be continued. This will mean that the sale of properties will prompt consideration of the need for a consent.

New applications

The role played by OSWTSs in the future development of rural communities will be decided on the basis of a range of factors to do with the chosen policy towards rural development. Although control of water pollution is an important consideration, it is likely that wider social and economic issues will eventually determine the number, type and distribution of OSWTSs. For example, a policy that favours development of rural centres involving groups of houses will encourage the installation of larger package treatment plants serving several houses. This is likely to be more readily managed and, for a number of reasons, could tend to result in treated effluents of better and more reliable quality than an equivalent number of septic tanks (though it would be more expensive). Conversely, a policy for more dispersed housing will favour more septic tanks which might have the advantage of dispersing the load of possible contamination leading to a lighter overall impact. Unless water pollution is clearly an issue of overriding importance, which might be the case at some locations, it is probable that the response of the environmental regulator will need to be flexible enough to deal with a range of different circumstances.

1. Improved access to data on OSWTSs (as proposed above) will encourage better interaction between the planning process and environmental regulation, and better enable the assessment of and response to pollution risk. It is recommended that agencies examine ways in which responsibilities that are divided between planning and pollution control can be coordinated more effectively. In particular, the involvement of environmental regulators early in the planning process is seen as a priority – to avoid the

situation where planners might have to take a view about whether or not a consent to discharge might be issued. Emphasis should be placed at the planning application stage on the requirement for discharges to be consented. It should be a requirement for applicants for planning permission to make an initial assessment of the likely suitability of their proposed method of effluent treatment and to provide details of this with their application. This should include notification of the regulator of future applications for a consent to discharge early in the planning process. This is particularly important in order that an assessment of likely impact can be made in the context of the river basin management plan. The implementation of the WFD means that the suitability of OSWTSs cannot be determined on the basis only of the property concerned, but must take account of wider issues. This is implicit in guidance such as PPS14, but close attention to the integration of pollution control measures into the planning process is recommended;

2. It is recommended that improved guidance on the specific information required as part of each application and the testing/assessment of each site should be considered. The information needs for new applications should be considered and incorporated into a formal assessment of new applications. This has been taken forward in guidance provided by a number of authorities eg in Northern Ireland in PPG14 in the SEPA Guidance PAN73 and EPA Consultation document of 2007;

3. Responsibility for the preparation of applications should be placed on the applicant in order to reduce the administrative burden on regulators (this is already the case in the Republic of Ireland) and to avoid their having to give specific guidance to individual applicants. It is intended that this will lead to the availability of independent guidance on effluent treatment, so that all factors relevant to an application have been considered and appropriate measures taken before the consent to discharge application is made. If possible, the use of an approved agent should be made mandatory. A set of qualification criteria for an approved agent or adviser on effluent treatment should be developed. These criteria should include training and a specification for soil percolation testing. This should be supplemented with a code of practice and an approved list of advisers/assessors who will act as agents in the application for consents to discharge. Qualified agents will be expected to comply with the code of practice such that applications received are ready for assessment by the regulator. Provision should be made for agents who fail to submit satisfactory (or accurate) applications to be removed from the approved list; In sensitive areas a hydrogeologist expert would be recommended to undertake such work/inspection.

4. A map referenced database should be developed for the results of site assessments and associated decisions, including details of sites deemed unsuitable for OSWTSs. This should be used as a reference to identify anomalies in site assessments. It will also help to identify areas which are unsuitable for installation and operations of certain types OSWTSs (eg septic tanks). It might be decided to define an area as unsuitable for a number of reasons, for example:

    - unfavourable characteristics of soil type or geology, eg a) unduly low permeability leading to retention of effluent and risk of pollution at times of high water table or flooding, or b) unduly high permeability leading to vulnerability of groundwater to pollution, especially in areas near to sites of groundwater used for potable purposes;

    - proximity of the proposed discharge to a receiving water body that is defined as particularly sensitive to pollution (and where it is judged unlikely that the effluent will be of sufficiently high quality);

- the presence of existing sources of contamination, including OSWTSs, where it is considered undesirable to add to current pressures.

- Whilst the decision to classify a site as unsuitable for a particular treatment system should be taken on the basis of local conditions (and hence no definite rules of classification would be appropriate), regulators should seek to develop common guidance for the assessment of suitability and for recommendation of alternative options to dischargers.

It should be recognised that environmental issues are not the only criteria by which the suitability of further dispersed development might be decided. However, whenever further development is approved, measures to deal with any consequent environmental issues should always be part of the overall plan. In the relatively small proportion of cases where effluent treatment and disposal is more problematic because of an unsuitable receiving environment, these measures are necessarily going to be more elaborate. Consideration may have to be given to more advanced (and more expensive) approaches to effluent treatment or disposal.

5. The recording of the location and circumstances of the site assessment, including reference to key criteria and the results of tests is intended to make the assessment process transparent and to make it possible to demonstrate to different applicants that assessment criteria have been applied fairly. An archive of assessments should be used to establish a more general overview of why certain sites or areas might be deemed unsuitable for (further) development of OSWTSs and help to identify receiving environments (surface waters and groundwaters) that are most vulnerable to pollution. This should also assist in the processing of assessments; resort to lengthy and expensive testing or assessment might be minimised if records show clearly that the outcome of previous evaluations has been unfavourable;

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APPENDIX 1

Notes of a Project Workshop held on 11/11/2008 at NIEA Klondyke Centre, Belfast.

This workshop was held with the intention of providing a wider audience of interested parties with an opportunity to comment on the content of this report. The notes below are an agreed summary of the discussions held as part of the workshop.

Overall, there was no disagreement with main content and conclusions of this report. The following points were made by workshop participants.

One key area where improved practices could be considered is that cooperation between environmental regulation and with planning should be improved. It was generally recognised that the raising of serious environmentally-related objections at a late stage in property development (ie when the property is already built) is undesirable. Refusals of permission for development on the grounds of effluent treatment or disposal are problematic. An improved level of concerted action in the planning process is a priority.

Regulators need to concentrate on the specification of required water quality – based on risk assessment procedures. This may require new technological treatment solutions in difficult cases.

A three phase approach to dealing with OSWTSs was envisaged:

- New applications – it is important to address these issues including the emphasis on owner responsibility plus trained expert input;
- Old systems – these should be dealt with on the basis of risk prioritisation;
- Measures to ensure better use of existing monitoring data in assessments should be considered.

It was recognised that different regimes under different regulators should prompt different approaches – depending on the nature of local issues and the measures already in place. The question was raised whether or not policy should take account of the different priorities of limiting any unwanted proliferation of OSWTSs or of promoting better integration with utility-based sewage treatment? The answer to this and desirability/feasibility may differ in different areas.

It was noted that there was a need to address:

- Treatment technologies - are these up to current best practice?
- Permitting – assessment, training,
- Early assessment of suitability of site eg hydrological performance etc;
- Checks and monitoring of existing systems (risk directed) and how these lead to enforcement action;
- Further research into new treatment techniques, use of tools for risk assessment, IT management aspects.