

REGULATION OF DISCHARGES FROM SEWERAGE TREATMENT SYSTEMS SERVING SINGLE HOUSES

Mark Livingstone and Richard Coey, Northern Ireland Environment Agency

Introduction

The Northern Ireland Environment Agency (NIEA) of the Department of the Environment is responsible under the Water (Northern Ireland) Order 1999 for promoting the conservation of water resources and the cleanliness of water in waterways and underground strata.

NIEA is responsible for the implementation and enforcement of environmental regulations, many of which require operators and their activities to be authorised and monitored where appropriate. The Agency is required to achieve full cost recovery for such regulatory functions through the application of fees and charges on customers we regulate.

One of the ways in which NIEA exercises these functions on behalf of the Department is by controlling effluent discharges to waterways or the underground stratum, through the granting of discharge consents.

Applications for single domestic dwellings have averaged almost 3000 per year since their introduction. These require thorough scrutiny before a consent can be granted in order to protect the aquatic environment. Where an application is for discharge to the underground stratum, (soakaway) the applicant must arrange for soil percolation tests to be carried out. The results are submitted to NIEA to determine if the ground is suitable and also the length of the soakaway that will be required to operate an efficient soakaway.

Legislation

On 24 August 2001, the Water (Northern Ireland) Order 1999 ('the Water Order') replaced the Water Act (Northern Ireland) 1972. Under Article 7 of the Water Order, it is necessary to obtain the consent of the Department of Environment to make a discharge from a house or other premises, to a waterway or to the underground stratum. This is a legal requirement and failure to do so is an offence under the legislation. The requirement to obtain a consent to discharge applies to all proposed discharges and also to pre-existing discharges, irrespective of the date of commencement.

Since 24 August 2001, all new discharge consents have been granted under the terms of the Water Order. However, discharge consents previously granted under the terms of the Water Act that were 'live' at 24 August 2001 became valid under the terms of the Water Order.

Under the terms of Article 11 of the Water Order, and in line with Government Policy on the 'Polluter Pays' principle, the Department has the powers to raise, through a scheme of fees and charges, sufficient funds to cover the Department's costs relating to:

- the processing of all applications for discharge consent, and also
- the monitoring of all discharge consents which are checked by NIEA for compliance with consent conditions under the Department's compliance assessment monitoring programme.

The application fees element of the charging scheme was implemented on 29 October 2001, and applies to all persons making application for consent to discharge, for review of an existing consent or for the transfer of an existing consent.

Under Schedule 1 paragraph 8 of the Water Order, a person selling or transferring ownership of consented premises is required to notify the Department within 21 days of the transfer occurring. NIEA charges a fee to the person who will take on responsibility for the

discharge consent, to cover the administrative cost of preparing and re-issuing the consent.

Review

There has been significant concern raised by local stakeholders during the River Basin Planning communication processes surrounding the impact of septic tanks on water quality. Based on this and the Agency's desire to review the regulatory process in terms of the Better Regulation Agenda, a review was launched in 2009, with SNIFFER (Ref) and North South Share (Ref) projects determining the evidence base.

Three discrete work packages were undertaken for these projects, covered under the following headings;

1. Diffuse source septic tanks assessment - NS Share
2. Legislative review/Responsibilities - SNIFFER
3. Review of Impacts - SNIFFER

The conclusions and recommendations from all three reports are presented below;

Review of Diffuse Source Septic Tanks Assessment

Information on waste water treatment in Northern Ireland is recorded in several databases, belonging to NIEA and other agencies, for operational, regulatory and reporting purposes. However, the baseline for this project was the NIEA Water Management Unit's Domestic Consents Database. Due to the poor quality of the data in this database, specialist expertise in the area of address matching and database cleaning was required for this project.

Automatic address matching was completed on NIEA Water Management Unit's Domestic Consents Database. The automatic address matching process has successfully matched 47.5% of the records in the Domestic Consents Database. The remaining 52.5% (55,301 records) must undergo interactive cleaning. A customised interactive cleaning methodology is provided in a separate document – 'Database Cleaning Report and Methodology'. The process is built around QuickAddress Batch but other resources are also used including GIS mapping, NIEA's gazetteer website and the original paper-based applications.

Recommendations

1. Interactive address matching on the remaining unmatched records must now be undertaken by NIEA. The time and effort required to complete interactive cleaning is considerable. It has been estimated by the contractor that one person could validate the database to between 65 and 75% over a period of up to two years. Options to consider would be date limiting, i.e. limiting back to a specific year.
2. Whether or not NIEA elect to undertake the lengthy interactive matching process, the current domestic consenting application process should be reviewed to ensure that future entries into the Domestic Consents Database contain all the required information. Addresses should be entered in their full, postally-correct state and spatial references should be included. QuickAddress Batch, GIS and NIEA's gazetteer tool can be used for this purpose. This would require a simple redesign of the IT package and an IT business out.
3. At present, less than half of the records in the Domestic Consents Database have verified spatial coordinates and can be mapped. Therefore, consideration should be given to applying the methodology developed by the Western River Basin District (WRBD) to generate a map of unsewered properties.

Legislative Review/Responsibilities

Objectives

- A. to examine legislative requirements and responsibilities and identification of best practice in relation to On Site Wastewater Treatment systems (OSWTS) and,
- B. to review the scientific literature on the impacts of OSWTS and small Wastewater Treatment Works (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.

Key findings and recommendations

1. Existing OSWTSs are located on a GIS database that will facilitate a rational apportionment of risk in relation to other environmental pressures and sensitivities;
2. 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;
3. 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;
4. 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;
5. 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.
6. 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);
7. Where codes of practice are not already in place 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.
8. The concept of licencing domestic consent needs considered for risk modelling under Better Regulation principles.

Review of Impacts

Objectives

The objective of this project is to carry out a review of the impacts of OSWTSs and small WWTW and in particular;

- A. The loadings – and in particular, the nutrient (nitrogen and phosphorus) loadings – and the microbial loadings associated with OSWTSs discharges and small WWTW.
- B. The cumulative loadings of discharges from OSWTS and small WWTW within catchments.
- C. The impacts of discharges from OSWTS on water quality and ecology, with particular regard to the issue of eutrophication, and to factors affecting the risk of significant discharge impacts (e.g. size/nature of discharge and receiving water, chemical form of nutrient, discharge/timing/consistency).
- D. The relationship between OSWTS maintenance and the impact of discharges on water quality.
- E. Elucidate methods used to estimate/ quantify the nutrient loadings in discharges from OSWTS and small WWTW and their impacts on water quality, and provide recommendations on a suitable methodology for undertaking those tasks.

Key findings and recommendations

- 1. The impact of OSWTSs on water quality and ecology is varied and unpredictable. Lack of information on the distribution and condition of these systems has been the main obstacle in assessing the contribution of OSWTSs to water pollution. Furthermore a lack of research relating specifically to the impact of OSWTSs on a national scale has meant that assumptions have had to be made based on general water quality monitoring data. The use of such data is limited in that the impact of OSWTS cannot be isolated from other pressures.
- 2. Impact of septic tanks arises from the discharge, directly or indirectly, of three main contaminants: nitrates, phosphates and microbiological pollutants. In terms of impacts, nitrates and phosphates are more of a concern for ecology, whereas microbiological contaminants can have more serious consequences for human health if allowed to enter drinking water supplies.
- 3. Significance of OSWTSs vary between and within countries, in general contaminant loadings in Northern Ireland are lower than in Scotland, but the importance of OSWTSs appears to be higher. Lack of data for ROI makes a comparative assessment difficult.
- 4. Microbiological contaminants are of greatest concern of the three pollutants due to their implications for human health and as a result of the high concentrations which are able to reach surface and ground waters in comparison to those from other sources. Numerical modeling studies carried out by SNIFFER (2006) indicate that impacts are highest in Northern Ireland, where OSWTSs contribute over 40% of diffuse microbiological contamination in comparison to less than 25% in Scotland. Comparable data for ROI are not available.

5. The contribution of OSWTs to nitrate pollution is relatively small when compared to other sectors. This ranges from approximately 4% in Northern Ireland and the Republic of Ireland to 6% in Scotland.

Outcome

NIEA has now completed a review of how applications for single domestic dwelling consents to discharge are handled and has redesigned the application process bearing in mind the findings of the projects above. The new processes are aligned to deliver against the ethos set out in the current draft Government White Paper on Better Regulation and apply to two distinct discharge types:

1. Application for Consent to Discharge to the Underground Stratum; and
2. Application for Consent to Discharge to a Waterway.

The restructuring and revision of application fees for single domestic dwellings has been developed with the aim of recovering the full costs associated with applying the legislation.

REVISED REGULATION PROCESS

Planning and Consent

Applicants should be aware that all discharges of sewage effluent require consent under The Water (Northern Ireland) Order 1999 which is independent of planning legislation. It is recommended that Water Order consent is applied for before planning permission. This ensures that WMU will have assessed the site's suitability for sewage disposal before being asked by Planning Service to respond to the planning consultation. Should the applicant bypass WMU and apply for planning permission, WMU will not be in a position to respond to the planning consultation until an application for consent under The Water (Northern Ireland) Order 1999 has been determined, which may delay the planning decision.

Policy Statement

The Department's preferred option for sewage disposal is discharge to public sewer. Where the applicant can demonstrate that discharge to public sewer is not practicable, the sewage effluent should be discharged to the underground stratum via a sub-surface irrigation system, provided the ground conditions are suitable. Where the ground conditions are unsuitable, site improvement works should be undertaken to determine whether discharge to underground stratum can be accommodated. Discharge to a waterway may be allowed where the ground conditions are unsuitable for discharge to underground stratum.

Application for Consent to Discharge to the Underground Stratum

Implementation of the new processes will reduce the technical and administrative burden on both the applicant and the Department in processing applications for consent to discharge to the underground stratum. This has resulted in a small reduction to the application fee. Where the applicant can demonstrate that discharge to a public sewer is not practicable, the sewage effluent should be discharged to the underground stratum via a sub-surface irrigation system, provided the ground conditions are suitable.

The application must clearly demonstrate that the proposal meets all the criteria listed below so that consent to discharge can be granted based on standard consent conditions. The specific details of the criteria required for Assessed Registration are consistent with extant legislation, current industry Codes of Practice and applicable British Standards.

1. Connection to the Northern Ireland Water Limited foul sewerage system is not feasible or practicable, or is not within 30m from the curtilage of the dwelling.
2. The discharge is solely of sewage from a single domestic dwelling and contains no surface water drainage.
3. The septic tank to be installed is certified as manufactured to BS EN 12566-1 or the packaged wastewater treatment plant to be installed has BS EN 12566-3 certification and has a removal efficiency for Biochemical Oxygen Demand of at least 95%.
4. Any sub-surface irrigation system is designed and installed in accordance with Departmental guidance, which is consistent with BS 6297:2007 + A1:2008.
5. Ground conditions are appropriate to offer effective treatment and dispersal of any sewage effluent discharged (percolation test average Vp value to be > 15 <100). Any percolation test must be undertaken by someone who is familiar with the requirements of BS 6297:2007 + A1:2008.
6. Any drainage field is appropriately sized in relation to the reported percolation test results.
7. The discharge is not within 50m of any potable water supply.

Application for Consent to Discharge to a Waterway

The Department must be satisfied that any treatment system proposed will provide adequate protection to the receiving waterway.

It is proposed to move towards non-numeric consents for discharges to waterway from single domestic dwellings. Therefore any consent issued for systems not in place at the time of application will require compliance with the relevant British Standards (currently BSEN 12566:2005 Part 3).

The requirements for discharge quality are based on the size of the catchment area of the waterway into which the discharge is to be made. In general, the smaller the catchment area of the waterway at the discharge point, the lower the flow in the waterway, and hence the lower the dilution available at the point where the effluent will be discharged. Therefore tighter discharge limits must be imposed for lower flowing waterways to reflect the fact that there is less available flow to dilute the effluent to a level which enables achievement and maintenance of the quality objectives for the waterway.

As stated, it is proposed to move towards non-numeric consents, therefore an applicant must demonstrate that any proposed treatment system can achieve a minimum percentage reduction in pollutant loading. This is measure in terms of Biochemical Oxygen Demand (BOD) removal.

The proposed treatment system must carry the appropriate CE marking, described in Annex ZA.3 of BSEN 12566-3:2005, demonstrating the appropriate treatment efficiency. The laboratory undertaking the testing must be able to demonstrate that they are a notified body for Part 3 of BSEN 12566:2005. As stated the treatment efficiency required will be determined by the dilution afforded by the proposed receiving waterway. This information will be obtained in the form of a catchment size.

The table below details the required minimum treatment efficiencies in relation to catchment size.

Catchment size of receiving waterway at discharge point	Minimum treatment efficiency* required (% Biochemical Oxygen Demand (BOD) reduction)
Greater than 2km ²	95%
Less than and including 2km ²	97.5%**

Table 1 Required Treatment Efficiencies in Relation to Catchment Size

** Treatment efficiency based on a maximum influent loading of 500mg/l, as stipulated by Annex B 3.2 of BSEN 12566:2005 Part 3.*

***or 95% followed by an appropriate form of tertiary treatment designed to further reduce BOD concentration to give an overall reduction of at least 97.5%.*

It is recognized that there are treatment technologies available for which the appropriate British Standard has not yet been agreed and adopted. This may include systems such as peat filters, sand filters, willow filtration and reedbeds. Where such systems are to be considered, the applicant must satisfy the Department that the treatment system proposed will provide at least the level of pollutant removal required for the size of the catchment into which the discharge is to be made.

Where a discharge already exists but is not causing a visible impact on the receiving waterway, numeric discharge standards will be set commensurate with the optimum performance of the existing treatment system. No upgrade of the treatment system will be required. However no standard less stringent than a 40 mg/l Biochemical Oxygen Demand and a 60 mg/l Suspended Solids should be set.

Should an existing discharge be determined as causing a visible impact on the receiving waterway, the system will require upgrade to a system compliant with the requirements of BSEN 12566:2005 Part 3, which demonstrates the appropriate treatment efficiency.

Considerations

Apart from the site requirements laid out in this document, NIEA has other considerations to take into account before determining whether or not to consent a discharge. These include the density of dwellings in the immediate vicinity which are not on mains sewerage, or any Natural Heritage (a Directorate of NIEA) designations which may restrict the site.

It is recommended that the applicant uses the services of a suitable engineer/architect to undertake:

1. Completion of the application and sign off.
2. The site suitability examination.
3. Design and installation of the sewerage system serving the domestic premises.

It may also be useful to commission the services of a professional hydrogeologist to assist with site suitability assessment.

It is an offence under the Water (Northern Ireland) Order 1999 to knowingly or recklessly make a statement which is false or misleading in any material particular for the purpose of obtaining a discharge consent. The Department will not hesitate to instigate enforcement action should an applicant be found to have willingly provided such information.

Failure to install the sewage treatment facilities in the manner described in the application (or in the case of existing systems to accurately describe the current condition on site) or to maintain as per the consent conditions shall be considered as non-compliance and therefore an offence under of the Water (Northern Ireland) Order 1999. Where the Department deems that this is the case, the Department's consent to discharge may be declared invalid, and appropriate enforcement action taken.

Maintenance

Satisfactory long-term performance of the drainage field depends on correct operation and maintenance of the upstream system. The septic tank or sewage treatment works should be regularly desludged, and maintained and operated according to the manufacturer's instructions.

The septic tank or sewage treatment works should be inspected regularly (at least annually). The drainage field should be inspected on a monthly basis to check that it is not waterlogged and that effluent is not backing up into the upstream system. Particular care should be taken to avoid compaction or disturbance of the area over and around the drainage field. Maintenance information should be recorded and retained by the building owner and occupier.

Monitoring & Compliance

In order to offer effective monitoring and enforcement of compliance with consent conditions, a robust and proportionate monitoring program is required. Elements of an effective monitoring and compliance protocol include:

- The consent holder maintaining any Septic tank/soakaway/package wastewater treatment plant as a condition of the consent.
- A maintenance and service log of any package wastewater treatment plant being kept and offered to officers of the Department for inspection on request.
- A record of de-sludging of any system being kept and offered to officers of the Department for inspection on request.
- A program of compliance inspection visits by NIEA implemented to a selected number of new and existing single domestic discharges each year.

Selection of sites for compliance monitoring will include both new installations and existing systems.

- Inspections of newly installed systems will ensure installation and operation in accordance with application details and consent conditions. The inspection shall include visual inspection of all elements of septic tank or sewage treatment system.
- Inspections of a number of existing systems will help monitor operation in accordance with the consent conditions. The inspection shall include visual inspection of all elements of septic tank or sewage treatment system and a request to view documentation of de-sludging and maintenance.

Current NIEA Inspection Plan

Sites are currently prioritized on the following basis for compliance monitoring:

- Inspections to catchments that have historical pollution issues;
- Where domestic sewage effluent is considered an issue within a Local Management Area Action Plan under the Water Framework Directive River Basin Management Plans.

45 Water Quality inspectors employed on behalf of NIEA are trained and equipped too undertake the investigations on a regional basis throughout Northern Ireland. Currently there are approximately 1000 inspections of septic tanks as a result of applications or pollution issues undertaken on an annual basis with approximately 3000 undergoing some level of intervention, from prosecution, to Enforcement Notice, to Warning Letter and advice.

Future Proposals

NIEA are currently developing a risk based methodology using GIS to include the following parameters:

- Overlay Bad and Poor Water Framework Directive classified areas
- Overlay Areas of Special Scientific Interest, Special Protection Areas and Special Areas of Conservation
- Overlay Local Management Areas (LMAs) and map against priority LMAs, e.g. Kingsmill waterbody.
- Unconsented properties – Discovered by mapping sewerage and unsewered areas, overlaying a database of all known residential properties in the area, and checking against consent records; or by inspection; or incident reports.

This methodology will provide a specific number of targeted “higher risks sites that NIEA will incorporate into a wider inspection and monitoring plan for the regulation of discharges.

Enforcement/Intervention

Under the Water (NI) Order 1999, it is an offence to discharge effluent to waterways or water contained in any underground strata without the consent of the Department of the Environment (DOE). Discharge of effluent includes any sewage effluent from residential premises.

Domestic consent holders are notified when their discharge is found to be in breach of their consent conditions and are asked to investigate the reason for any exceedances, and to supply the Department with details of their plans to remedy the situation.

Where consent holders do not remedy the situation within a reasonable timescale, dye tests may be performed and/or samples may be collected with a view to prosecution for breach of consent.

Failure to comply with the conditions of a consent is an offence under Article 7(6) of the Water Order which can on summary conviction lead to a maximum fine of £20,000 or a maximum prison sentence of three months (two years on conviction on indictment) or both.

As Domestic properties are considered low risk sites the Department is mainly reactive to

any reports of unconsented domestic discharges or domestic discharges believed to be breaching their consent. Reports can come from members of the public, NIEA staff and authorised Water Quality Staff or members of other organisations who find problems in the course of their work.

Proactive monitoring is currently driven by river quality data held by NIEA. Areas which are in river catchments classified as poor under the Water Framework Directive come under the scope of targeted programmes aimed at finding problems with domestic discharges in the area in addition to industrial, water utility and agricultural discharges.

The Domestic Consent Breach Matrix, table 2, below directs the action taken by the Agency when Consent Holders breach their consent.

Complaint received/Issue noted	Dye test and/or sample pass				
	No further action				
Investigation to include dye test and/or sample taken	Dye test and/or sample fail	no response	no response	Dye test and/or sample pass	
	Warning Letter		Enforcement Notice	No further action	
			dye test and/or sample taken at end of notice period	Dye test and/or sample fail	Prosecution
		response received & timescale for works agreed		Dye test and/or sample pass	
	Advisory Letter	Advisory Letter		no further action	
				Dye test and/or sample fail	Dye test and/or sample pass
		dye test and/or sample taken at end of agreed period	Enforcement Notice	no further action	
		dye test and/or sample taken at end of notice period		Dye test and/or sample fail	Prosecution

Table 2 Domestic Consent Breach Matrix

References

1. Code of Practice: “*A Guide For Users Of Sewage Treatment Systems*”, ISBN 978-1-903481-13-4.
2. Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (The Habitats Directive)
3. Council Directive 2009/147/EC on the conservation of wild birds (The Birds Directive)
4. British Water Code of Practice, Flows & Loads 3, Sizing Criteria, Treatment Capacity for Small Wastewater Treatment Systems (Package Plants), ISBN 1 9034810 5 8
5. BS 6297:2007+A1:2008, Code of practice for the design and installation of drainage fields for the use in wastewater treatment. (plus any future amendments)
6. BS EN 12566-3:2005+A1:2009 Small wastewater treatment systems for up to 50 PT. Packaged and/or site assembled domestic wastewater treatment plants (plus any future amendments).
7. Building Regulations (Northern Ireland) 2000 (specifically Part N).
8. Environmental Protection Agency Code of Practice (2009), Wastewater treatment and disposal systems serving houses (p.e. \leq 10)
9. Environmental Protection Agency, Draft consultation on technical guidance for the registration of exempt discharges of sewage effluent to surface and groundwaters under the Environmental Permitting Regulations, 2010.
10. “NIEA procedure on dealing with Water (Northern Ireland) Order 1999 applications for discharge consents to small waterways” – **internal NIEA document**
11. The Conservation (Nature Habitats, etc.) Regulations (Northern Ireland) 1995
12. The Construction Products Regulations 1991
13. The Controlled Activities Regulations (2005) – Scotland (SEPA)
14. 2009, WFD96 Review of the Legislative Requirements and Responsibilities Relating to On-Site Wastewater Treatment Systems and Their Impact on Water Quality: Work Package A, B and C. Project funders/partners: SNIFFER, Northern Ireland Environment Agency, Scottish Environment Protection Agency, Environmental Protection Agency (EPA) Ireland, Northern Ireland Water, Department of the Environment Northern Ireland Planning and Environmental Policy Group.
15. North South Shared Aquatic Resource; Further Characterisation WP2.2: Refined diffuse source septic tanks assessment; Database Cleaning Report and Methodology